Attachment I – Hydrology Report: Drainage Study

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DECLARATION OF RESPONSIBLE CHARGE

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

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

William G Mack
R.C.E. 73620
EXP. 12-31-23

DATE

Drainage Certification

I hereby declare that no adverse impacts to neighboring property will result from drainage from proposed improvements within the project site.

William G Mack
R.C.E. 73620
EXP. 12-31-23

DATE

PASCO LARET SUITER & ASSOCIATES
CIVIL ENGINEERING + LAND PLANNING + LAND SURVEYING

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1.0 EXECUTIVE SUMMARY

1.1 Introduction

This Hydrology Study for the Kensho Housing project has been prepared to analyze the hydrologic characteristics of the existing and proposed project site, and to determine the existing condition onsite and offsite hydrologic characteristics that are generated on and conveyed through the proposed project site. This report intends to present the methodology and the calculations used for determining the runoff from the project site in both the existing conditions and the developed conditions produced by the 100-year 6-hour storm.

1.2 Project Description

The proposed development is approximately 4.56 acres. The subject site is located along Guajome Street in the City of Vista, California. The subject site consists of existing undeveloped lots on a hillside located adjacent to public right of way along the northern and eastern property lines. The property is identified as APN #179-093-18, 23, 30, 32, 34.

The property is geographically located at 33°11'43.1"N 117°14'24.7"W. The property is accessed from Guaiome Street. The site is bordered by Guajome Street to the North, NCTD Railroad right of way to the east, existing residential lots and Lado De Loma Drive to the West and existing residential lots to the South. The project site is located in the Carlsbad Hydrologic Area and more specifically, the Vista Hydrologic Sub-Area (904.22).

The site condition is divided into a single POC at the Northern corner of the site. Prior to reaching this, the site is broken up into 8 Basins. Basins 1-6 are tributary to 5 biofiltration structures along the eastern PL and one behind the proposed buildings along the western PL. Basin 7 is routed to a modular wetland and is considered unmitigated flow. The last Basin is considered self mitigating area that is also considered unmitigated flow. Note that all existing off site run-on will be captured by D-75 brow ditches and routed around the site to the same outlet location, ultimately maintaining existing drainage patterns.

Treatment of storm water runoff from the site has been addressed in a separate report- “Priority Development Project (PDP) Storm Water Quality Management Plan (SWQMP) for Kensho Housing” by Pasco Laret Suiter & Associates, dated October 2022. Hydromodification (HMP) analysis has also been presented within the SWQMP and analyze each site as separate entities.

Per County of San Diego drainage criteria, the Modified Rational Method should be used to determine peak flowrates. Methodology used for the computation of design rainfall events, runoff coefficients, and rainfall intensity values are consistent with the criteria set forth in the “San Diego County Hydrology Manual (SDCHM), June 2003.”

1.3 Existing Conditions

The current site is an undeveloped lot. Topographically, the site slopes North to North-east with slopes around 4:1. For purposes of Hydrologic analysis, this report analyzes the entire property limits and additional area downstream of the development to the ultimate single POC.

The site is situated upon 100% of Type C hydrologic soils, as determined from the Natural Resources Conservation Service (NRCS) Web Soil Survey.

Site runoff primarily drains from the South, South-west to the Northern, North-Eastern edge of the project via sheetflow over the undeveloped lot. Once across the Northern project boundary, runoff continues through existing 3' wide trapezoidal concrete brow ditches before being collected in an existing culvert south of Guajome Street. This then flows into Buena Vista Creek, and ultimately outfalls into the Pacific Ocean.

There is run-on that enters the project from the adjacent properties to the south and west. Any run-on will be captured in concrete brow ditches located along the southern and western edges of the proposed development and routed around the proposed site. Note that these brow ditches will route this flow into the existing concrete trapezoidal brow ditches to the North and East, matching existing drainage patterns. We therefore assume the western and southern property boundary to be the limits of the of the hydraulic analysis as everything outside of this will remain unchanged and would represent no change. This allows us to properly analyze apples to apples the existing and proposed site conditions within the limits of development to determine that the proposed project mitigates peak flow from existing to proposed conditions. These areas of offsite run-on will be analyzed at the final engineering stage of the project for brow ditch, pipe, and drainage ditch sizing.

Table 1.1 below summarizes the existing condition 100-year peak flows at the project's discharge locations. For delineated basin details, please refer to the Existing Condition Hydrology Map included as an Attachment of this report.

Table 1 below summarizes the existing condition design 100-year peak flows to the project's outfalls within the project site.

Table 1 – Summary of Existing Conditions

Drainage Basin	Node	Outfall Node	TC (min)	Intensity (inch/hr)	Drainage Area (acres)	C	Pre-100-Year Peak Flow (cfs)	Pre-100-Year Peak Velocity (fs)
POC-1	150	100	9.88	5.43	5.8	0.37	11.58	6.83
Total					5.8	0.37	11.58	6.83

1.4 Developed Conditions

The project proposes the removal of all the existing site improvements and the development of (4) four multi-family buildings, private roads, landscaping, and associated improvements. Site grading and drainage improvements, such as concrete brow ditches, catch basins, biofiltration facilities, and storm drain pipes will also be constructed.

Storm water runoff from the project site is routed to one outfall location (POC-1) in the Northeastern corner of the site at Node 100 as shown in the proposed hydrology exhibit (per Section 5 - Appendix). This outfall location is the same as existing conditions. Offsite stormwater from the west of the developed area will be routed with a concrete brow ditch around the proposed development to

not comingle any stormwater runoff. Prior to discharging from the project site, developed site runoff is intercepted by one of six biofiltration-detention basins (BMPs) that are used as onsite multiple purpose best management practice facilities. The BMPs serve to meet water quality, hydromodification and peak flow reduction requirements for the project site.

Unmitigated developed conditions are calculated as the proposed hydrologic conditions without the use of the proposed BMPs. The unmitigated developed condition peak flow is used to calculate the time it takes to fill the available storage in the proposed BMP. The mitigated developed condition can then be modelled by using the increase in the travel time, or the time it would take the unmitigated developed flow to fill and overtop the outlet structure at the proposed BMP. See section 2.4 for specific mitigated travel time calculations.

Undisturbed areas in the project site will continue to flow according to the same historic conditions towards the east or southwest outlet locations.

Table 2 below summarizes the expected cumulative 100-year peak flow rates for at the project's discharge locations.

Table 2 – Summary of Proposed Conditions

Unmitigated Developed Condition

Drainage Basin	Node	Outfall Node	TC (min)	Intensity (inch/hr)	Drainage Area (acres)	C	Post-100-Year Peak Flow (cfs)	Post-100-Year Peak Velocity (fs)
POC-1	180	100	13.89	4.36	5.8	0.61	15.49	7.30
POC-1 Total:					5.8	0.61	15.49	7.30

Mitigated Developed Condition

Drainage Basin	Node	Outfall Node	TC (min)	Intensity (inch/hr)	Drainage Area (acres)	C	Post-100-Year Peak Flow (cfs)	Post-100-Year Peak Velocity (fs)
POC-1	180	100	18.56	3.62	5.8	0.61	10.90	6.53
POC-1 Total:					5.8	0.61	10.90	6.53

1.5 Conclusions

Table 3 below summarizes the results of the existing, proposed unmitigated and proposed mitigated condition drainage areas and resultant 100-year peak flow rates at the outfall locations for the project site. Please refer to the Existing and Developed Condition Hydrology Maps for drainage patterns and areas.

Table 3 – Summary of Pre vs. Post Developed Peak Flows

Outfall Condition	Total Drainage Area (acres)	Parcel 2 100-Year Peak Flow (cfs)
Pre-Developed Condition	5.8	11.58
Post-Developed Undetained	5.8	15.49
Mitigated Condition	5.8	10.90
DIFFERENCE	0.00	0.68

Peak flow rates listed above were generated based on criteria set forth in the "County of San Diego Hydrology Manual" (methodology presented in Section 2 of this report). Rational method output is located in Section 3. The hydraulic calculations show that the proposed storm drain facilities can sufficiently convey the anticipated Q100 flowrate without any adverse effects.

All developed runoff will receive water quality treatment in accordance with the site specific SWQMP. Additionally, all Points of Compliance (POCs) are HMP compliant as analyzed in the SWQMP.

Based on this conclusion, proposed design properly attenuates runoff from the subject site and adequately intercepts, contains and conveys the runoff to mimic the historic discharge points. Runoff released from the proposed project site will be unlikely to cause any adverse impact to downstream water bodies or existing habitat integrity. Sediment will likely be reduced upon site development.

1.6 References

"San Diego County Hydrology Manual", revised June 2003, County of San Diego, Department of Public Works, Flood Control Section.

"San Diego County Hydraulic Design Manual", revised September 2014, County of San Diego, Department of Public Works, Flood Control Section.

"County of San Diego BMP Design Manual", revised February 2019, County of San Diego, Department of Public Works.

"California Regional Water Quality Control Board Order No. R9-2013-0001", California Regional Water Quality Control Board, San Diego Region (SDRWQCB).

"*Priority Development Project (PDP) Storm Water Quality Management Plan (SWQMP) for Grigsby Residence*", December 2020, Pasco Laret Suiter and Associates.

2.0 METHODOLOGY

2.1 Introduction

The hydrologic model used to perform the hydrologic analysis presented in this report utilizes the Rational Method (RM) equation, Q=CIA. The RM formula estimates the peak rate of runoff based on the variables of area, runoff coefficient, and rainfall intensity. The rainfall intensity (I) is equal to:

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

Where:

I = Intensity (in/hr)
P_6 = 6-hour precipitation (inches)
D = duration (minutes – use Tc)

Using the Time of Concentration (Tc), which is the time required for a given element of water that originates at the most remote point of the basin being analyzed to reach the point at which the runoff from the basin is being analyzed. The RM equation determines the storm water runoff rate (Q) for a given basin in terms of flow (typically in cubic feet per second (cfs) but sometimes as gallons per minute (gpm)). The RM equation is as follows:

$$Q = CIA$$

Where:

Q = flow (in cfs)
C = runoff coefficient, ratio of rainfall that produces storm water runoff (runoff vs. infiltration/evaporation/absorption/etc)
I = average rainfall intensity for a duration equal to the Tc for the area, in inches per hour.
A = drainage area contributing to the basin in acres.

The RM equation assumes that the storm event being analyzed delivers precipitation to the entire basin uniformly, and therefore the peak discharge rate will occur when a raindrop that falls at the most remote portion of the basin arrives at the point of analysis. The RM also assumes that the fraction of rainfall that becomes runoff or the runoff coefficient C is not affected by the storm intensity, I, or the precipitation zone number.

In addition to the above Rational Method assumptions, the project site is assumed to be located on Hydrologic group soil D. This assumption was based on USGS web soil survey data for the project site.

2.1 City of Vista Criteria

As defined by the San Diego County Hydrology Manual (SDCHM) dated June 2003, the Rational Method is the preferred method for determining the hydrologic characteristics of drainage areas less than one square mile. The County of San Diego has developed its own tables, nomographs, and

methodologies for analyzing storm water runoff for areas within the County. Precipitation Isopluvial Contour Maps have also been developed that show even lines of rainfall anticipated from a given storm event (i.e. 100-year, 6-hour storm). The 100-year 6-hour storm event Isopluvial Map for the project site is included in the Appendix.

One of the variables of the RM equation is the runoff coefficient, C. The runoff coefficient is dependent upon land use and soil type. Table 3.1 of the SDCHM has been developed by the County and applies runoff coefficients for urban areas. The table categorizes land use, associated development density (dwelling units per acre) and percentage of impervious area. Each of the categories listed has an associated runoff coefficient, C, for each soil type class.

The County has also described the methodology for determining the time of concentration, in particular the initial time of concentration. The County has adopted the Federal Aviation Agency's (FAA) overland time of flow equation. This equation essentially limits the flow path length for the initial time of concentration to less than 100 feet and is dependent on land use and slope. The minimum time of concentration is 5 minutes per County of San Diego requirements.

2.2 Runoff Coefficient Determination

In accordance with County of San Diego standards, runoff coefficients were based on land use and soil type. The soil condition used in this study is consistent with Type D soil quantities. An appropriate runoff coefficient (C) for each type of land use in the subarea was selected from Table 3-1 of the SDCHM and multiplied by the percentage of total area (A) included in that class. The sum of products for all land uses is the weighted runoff coefficient ($\sum$[C]). The Existing and Developed Condition Hydrology Maps show the drainage basin subareas, on-site drainage system and nodal points.

2.4 Time of Concentration

The time of concentration (Tc) is composed of two components: The initial time of concentration (Ti) and the travel time (Tt). For the Rational Method, the Tc at any point within the drainage area is given by:

$$Tc = Ti + Tt$$

The initial time of concentration is the time required for runoff to sheet flow from the most remote part of the watershed to the outlet point of the first sub-basin. Rational Method- Overland Time of Flow Nomograph (SDCHM Figure 3-3) is utilized to calculate the initial time of concentration. This chart is based on the Federal Aviation Agency (FAA) equation. Maximum sheet flow length from Table 3-2 of the SDCHM is also used in this drainage study. Initial Ti values are based on runoff coefficient and land slope. This equation essentially limits the flow path length for the initial time of concentration to less than 100 feet.

The travel time is the time required for the storm water to flow from the initial sub-basin to the point in question. The travel time is computed by dividing the length of storm drain by the computed flow velocity.

The overland flow component of travel time, Tt, may be estimated by the use of San Diego County Hydrology Manual Figure 3-4, Nomograph for Determination of Time of Concentration (Tc) or Travel Time (Tt) for Natural Watersheds. Figure 3-6 can be used to estimate time of travel for street gutter flow. Velocity in a channel can be estimated by using the nomograph shown in Figure 3-7 (Manning's Equation Nomograph).

The minimum time of concentration is 5 minutes per County of San Diego requirements.

Travel time for mitigated developed conditions includes the storage of the proposed BMPs to lag the total travel time for the developed condition. The time it takes to fill the BMP storge area is calculated by dividing the storage volume of the BMP by the unmitigated developed condition peak flow.

2.5 Hydrologic Modeling Software

Existing and proposed storm flows were developed using the Advanced Engineering Software (AES) Rational Method computer program. The results of these calculations are included in Section 3.1 (existing conditions) and Section 3.2 (proposed conditions). The AES software is designed with separate modules that are programmed to meet specific San Diego County Hydrology Manual requirements. The AES Rational Method Hydrology program was selected to meet the calculation requirements set forth by Chapter 3 of the SDCHM.

The Rational Method Hydrology program is a computer-aided design program where the user develops a node-link model of the watershed, and in this process estimates the conduit and channel sizes needed to accommodate the design peak storm flowrate. The node-link model is developed by creating independent node-link models of each interior watershed and linking these sub models together at confluence points.

To perform the hydrology routing, the total watershed area is divided into sub-areas which discharge at designated nodes. The nodes are joined together by links, which may be street gutter flows, drainage swales, drainage ditches, pipe flow, or various channel flows. At the confluence point of two or more basins, the combined peak flow is determined based on the sub-basin's time of concentration. Adjustments to peak flows are based on the assumption that each basin's hydrographs are triangular in shape.

Following the completion of the unmitigated post project AES routing analysis, HEC-HMS was utilized to model the detention and outlet structure design for each BMP. Each structure utilizes a midflow slot orifice and overflow riser to taper each facility's outflow, which is reflected utilizing rating curves based on head height and available detention volume above the water quality ponding depth. This ultimately led to reduction in the Q100 out of each BMP facility.All assumptions, rating curves, and orifice designs are included in the exhibits included in this report.

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3.0 HYDROLOGY ANALYSIS

AES Assumptions

Manning Roughness Coefficients

- Natural Channel (existing and proposed)
  - N=0.035
- PVC Pipe Flow
  - N=0.011
- Concrete Channel Flow
  - N=0.015
- Concrete Pavement Flow
  - N=0.015

Channel Widths:

- Natural existing channels (pre and post condition)
  - Base Width = 10'
  - Side slope ratio = 20:1

Weighted Runoff Coefficients:

- $C_{pervious}$=0.30
- $C_{impervious}$=0.90
  - Per Table 3-1 of the County of San Diego Hydrology Manual

100 year, 6 hour rainfall depth:

- 3.2 inches per the County of San Diego Hydrology Manual Isopluvial Maps
  - Determines a 100 yr rainfall intensity of 8.43 in/hr

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

d = 3.2 inches

Orange County

Riverside County

Imperial County

Pacific Ocean

Mexico

PROJECT SITE

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

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

DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

N W E S

3 0 3 Miles

LEGEND

DESCRIPTION	SYMBOL
PROPERTY LINE	— — —
BASIN BOUNDARY	(red line)
HYDROLOGY NODE / Q100 (CFS)	400 / 1.56
SUB-BASIN AREA	A=0.40

HYDROLOGIC SOIL GROUP

HYDROLOGIC SOIL TYPE: C

DEPTH TO GROUNDWATER

DEPTH TO GROUNDWATER > 20 FT

PROJECT CHARACTERISTICS

PROJECT AREA: 4.56 ACRES

DISTURBED AREA: 4.56 ACRES

HYDROLOGIC AREA ANALYZED: 5.80 ACRES

RUNOFF COEFFICIENTS WERE BASED ON LAND USE AND SOIL TYPE. AN APPROPRIATE RUNOFF COEFFICIENT WAS SELECTED FROM TABLE 3-1 OF THE SAN DIEGO COUNTY HYDROLOGY MANUAL AND MULTIPLIED BY THE PERCENTAGE OF TOTAL AREA IN THAT CLASS. THE SUM OF THE PRODUCTS FOR ALL LAND USES IS THE WEIGHTED RUNOFF COEFFICIENT. SEE THE "HYDROLOGY STUDY FOR KENSHO HOUSING- GUAJOME STREET" BY PASCO LARET SUITER AND ASSOCIATES FOR WEIGHTED RUNOFF COEFFICIENT CALCULATIONS.

POC OUTFALL NOTES

THIS HYDROLOGY EXHIBIT ANALYZES THE EXISTING PEAK FLOWS WITHIN THE PROPOSED PROJECT LIMITS TO DETERMINE AN ACCURATE, APPLES TO APPLES COMPARISON OF UPDATES WITHIN THE PROPOSED DEVELOPMENT FOOTPRINT COMPARED EXACTLY TO EXISTING CONDITIONS SO SHOW THAT THE PEAK FLOW FOR THE PROJECT SITE IS BEING MITIGATED BETWEEN PRE AND POST PROJECT CONDITIONS. IN BOTH EXISTING AND PROPOSED CONDITIONS, THE SITE OUTLETS TO A SINGLE POC AT THE NORTHERN CORNER OF THE SITE AT AN EXISTING CULVERT THAT IS TO REMAIN AND BE REUSED. NOTE THAT ALL OFFSITE AREA THAT REACHED THIS CULVERT IN EXISTING CONDITIONS THROUGH OR AROUND THE PROJECT SITE WILL BE ACCOMMODATED FOR AND ROUTED TO THE SAME POC VIA BROW DITCHES IN THE PROPOSED CONDITION. NOTE THAT THESE BROW DITCHES WILL BE SIZED APPROPRIATELY TO CONVEY THE 100 YEAR STORM OF ALL RECEIVED DRAINAGE AREA.

PREPARED BY:

PASCO LARET SUITER & ASSOCIATES
San Diego | Encinitas | Orange County
Phone 858.259.8212 | www.plsaengineering.com

EXISTING HYDROLOGY EXHIBIT

KENSHO HOUSING- GUAJOME STREET

212 GUAJOME STREET
VISTA, CA 92083

SHEET 1 OF 1

LEGEND

DESCRIPTION	SYMBOL
PROPERTY LINE	(dashed line)
BASIN BOUNDARY	(red line)
HYDROLOGY NODE / Q100 (CFS)	400 / 1.56
SUB-BASIN AREA	A=0.40

HYDROLOGIC SOIL GROUP

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30' 15' 0 30' 60' 90'
GRAPHIC SCALE: 1" = 30'

PROPOSED HYDROLOGY EXHIBIT

KENSHO HOUSING- GUAJOME STREET

212 GUAJOME STREET
VISTA, CA 92083

SHEET 1 OF 1

Weighted Runoff Coefficient Calculations

Existing Condition											
Up Node	Down Node	Total Area (sf)	Total Area (ac)	C_{perv}	A_{perv} (sf)	A_{perv} (ac)	C_{imp}	A_{imp} (sf)	A_{imp} (ac)	% Imp	C_{comp}
150	140	2308	0.05	0.30	1642	0.04	0.90	666	0.02	29%	0.47
140	130	38942	0.89	0.30	37617	0.86	0.90	1325	0.03	3%	0.32
130	120	17501	0.40	0.30	14392	0.33	0.90	3109	0.07	18%	0.41
122	121	5075	0.12	0.30	4332	0.10	0.90	743	0.02	15%	0.39
121	120	26444	0.61	0.30	25763	0.59	0.90	681	0.02	3%	0.32
120	110	14856	0.34	0.30	9003	0.21	0.90	5853	0.13	39%	0.54
113	112	10077	0.23	0.30	9411	0.22	0.90	666	0.02	7%	0.34
112	111	67007	1.54	0.30	66582	1.53	0.90	425	0.01	1%	0.30
111	110	65777	1.51	0.30	64167	1.47	0.90	1610	0.04	2%	0.31
110	100	4648	0.11	0.30	3982	0.09	0.90	666	0.02	14%	0.39
Proposed Condition											
Up Node	Down Node	Total Area (sf)	Total Area (ac)	C_{perv}	A_{perv} (sf)	A_{perv} (ac)	C_{imp}	A_{imp} (sf)	A_{imp} (ac)	% Imp	C_{comp}
180	170	1993	0.05	0.30	1213	0.03	0.90	780	0.02	39%	0.53
160.1	160	20045	0.46	0.30	8968	0.21	0.90	11077	0.25	55%	0.63
150.1	150	23506	0.54	0.30	4975	0.11	0.90	18531	0.43	79%	0.77
150	140	1916	0.04	0.30	1744	0.04	0.90	172	0.00	9%	0.35
140	130	6397	0.15	0.30	5250	0.12	0.90	1147	0.03	18%	0.41
136	135	3707	0.09	0.30	3707	0.09	0.90	0	0.00	0%	0.30
134.1	134	30931	0.71	0.30	30931	0.71	0.90	0	0.00	0%	0.30
131.1	131	2258	0.05	0.30	2258	0.05	0.90	0	0.00	0%	0.30
130	120	17535	0.40	0.30	14425	0.33	0.90	3110	0.07	18%	0.41
125	124	2993	0.07	0.30	0	0.00	0.90	2993	0.07	100%	0.90
124.1	124	11587	0.27	0.30	0	0.00	0.90	11587	0.27	100%	0.90
124	123	3247	0.07	0.30	2803	0.06	0.90	444	0.01	14%	0.38
122	121	2771	0.06	0.30	2167	0.05	0.90	604	0.01	22%	0.43
120	110	14856	0.34	0.30	12351	0.28	0.90	2505	0.06	17%	0.40
117	116	972	0.02	0.30	11	0.00	0.90	961	0.02	99%	0.89
116	115	11312	0.26	0.30	1451	0.03	0.90	9861	0.23	87%	0.82
115.1	115	16320	0.37	0.30	1940	0.04	0.90	14380	0.33	88%	0.83
115	114	3375	0.08	0.30	3000	0.07	0.90	375	0.01	11%	0.37
114	113	3802	0.09	0.30	2961	0.07	0.90	841	0.02	22%	0.43
113.4	113.3	512	0.01	0.30	369	0.01	0.90	143	0.00	28%	0.47
113.3	113.2	4730	0.11	0.30	228	0.01	0.90	4502	0.10	95%	0.87
113.2	113.1	437	0.01	0.30	357	0.01	0.90	80	0.00	18%	0.41
113	112	2738	0.06	0.30	2242	0.05	0.90	496	0.01	18%	0.41
112.5	112.4	1507	0.03	0.30	216	0.00	0.90	1291	0.03	86%	0.81
112.4	112.3	10902	0.25	0.30	816	0.02	0.90	10086	0.23	93%	0.86
112.2	112.1	865	0.02	0.30	793	0.02	0.90	72	0.00	8%	0.35
112	111	3980	0.09	0.30	3282	0.08	0.90	698	0.02	18%	0.41
111.6	111.5	291	0.01	0.30	291	0.01	0.90	0	0.00	0%	0.30
111.5	111.4	2175	0.05	0.30	1643	0.04	0.90	532	0.01	24%	0.45
111.41	111.4	18417	0.42	0.30	0	0.00	0.90	18417	0.42	100%	0.90
111.4	111.3	909	0.02	0.30	492	0.01	0.90	417	0.01	46%	0.58
111.21	111.2	5906	0.14	0.30	4936	0.11	0.90	970	0.02	16%	0.40
110	100	4647	0.11	0.30	3981	0.09	0.90	666	0.02	14%	0.39
100.4	100.3	1306	0.03	0.30	722	0.02	0.90	584	0.01	45%	0.57
100.3	100.2	1335	0.03	0.30	617	0.01	0.90	718	0.02	54%	0.62
100.11	100.1	11384	0.26	0.30	1739	0.04	0.90	9645	0.22	85%	0.81
100.09	100.07	413	0.01	0.30	401	0.01	0.90	12	0.00	3%	0.32
100.08	100.7	658	0.02	0.30	0	0.00	0.90	658	0.02	100%	0.90

Note: C-values taken from Table 3-1 of San Diego County Hydrology Manual, consistent with on-site existing soil types. See References.

PRE HYDROLOGY ANALYSIS SPREADSHEET

Project #: 3599
Page:_____of_____
Date:_____

UPPER NODE		LOWER NODE				INPUT				
#	ELEV (FT)	#	ELEV (FT)	CODE	DISTANCE (FT)	Cn	n	AREA (sf)	AREA (AC)	COMMENTS
150	432	140	412	2	100	0.47	0.035	2308	0.053	Initial Sub area of longest path
140	412	130	362	5	332	0.32	0.035	38942	0.894	overland flow
130	362	120	349	5	531	0.41	0.015	17501	0.402	flow in concrete brow ditch
120		120		1						1 of 2
122	426	121	406	2	100	0.39	0.035	5075	0.117	initial
121	406	120	349	5	287	0.32	0.035	26444	0.607	trap channel
120		120		1						2 of 2
120	349	110	340	5	422	0.54	0.015	14856	0.341	flow in concrete brow ditch
110		110		1						1 of 2
113	424	112	403	2	100	0.34	0.035	10077	0.231	Initial
112	403	111	357	5	366	0.3	0.035	67007	1.538	trap channel
111	357	110	340	5	305	0.31	0.015	65777	1.510	Brow Ditch
110		110		1						2 OF 2
110	340	100	338	5	93	0.39	0.015	4648	0.107	flow in concrete brow ditch
										STOP
								252635		

POST HYDROLOGY ANALYSIS SPREADSHEET

Project #: 3599
Page: _____ of _____
Date: _____

UPPER NODE		LOWER NODE				INPUT				
#	ELEV (FT)	#	ELEV (FT)	CODE	DISTANCE (FT)	C	n	AREA (sf)	AREA (AC)	COMMENTS
180	398	170	397.5	2	48	0.53	0.035	1993	0.046	Initial to BMP 1
170	396.3	160	385.4	4	295		0.011		0.000	Pipe
160.1		160		8		0.63		20045	0.460	additional rear area
160	385.4	150	367	4	326		0.011		0.000	pipe to bmp
150.1		150		8		0.77		23506	0.540	addl area to bmp
150	367	140	365.5	5	17	0.35	0.035	1916	0.044	trap chan over bmp
140	364	130	361	5	447	0.41	0.015	6397	0.147	brow ditch
130		130		1					0.000	1 of 2
136	432	135	410.5	2	100	0.30	0.035	3707	0.085	initial past bmp 2
135	409	134	401	4	237		0.011		0.000	pipe and bor ditch flow
134.1		134		8		0.30		30931	0.710	addl rear area
134	401	133	374	4	438		0.011		0.000	pipe from rear ditechs
133	374	132	367	4	75		0.015		0.000	brow ditch flow
132	367	131	363	4	58		0.015		0.000	brow ditch flow
131.1		131		8		0.30		2258	0.052	additional
131	363	130	361	5	19		0.035		0.000	sheet flow
130		130		1					0.000	2 of 2
130	361	120	349.5	5	531	0.41	0.015	17535	0.403	brow ditch
120		120		1					0.000	1 of 2
125	382.48	124	381	2	74	0.90	0.015	2993	0.069	initial to bmp 2
124.1		124		8		0.90		11587	0.266	roof area
124	381	123	378.5	5	93	0.38	0.035	3247	0.075	trap chan
123	374	122	362	4	85		0.011		0.000	pipe flow out
122	362	121	359.5	5	110	0.43	0.015	2771	0.064	trap chan
121	359.5	120	349.5	5	23		0.015		0.000	trap chan
120		120		1					0.000	2 of 2
120	349.5	110	340	5	422	0.40	0.015	14856	0.341	trap chan
110		110		10					0.000	Memory Bank 1 (BMP 1, 2, and self mit)

117	379.5	116	378.4	2	53	0.89	0.015	972	0.022	Initial to BMP 3
116	378.4	115	369.4	6	213	0.82	0.015	11312	0.260	Street Flow
115.1		115		8		0.83		16320	0.375	Addl area
115	362.5	114	361.5	5	23	0.37	0.035	3375	0.077	trap chan across bmp
114	358	113	352	5	253	0.43	0.015	3802	0.087	brow ditch
113		113		1					0.000	1 of 2
113.4	374.5	113.3	373.5	2	31	0.47	0.015	512	0.012	Initial to BMP 4
113.3	373.5	113.2	367.4	6	136	0.87	0.015	4730	0.109	Street Flow
113.2	359.5	113.1	358.5	5	50	0.41	0.035	437	0.010	trap chan across bmp
113.1	355	113	352	5	23		0.035		0.000	overland channel
113		113		1					0.000	2 of 2
113	352	112	349	5	108	0.41	0.015	2738	0.063	brow ditch
112		112		1					0.000	1 of 2
112.5	370.5	112.4	368.5	2	60	0.81	0.015	1507	0.035	initial to bmp 6
112.4	368.5	112.3	355.95	6	279	0.86	0.015	10902	0.250	street flow
112.3	354.95	112.2	354.5	4	43		0.011		0.000	pipe to bmp
112.2	354.5	112.1	353.5	5	47	0.35	0.035	865	0.020	trap chan across bmp 6
112.1	351.5	112	349	5	37		0.035		0.000	sheet flow
112		112		1					0.000	2 of 2
112	349	111	346.5	5	87	0.41	0.015	3980	0.091	brow ditch
111		111		1					0.000	1 of 2
111.6	391.5	111.5	391	2	50	0.30	0.035	291	0.007	initial to bmp 5
111.5	391	111.4	378.51	5	264	0.45	0.035	2175	0.050	trap chan
111.41		111.4		8		0.90		18417	0.423	roof area
111.4	378.51	111.3	378.5	5	82	0.58	0.035	909	0.021	trap chan across bmp
111.3	374	111.2	371.5	4	18		0.011		0.000	pipe
111.21		111.2		8		0.40		5906	0.136	Addl area
111.2	371.5	111.1	350	4	148		0.011		0.000	pipe
111.1	350	111	346.5	5	22		0.035		0.000	sheet flow
111		111		1					0.000	2 of 2
111	346.5	110	340	5	15		0.035		0.000	trap chan
110		110		11					0.000	memory bank add
110	340	100	338	5	93	0.39	0.015	4647	0.107	Trap Chan
100		100		1					0.000	1 of 2
100.4	378	100.3	367.5	2	50	0.57	0.015	1306	0.030	Initial to mod wet
100.3	367.5	100.2	357.25	6	60	0.62	0.015	1335	0.031	street flow
100.2	353.5	100.1	351.33	4	90		0.011		0.000	pipe
100.11		100.1		8		0.81		11384	0.261	addl
100.1	351.33	100.07	349	5	26				0.000	trap chan to mod wetland
100.09		100.07		8		0.32		413	0.009	addl
100.08		100.07		8		0.90		658	0.015	addl
100.07	345	100	338	4	93		0.011		0.000	pipe
100		100		1					0.000	2 of 2
								252635		

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2016 Advanced Engineering Software (aes)
              Ver. 23.0 Release Date: 07/01/2016  License ID 1452

              KENSHO HOUSING - PRE-PROJECT HYDROLOGY ANALYSIS

                              Analysis prepared by:

                               PLSA ENGINEERING


--------------------------------------------------------------------------
  FILE NAME: KENPRE.DAT
  TIME/DATE OF STUDY: 17:35 08/04/2022
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.200
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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.*

**************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    140.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
```

```
  USER-SPECIFIED RUNOFF COEFFICIENT = .4700
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    432.00
  DOWNSTREAM ELEVATION(FEET) =    412.00
  ELEVATION DIFFERENCE(FEET) =     20.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.264
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.156
  SUBAREA RUNOFF(CFS) =      0.20
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.20

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    130.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    412.00  DOWNSTREAM(FEET) =    362.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   332.00   CHANNEL SLOPE =  0.1506
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.299
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3200
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.14
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.13
  AVERAGE FLOW DEPTH(FEET) =   0.05   TRAVEL TIME(MIN.) =   2.59
  Tc(MIN.) =    7.86
  SUBAREA AREA(ACRES) =     0.89       SUBAREA RUNOFF(CFS) =    1.80
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.328
  TOTAL AREA(ACRES) =        0.9         PEAK FLOW RATE(CFS) =       1.96

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.07   FLOW VELOCITY(FEET/SEC.) =   2.63
  LONGEST FLOWPATH FROM NODE    150.00 TO NODE    130.00 =     432.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    120.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    362.00  DOWNSTREAM(FEET) =    349.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   531.00   CHANNEL SLOPE =  0.0245
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.434
  *USER SPECIFIED(SUBAREA):
```

```
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.41
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.38
  AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   2.02
  Tc(MIN.) =    9.88
  SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    0.90
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.353
  TOTAL AREA(ACRES) =        1.3         PEAK FLOW RATE(CFS) =       2.59

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.17   FLOW VELOCITY(FEET/SEC.) =   4.48
  LONGEST FLOWPATH FROM NODE    150.00 TO NODE    120.00 =     963.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.88
  RAINFALL INTENSITY(INCH/HR) =   5.43
  TOTAL STREAM AREA(ACRES) =     1.35
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.59

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    121.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3900
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    426.00
  DOWNSTREAM ELEVATION(FEET) =    406.00
  ELEVATION DIFFERENCE(FEET) =     20.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.932
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.551
  SUBAREA RUNOFF(CFS) =      0.34
  TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.34

****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    120.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
```

```
 ELEVATION DATA: UPSTREAM(FEET) =    406.00  DOWNSTREAM(FEET) =    349.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   287.00   CHANNEL SLOPE =  0.1986
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
 MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.274
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .6200
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.52
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.42
 AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   1.97
 Tc(MIN.) =    7.91
 SUBAREA AREA(ACRES) =     0.61       SUBAREA RUNOFF(CFS) =    2.36
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.583
 TOTAL AREA(ACRES) =        0.7         PEAK FLOW RATE(CFS) =       2.65

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.07   FLOW VELOCITY(FEET/SEC.) =   3.14
 LONGEST FLOWPATH FROM NODE    122.00 TO NODE    120.00 =     387.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    7.91
 RAINFALL INTENSITY(INCH/HR) =   6.27
 TOTAL STREAM AREA(ACRES) =     0.72
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.65

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        2.59     9.88        5.434          1.35
     2        2.65     7.91        6.274          0.72

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1        4.72     7.91       6.274
     2        4.88     9.88       5.434

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       4.88   Tc(MIN.) =    9.88
```

```
  TOTAL AREA(ACRES) =        2.1
  LONGEST FLOWPATH FROM NODE    150.00 TO NODE    120.00 =     963.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    110.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    349.00  DOWNSTREAM(FEET) =    340.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   422.00   CHANNEL SLOPE =  0.0213
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.018
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5400
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.34
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.41
  AVERAGE FLOW DEPTH(FEET) =   0.28   TRAVEL TIME(MIN.) =   1.30
  Tc(MIN.) =   11.18
  SUBAREA AREA(ACRES) =     0.34       SUBAREA RUNOFF(CFS) =    0.92
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.448
  TOTAL AREA(ACRES) =        2.4         PEAK FLOW RATE(CFS) =       5.43

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.28   FLOW VELOCITY(FEET/SEC.) =   5.50
  LONGEST FLOWPATH FROM NODE    150.00 TO NODE    110.00 =    1385.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.18
  RAINFALL INTENSITY(INCH/HR) =   5.02
  TOTAL STREAM AREA(ACRES) =     2.41
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.43

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    112.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3400
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
```

```
  UPSTREAM ELEVATION(FEET) =    424.00
  DOWNSTREAM ELEVATION(FEET) =    403.00
  ELEVATION DIFFERENCE(FEET) =     21.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.350
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.226
  SUBAREA RUNOFF(CFS) =      0.57
  TOTAL AREA(ACRES) =      0.23   TOTAL RUNOFF(CFS) =      0.57

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    111.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    403.00  DOWNSTREAM(FEET) =    357.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   366.00   CHANNEL SLOPE =  0.1257
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.798
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.93
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.36
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   2.58
  Tc(MIN.) =    8.93
  SUBAREA AREA(ACRES) =     1.54       SUBAREA RUNOFF(CFS) =    2.68
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.305
  TOTAL AREA(ACRES) =        1.8         PEAK FLOW RATE(CFS) =       3.13

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   2.79
  LONGEST FLOWPATH FROM NODE    113.00 TO NODE    111.00 =     466.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    110.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    357.00  DOWNSTREAM(FEET) =    340.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   305.00   CHANNEL SLOPE =  0.0557
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.515
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3100
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.42
```

```
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.05
  AVERAGE FLOW DEPTH(FEET) =   0.19   TRAVEL TIME(MIN.) =   0.72
  Tc(MIN.) =    9.66
  SUBAREA AREA(ACRES) =     1.51       SUBAREA RUNOFF(CFS) =    2.58
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.307
  TOTAL AREA(ACRES) =        3.3         PEAK FLOW RATE(CFS) =       5.56

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.21   FLOW VELOCITY(FEET/SEC.) =   7.71
  LONGEST FLOWPATH FROM NODE    113.00 TO NODE    110.00 =     771.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.66
  RAINFALL INTENSITY(INCH/HR) =   5.51
  TOTAL STREAM AREA(ACRES) =     3.28
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.56

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        5.43    11.18        5.018          2.41
      2        5.56     9.66        5.515          3.28

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       10.50     9.66       5.515
      2       10.49    11.18       5.018

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      10.50   Tc(MIN.) =    9.66
  TOTAL AREA(ACRES) =        5.7
  LONGEST FLOWPATH FROM NODE    150.00 TO NODE    110.00 =    1385.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    100.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =    340.00  DOWNSTREAM(FEET) =    338.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    93.00   CHANNEL SLOPE =  0.0215
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.433
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3900
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.61
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.83
  AVERAGE FLOW DEPTH(FEET) =   0.41   TRAVEL TIME(MIN.) =   0.23
  Tc(MIN.) =    9.88
  SUBAREA AREA(ACRES) =     0.11       SUBAREA RUNOFF(CFS) =    0.23
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.368
  TOTAL AREA(ACRES) =        5.8         PEAK FLOW RATE(CFS) =      11.58

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.43   FLOW VELOCITY(FEET/SEC.) =   6.98
  LONGEST FLOWPATH FROM NODE    150.00 TO NODE    100.00 =    1478.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        5.8  TC(MIN.) =      9.88
  PEAK FLOW RATE(CFS)   =      11.58
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2016 Advanced Engineering Software (aes)
              Ver. 23.0 Release Date: 07/01/2016  License ID 1452

     KENSHO HOUSING - POST-PROJECT UNMITIGATED CONDITION HYDROLOGY ANALYSIS

                              Analysis prepared by:

                                PLSA ENGINEERING

--------------------------------------------------------------------------
  FILE NAME: KENPOST.DAT
  TIME/DATE OF STUDY: 18:22 10/04/2022
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.200
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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 0.0313 0.167 0.0150

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

**************************************************************************
  FLOW PROCESS FROM NODE    180.00 TO NODE    170.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5300
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    48.00
  UPSTREAM ELEVATION(FEET) =    398.00
  DOWNSTREAM ELEVATION(FEET) =    397.50
  ELEVATION DIFFERENCE(FEET) =      0.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.012
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.779
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    160.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   396.30  DOWNSTREAM(FEET) =   385.40
  FLOW LENGTH(FEET) =   295.00   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   1.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.34
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.17
  PIPE TRAVEL TIME(MIN.) =   1.13    Tc(MIN.) =    8.14
  LONGEST FLOWPATH FROM NODE    180.00 TO NODE    160.00 =     343.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    160.10 TO NODE    160.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.155
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6209
  SUBAREA AREA(ACRES) =    0.46   SUBAREA RUNOFF(CFS) =    1.78
  TOTAL AREA(ACRES) =        0.5   TOTAL RUNOFF(CFS) =       1.93
  TC(MIN.) =    8.14

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    150.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   385.40  DOWNSTREAM(FEET) =   367.00
  FLOW LENGTH(FEET) =   326.00   MANNING'S N =  0.011
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.66
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =       1.93
  PIPE TRAVEL TIME(MIN.) =   0.56    Tc(MIN.) =    8.71
  LONGEST FLOWPATH FROM NODE    180.00 TO NODE    150.00 =     669.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.10 TO NODE    150.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.895
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6979
  SUBAREA AREA(ACRES) =    0.54   SUBAREA RUNOFF(CFS) =    2.45
  TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       4.30
  TC(MIN.) =    8.71

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    140.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    367.00  DOWNSTREAM(FEET) =    365.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =    17.00   CHANNEL SLOPE =  0.0882
  CHANNEL BASE(FEET) =   11.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   1.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.856
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.35
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.12
  AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   0.09
  Tc(MIN.) =    8.80
  SUBAREA AREA(ACRES) =     0.04       SUBAREA RUNOFF(CFS) =    0.09
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.684
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       4.36

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   3.13
  LONGEST FLOWPATH FROM NODE    180.00 TO NODE    140.00 =     686.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    130.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =    364.00  DOWNSTREAM(FEET) =    361.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   447.00   CHANNEL SLOPE =  0.0067
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.094
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.52
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.51
  AVERAGE FLOW DEPTH(FEET) =   0.35   TRAVEL TIME(MIN.) =   2.12
  Tc(MIN.) =   10.92
  SUBAREA AREA(ACRES) =     0.15       SUBAREA RUNOFF(CFS) =    0.31
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.651
  TOTAL AREA(ACRES) =        1.2         PEAK FLOW RATE(CFS) =       4.36

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.34   FLOW VELOCITY(FEET/SEC.) =   3.48
  LONGEST FLOWPATH FROM NODE    180.00 TO NODE    130.00 =    1133.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 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.) =   10.92
  RAINFALL INTENSITY(INCH/HR) =   5.09
  TOTAL STREAM AREA(ACRES) =     1.24
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.36

****************************************************************************
  FLOW PROCESS FROM NODE    136.00 TO NODE    135.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    432.00
  DOWNSTREAM ELEVATION(FEET) =    410.50
  ELEVATION DIFFERENCE(FEET) =     21.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.991
  SUBAREA RUNOFF(CFS) =      0.18
  TOTAL AREA(ACRES) =      0.09   TOTAL RUNOFF(CFS) =      0.18
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    134.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   409.00  DOWNSTREAM(FEET) =   401.00
  FLOW LENGTH(FEET) =   237.00   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   1.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.30
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.18
  PIPE TRAVEL TIME(MIN.) =   0.92    Tc(MIN.) =    7.60
  LONGEST FLOWPATH FROM NODE    136.00 TO NODE    134.00 =     337.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    134.10 TO NODE    134.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.434
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3000
  SUBAREA AREA(ACRES) =    0.71   SUBAREA RUNOFF(CFS) =    1.37
  TOTAL AREA(ACRES) =        0.8   TOTAL RUNOFF(CFS) =       1.53
  TC(MIN.) =    7.60

****************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    133.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   401.00  DOWNSTREAM(FEET) =   374.00
  FLOW LENGTH(FEET) =   438.00   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.05
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.53
  PIPE TRAVEL TIME(MIN.) =   0.81    Tc(MIN.) =    8.41
  LONGEST FLOWPATH FROM NODE    136.00 TO NODE    133.00 =     775.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    133.00 TO NODE    132.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   374.00  DOWNSTREAM(FEET) =   367.00
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.015
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   2.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.85
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.53
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =    8.57
  LONGEST FLOWPATH FROM NODE    136.00 TO NODE    132.00 =     850.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    132.00 TO NODE    131.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   367.00  DOWNSTREAM(FEET) =   363.00
  FLOW LENGTH(FEET) =    58.00   MANNING'S N =  0.015
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   2.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.06
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.53
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    8.71
  LONGEST FLOWPATH FROM NODE    136.00 TO NODE    131.00 =     908.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    131.10 TO NODE    131.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.896
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3000
  SUBAREA AREA(ACRES) =    0.05   SUBAREA RUNOFF(CFS) =    0.09
  TOTAL AREA(ACRES) =        0.8   TOTAL RUNOFF(CFS) =       1.53
  TC(MIN.) =    8.71
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    131.00 TO NODE    130.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    363.00  DOWNSTREAM(FEET) =    361.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    19.00   CHANNEL SLOPE =  0.1053
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.53
```

```
  FLOW VELOCITY(FEET/SEC.) =   2.36   FLOW DEPTH(FEET) =   0.09
  TRAVEL TIME(MIN.) =   0.13   Tc(MIN.) =    8.84
  LONGEST FLOWPATH FROM NODE    136.00 TO NODE    130.00 =     927.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.84
  RAINFALL INTENSITY(INCH/HR) =   5.84
  TOTAL STREAM AREA(ACRES) =     0.85
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.53

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        4.36    10.92        5.094          1.24
      2        1.53     8.84        5.838          0.85

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        5.07     8.84       5.838
      2        5.70    10.92       5.094

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.70   Tc(MIN.) =   10.92
  TOTAL AREA(ACRES) =        2.1
  LONGEST FLOWPATH FROM NODE    180.00 TO NODE    130.00 =    1133.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    120.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    361.00  DOWNSTREAM(FEET) =    349.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   531.00   CHANNEL SLOPE =  0.0217
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.667
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.09
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.57
  AVERAGE FLOW DEPTH(FEET) =   0.29   TRAVEL TIME(MIN.) =   1.59
  Tc(MIN.) =   12.51
  SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    0.77
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.493
  TOTAL AREA(ACRES) =        2.5         PEAK FLOW RATE(CFS) =       5.72

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.28   FLOW VELOCITY(FEET/SEC.) =   5.53
  LONGEST FLOWPATH FROM NODE    180.00 TO NODE    120.00 =    1664.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.51
  RAINFALL INTENSITY(INCH/HR) =   4.67
  TOTAL STREAM AREA(ACRES) =     2.49
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.72

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    124.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    74.00
  UPSTREAM ELEVATION(FEET) =    382.48
  DOWNSTREAM ELEVATION(FEET) =    381.00
  ELEVATION DIFFERENCE(FEET) =      1.48
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.458
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.52
  TOTAL AREA(ACRES) =      0.07   TOTAL RUNOFF(CFS) =      0.52

****************************************************************************
  FLOW PROCESS FROM NODE    124.10 TO NODE    124.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
```

```
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.9000
  SUBAREA AREA(ACRES) =    0.27   SUBAREA RUNOFF(CFS) =    2.02
  TOTAL AREA(ACRES) =        0.3   TOTAL RUNOFF(CFS) =       2.54
  TC(MIN.) =    2.46

****************************************************************************
  FLOW PROCESS FROM NODE    124.00 TO NODE    123.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    381.00  DOWNSTREAM(FEET) =    378.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =    93.00   CHANNEL SLOPE =  0.0269
  CHANNEL BASE(FEET) =   13.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   4.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3800
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.66
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.66
  AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   0.94
  Tc(MIN.) =    3.39
  SUBAREA AREA(ACRES) =     0.08       SUBAREA RUNOFF(CFS) =    0.24
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.805
  TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       2.78

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =   1.65
  LONGEST FLOWPATH FROM NODE    125.00 TO NODE    123.00 =     167.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    123.00 TO NODE    122.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   374.00  DOWNSTREAM(FEET) =   362.00
  FLOW LENGTH(FEET) =    85.00   MANNING'S N =  0.011
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.91
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.78
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    3.49
  LONGEST FLOWPATH FROM NODE    125.00 TO NODE    122.00 =     252.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    121.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    362.00  DOWNSTREAM(FEET) =    359.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   110.00   CHANNEL SLOPE =  0.0227
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4300
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.90
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.45
  AVERAGE FLOW DEPTH(FEET) =   0.19   TRAVEL TIME(MIN.) =   0.41
  Tc(MIN.) =    3.90
  SUBAREA AREA(ACRES) =     0.06       SUBAREA RUNOFF(CFS) =    0.23
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.754
  TOTAL AREA(ACRES) =        0.5         PEAK FLOW RATE(CFS) =       3.01

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =   4.47
  LONGEST FLOWPATH FROM NODE    125.00 TO NODE    121.00 =     362.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    120.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    359.50  DOWNSTREAM(FEET) =    349.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =    23.00   CHANNEL SLOPE =  0.4348
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.01
  FLOW VELOCITY(FEET/SEC.) =  11.61   FLOW DEPTH(FEET) =   0.08
  TRAVEL TIME(MIN.) =   0.03   Tc(MIN.) =    3.93
  LONGEST FLOWPATH FROM NODE    125.00 TO NODE    120.00 =     385.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 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.) =    3.93
 RAINFALL INTENSITY(INCH/HR) =   8.43
 TOTAL STREAM AREA(ACRES) =     0.47
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.01

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        5.72    12.51        4.667          2.49
     2        3.01     3.93        8.431          0.47

 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        6.18     3.93       8.431
     2        7.39    12.51       4.667

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       7.39   Tc(MIN.) =   12.51
 TOTAL AREA(ACRES) =        3.0
 LONGEST FLOWPATH FROM NODE    180.00 TO NODE    120.00 =    1664.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    120.00 TO NODE    110.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    349.50  DOWNSTREAM(FEET) =    340.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   422.00   CHANNEL SLOPE =  0.0225
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.500
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.408
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .4000
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.69
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.07
 AVERAGE FLOW DEPTH(FEET) =   0.33   TRAVEL TIME(MIN.) =   1.16
 Tc(MIN.) =   13.67
 SUBAREA AREA(ACRES) =     0.34       SUBAREA RUNOFF(CFS) =    0.60
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.521
 TOTAL AREA(ACRES) =        3.3         PEAK FLOW RATE(CFS) =       7.58

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.33   FLOW VELOCITY(FEET/SEC.) =   6.11
 LONGEST FLOWPATH FROM NODE    180.00 TO NODE    110.00 =    2086.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    116.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8900
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    53.00
  UPSTREAM ELEVATION(FEET) =    379.50
  DOWNSTREAM ELEVATION(FEET) =    378.40
  ELEVATION DIFFERENCE(FEET) =      1.10
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.157
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    115.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  378.40  DOWNSTREAM ELEVATION(FEET) =  369.40
  STREET LENGTH(FEET) =   213.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.001
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.001

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.005
  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) =       1.06
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.18   FLOOD WIDTH(FEET) =   30.00
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    1.48
    SPLIT DEPTH(FEET) =    0.16   SPLIT FLOOD WIDTH(FEET) =    2.34
    SPLIT FLOW(CFS) =    0.19   SPLIT VELOCITY(FEET/SEC.) =    1.36
```

```
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.18
    HALFSTREET FLOOD WIDTH(FEET) =   30.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.48
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.27
  STREET FLOW TRAVEL TIME(MIN.) =   2.41   Tc(MIN.) =    4.56
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.825
  SUBAREA AREA(ACRES) =    0.26      SUBAREA RUNOFF(CFS) =    1.80
  TOTAL AREA(ACRES) =        0.3        PEAK FLOW RATE(CFS) =       1.96

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.19   HALFSTREET FLOOD WIDTH(FEET) =  30.00
  FLOW VELOCITY(FEET/SEC.) =  1.52   DEPTH*VELOCITY(FT*FT/SEC.) =   0.28
  LONGEST FLOWPATH FROM NODE    117.00 TO NODE    115.00 =     266.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.10 TO NODE    115.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8281
  SUBAREA AREA(ACRES) =    0.38   SUBAREA RUNOFF(CFS) =    2.62
  TOTAL AREA(ACRES) =        0.7   TOTAL RUNOFF(CFS) =       4.59
  TC(MIN.) =    4.56

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    114.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    362.50  DOWNSTREAM(FEET) =    361.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =    23.00   CHANNEL SLOPE =  0.0435
  CHANNEL BASE(FEET) =    9.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3700
  S.C.S. CURVE NUMBER (AMC II) =   0
```

```
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.71
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.81
  AVERAGE FLOW DEPTH(FEET) =   0.19   TRAVEL TIME(MIN.) =   0.14
  Tc(MIN.) =    4.70
  SUBAREA AREA(ACRES) =     0.08       SUBAREA RUNOFF(CFS) =    0.24
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.780
  TOTAL AREA(ACRES) =        0.7         PEAK FLOW RATE(CFS) =       4.83

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =   2.85
  LONGEST FLOWPATH FROM NODE    117.00 TO NODE    114.00 =     289.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    113.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    358.00  DOWNSTREAM(FEET) =    352.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   253.00   CHANNEL SLOPE =  0.0237
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.943
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4300
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.98
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.37
  AVERAGE FLOW DEPTH(FEET) =   0.25   TRAVEL TIME(MIN.) =   0.78
  Tc(MIN.) =    5.48
  SUBAREA AREA(ACRES) =     0.09       SUBAREA RUNOFF(CFS) =    0.30
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.743
  TOTAL AREA(ACRES) =        0.8         PEAK FLOW RATE(CFS) =       4.84

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.25   FLOW VELOCITY(FEET/SEC.) =   5.37
  LONGEST FLOWPATH FROM NODE    117.00 TO NODE    113.00 =     542.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 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.) =    5.48
  RAINFALL INTENSITY(INCH/HR) =   7.94
  TOTAL STREAM AREA(ACRES) =     0.82
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.84
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    113.40 TO NODE    113.30 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4700
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    31.00
  UPSTREAM ELEVATION(FEET) =    374.50
  DOWNSTREAM ELEVATION(FEET) =    373.50
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.273
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.05
  TOTAL AREA(ACRES) =      0.01   TOTAL RUNOFF(CFS) =      0.05

****************************************************************************
  FLOW PROCESS FROM NODE    113.30 TO NODE    113.30 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   6.39   RAIN INTENSITY(INCH/HOUR) =  7.20
  TOTAL AREA(ACRES) =     0.01   TOTAL RUNOFF(CFS) =      0.10

****************************************************************************
  FLOW PROCESS FROM NODE    113.30 TO NODE    113.20 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  373.50  DOWNSTREAM ELEVATION(FEET) =  367.40
  STREET LENGTH(FEET) =   136.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 24.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.025
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.025

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.42
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.16
    HALFSTREET FLOOD WIDTH(FEET) =    1.50
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.99
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.62
```

```
  STREET FLOW TRAVEL TIME(MIN.) =   0.57   Tc(MIN.) =    6.96
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.812
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.906
  SUBAREA AREA(ACRES) =    0.11      SUBAREA RUNOFF(CFS) =    0.65
  TOTAL AREA(ACRES) =        0.1        PEAK FLOW RATE(CFS) =       0.74

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.19   HALFSTREET FLOOD WIDTH(FEET) =   2.75
  FLOW VELOCITY(FEET/SEC.) =  3.57   DEPTH*VELOCITY(FT*FT/SEC.) =   0.67
  LONGEST FLOWPATH FROM NODE    113.40 TO NODE    113.20 =     167.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.20 TO NODE    113.10 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    359.50  DOWNSTREAM(FEET) =    358.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =    50.00   CHANNEL SLOPE =  0.0200
  CHANNEL BASE(FEET) =    7.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.411
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.75
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.21
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   0.69
  Tc(MIN.) =    7.65
  SUBAREA AREA(ACRES) =     0.01       SUBAREA RUNOFF(CFS) =    0.03
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.868
  TOTAL AREA(ACRES) =        0.1         PEAK FLOW RATE(CFS) =       0.74

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   1.19
  LONGEST FLOWPATH FROM NODE    113.40 TO NODE    113.10 =     217.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.10 TO NODE    113.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    355.00  DOWNSTREAM(FEET) =    352.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    23.00   CHANNEL SLOPE =  0.1304
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
```

```
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.74
  FLOW VELOCITY(FEET/SEC.) =   2.07   FLOW DEPTH(FEET) =   0.06
  TRAVEL TIME(MIN.) =   0.19   Tc(MIN.) =    7.83
  LONGEST FLOWPATH FROM NODE    113.40 TO NODE    113.00 =     240.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.83
  RAINFALL INTENSITY(INCH/HR) =   6.31
  TOTAL STREAM AREA(ACRES) =     0.13
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.74

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        4.84     5.48        7.943          0.82
      2        0.74     7.83        6.312          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        5.36     5.48       7.943
      2        4.59     7.83       6.312

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.36   Tc(MIN.) =    5.48
  TOTAL AREA(ACRES) =        1.0
  LONGEST FLOWPATH FROM NODE    117.00 TO NODE    113.00 =     542.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    112.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    352.00  DOWNSTREAM(FEET) =    349.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   108.00   CHANNEL SLOPE =  0.0278
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.670
  *USER SPECIFIED(SUBAREA):
```

```
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.46
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.90
  AVERAGE FLOW DEPTH(FEET) =   0.25   TRAVEL TIME(MIN.) =   0.31
  Tc(MIN.) =    5.79
  SUBAREA AREA(ACRES) =     0.06       SUBAREA RUNOFF(CFS) =    0.20
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.738
  TOTAL AREA(ACRES) =        1.0         PEAK FLOW RATE(CFS) =       5.74

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.26   FLOW VELOCITY(FEET/SEC.) =   5.99
  LONGEST FLOWPATH FROM NODE    117.00 TO NODE    112.00 =     650.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 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.) =    5.79
  RAINFALL INTENSITY(INCH/HR) =   7.67
  TOTAL STREAM AREA(ACRES) =     1.01
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.74

****************************************************************************
  FLOW PROCESS FROM NODE    112.50 TO NODE    112.40 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8100
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    370.50
  DOWNSTREAM ELEVATION(FEET) =    368.50
  ELEVATION DIFFERENCE(FEET) =      2.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.707
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.24
  TOTAL AREA(ACRES) =      0.04   TOTAL RUNOFF(CFS) =      0.24

****************************************************************************
  FLOW PROCESS FROM NODE    112.40 TO NODE    112.30 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
```

```
  UPSTREAM ELEVATION(FEET) =  368.50  DOWNSTREAM ELEVATION(FEET) =  355.95
  STREET LENGTH(FEET) =   279.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 24.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.025
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.025

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.15
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.22
    HALFSTREET FLOOD WIDTH(FEET) =    3.98
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.69
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.80
  STREET FLOW TRAVEL TIME(MIN.) =   1.26   Tc(MIN.) =    3.97
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.854
  SUBAREA AREA(ACRES) =    0.25      SUBAREA RUNOFF(CFS) =    1.81
  TOTAL AREA(ACRES) =        0.3        PEAK FLOW RATE(CFS) =       2.05

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   5.61
  FLOW VELOCITY(FEET/SEC.) =  4.06   DEPTH*VELOCITY(FT*FT/SEC.) =   1.05
  LONGEST FLOWPATH FROM NODE    112.50 TO NODE    112.30 =     339.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.30 TO NODE    112.20 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   354.95  DOWNSTREAM(FEET) =   354.50
  FLOW LENGTH(FEET) =    43.00   MANNING'S N =  0.011
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.45
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.05
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    4.04
  LONGEST FLOWPATH FROM NODE    112.50 TO NODE    112.20 =     382.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.20 TO NODE    112.10 IS CODE =  51
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    354.50  DOWNSTREAM(FEET) =    353.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =    47.00   CHANNEL SLOPE =  0.0213
  CHANNEL BASE(FEET) =   11.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.08
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.51
  AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   0.52
  Tc(MIN.) =    4.55
  SUBAREA AREA(ACRES) =     0.02       SUBAREA RUNOFF(CFS) =    0.06
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.821
  TOTAL AREA(ACRES) =        0.3         PEAK FLOW RATE(CFS) =       2.11

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =   1.54
  LONGEST FLOWPATH FROM NODE    112.50 TO NODE    112.10 =     429.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.10 TO NODE    112.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    351.50  DOWNSTREAM(FEET) =    349.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    37.00   CHANNEL SLOPE =  0.0676
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.11
  FLOW VELOCITY(FEET/SEC.) =   5.77   FLOW DEPTH(FEET) =   0.11
  TRAVEL TIME(MIN.) =   0.11   Tc(MIN.) =    4.66
  LONGEST FLOWPATH FROM NODE    112.50 TO NODE    112.00 =     466.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 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.) =    4.66
  RAINFALL INTENSITY(INCH/HR) =   8.43
```

```
  TOTAL STREAM AREA(ACRES) =     0.31
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.11

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        5.74     5.79        7.670          1.01
      2        2.11     4.66        8.431          0.31

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        7.33     4.66       8.431
      2        7.66     5.79       7.670

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.66   Tc(MIN.) =    5.79
  TOTAL AREA(ACRES) =        1.3
  LONGEST FLOWPATH FROM NODE    117.00 TO NODE    112.00 =     650.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    111.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    349.00  DOWNSTREAM(FEET) =    346.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =    87.00   CHANNEL SLOPE =  0.0287
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.490
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.80
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.67
  AVERAGE FLOW DEPTH(FEET) =   0.31   TRAVEL TIME(MIN.) =   0.22
  Tc(MIN.) =    6.01
  SUBAREA AREA(ACRES) =     0.09       SUBAREA RUNOFF(CFS) =    0.28
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.735
  TOTAL AREA(ACRES) =        1.4         PEAK FLOW RATE(CFS) =       7.76

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.31   FLOW VELOCITY(FEET/SEC.) =   6.68
  LONGEST FLOWPATH FROM NODE    117.00 TO NODE    111.00 =     737.00 FEET.

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

```
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 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.) =    6.01
  RAINFALL INTENSITY(INCH/HR) =   7.49
  TOTAL STREAM AREA(ACRES) =     1.41
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.76

****************************************************************************
  FLOW PROCESS FROM NODE    111.60 TO NODE    111.50 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    391.50
  DOWNSTREAM ELEVATION(FEET) =    391.00
  ELEVATION DIFFERENCE(FEET) =      0.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.182
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.329
  SUBAREA RUNOFF(CFS) =      0.02
  TOTAL AREA(ACRES) =      0.01   TOTAL RUNOFF(CFS) =      0.02

****************************************************************************
  FLOW PROCESS FROM NODE    111.50 TO NODE    111.50 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  10.18   RAIN INTENSITY(INCH/HOUR) =  5.33
  TOTAL AREA(ACRES) =     0.01   TOTAL RUNOFF(CFS) =      0.10

****************************************************************************
  FLOW PROCESS FROM NODE    111.50 TO NODE    111.40 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    391.00  DOWNSTREAM(FEET) =    378.51
  CHANNEL LENGTH THRU SUBAREA(FEET) =   264.00   CHANNEL SLOPE =  0.0473
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.361
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.15
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.19
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   3.71
  Tc(MIN.) =   13.89
  SUBAREA AREA(ACRES) =     0.05       SUBAREA RUNOFF(CFS) =    0.10
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.724
  TOTAL AREA(ACRES) =        0.1         PEAK FLOW RATE(CFS) =       0.18

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   1.35
  LONGEST FLOWPATH FROM NODE    111.60 TO NODE    111.40 =     314.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.41 TO NODE    111.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.361
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8791
  SUBAREA AREA(ACRES) =    0.42   SUBAREA RUNOFF(CFS) =    1.66
  TOTAL AREA(ACRES) =        0.5   TOTAL RUNOFF(CFS) =       1.84
  TC(MIN.) =   13.89

****************************************************************************
  FLOW PROCESS FROM NODE    111.40 TO NODE    111.30 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    378.51  DOWNSTREAM(FEET) =    378.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =    82.00   CHANNEL SLOPE =  0.0001
  CHANNEL BASE(FEET) =    9.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.670
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5800
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.86
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.32
  AVERAGE FLOW DEPTH(FEET) =   0.65   TRAVEL TIME(MIN.) =   4.26
  Tc(MIN.) =   18.16
  SUBAREA AREA(ACRES) =     0.02       SUBAREA RUNOFF(CFS) =    0.04
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.867
  TOTAL AREA(ACRES) =        0.5         PEAK FLOW RATE(CFS) =       1.84

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
  DEPTH(FEET) =  0.64   FLOW VELOCITY(FEET/SEC.) =   0.32
  LONGEST FLOWPATH FROM NODE    111.60 TO NODE    111.30 =     396.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.30 TO NODE    111.20 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   374.00  DOWNSTREAM(FEET) =   371.50
  FLOW LENGTH(FEET) =    18.00   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.23
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.84
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   18.18
  LONGEST FLOWPATH FROM NODE    111.60 TO NODE    111.20 =     414.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.21 TO NODE    111.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.667
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7669
  SUBAREA AREA(ACRES) =    0.14   SUBAREA RUNOFF(CFS) =    0.20
  TOTAL AREA(ACRES) =        0.6   TOTAL RUNOFF(CFS) =       1.84
  TC(MIN.) =   18.18
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    111.20 TO NODE    111.10 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   371.50  DOWNSTREAM(FEET) =   350.00
  FLOW LENGTH(FEET) =   148.00   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.47
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.84
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   18.36
  LONGEST FLOWPATH FROM NODE    111.60 TO NODE    111.10 =     562.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.10 TO NODE    111.00 IS CODE =  51
```

```
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    350.00  DOWNSTREAM(FEET) =    346.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =    22.00   CHANNEL SLOPE =  0.1591
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.84
  FLOW VELOCITY(FEET/SEC.) =   2.83   FLOW DEPTH(FEET) =   0.09
  TRAVEL TIME(MIN.) =   0.13   Tc(MIN.) =   18.49
  LONGEST FLOWPATH FROM NODE    111.60 TO NODE    111.00 =     584.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =   1
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   18.49
  RAINFALL INTENSITY(INCH/HR) =   3.63
  TOTAL STREAM AREA(ACRES) =     0.64
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.84

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        7.76     6.01        7.490          1.41
      2        1.84    18.49        3.627          0.64

  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        8.36     6.01       7.490
      2        5.60    18.49       3.627

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       8.36   Tc(MIN.) =    6.01
  TOTAL AREA(ACRES) =        2.0
  LONGEST FLOWPATH FROM NODE    117.00 TO NODE    111.00 =     737.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    110.00 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    346.50  DOWNSTREAM(FEET) =    340.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    15.00   CHANNEL SLOPE =  0.4333
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       8.36
  FLOW VELOCITY(FEET/SEC.) =  16.78   FLOW DEPTH(FEET) =   0.15
  TRAVEL TIME(MIN.) =   0.01   Tc(MIN.) =    6.02
  LONGEST FLOWPATH FROM NODE    117.00 TO NODE    110.00 =     752.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 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        8.36     6.02       7.478        2.05
  LONGEST FLOWPATH FROM NODE    117.00 TO NODE    110.00 =     752.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        7.58    13.67       4.408        3.30
  LONGEST FLOWPATH FROM NODE    180.00 TO NODE    110.00 =    2086.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      11.70       6.02        7.478
      2      12.50      13.67        4.408

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      12.50   Tc(MIN.) =   13.67
  TOTAL AREA(ACRES) =        5.3

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    100.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    340.00  DOWNSTREAM(FEET) =    338.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    93.00   CHANNEL SLOPE =  0.0215
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.363
```

```
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3900
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.60
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.03
  AVERAGE FLOW DEPTH(FEET) =   0.44   TRAVEL TIME(MIN.) =   0.22
  Tc(MIN.) =   13.89
  SUBAREA AREA(ACRES) =     0.11       SUBAREA RUNOFF(CFS) =    0.18
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.602
  TOTAL AREA(ACRES) =        5.5         PEAK FLOW RATE(CFS) =      14.33

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.47   FLOW VELOCITY(FEET/SEC.) =   7.30
  LONGEST FLOWPATH FROM NODE    180.00 TO NODE    100.00 =    2179.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    100.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.89
  RAINFALL INTENSITY(INCH/HR) =   4.36
  TOTAL STREAM AREA(ACRES) =     5.46
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     14.33

****************************************************************************
  FLOW PROCESS FROM NODE    100.40 TO NODE    100.30 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5700
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    378.00
  DOWNSTREAM ELEVATION(FEET) =    367.50
  ELEVATION DIFFERENCE(FEET) =     10.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.131
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  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    100.30 TO NODE    100.20 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    367.50  DOWNSTREAM(FEET) =    357.25
  CHANNEL LENGTH THRU SUBAREA(FEET) =    60.00   CHANNEL SLOPE =  0.1708
  CHANNEL BASE(FEET) =    1.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6200
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.23
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.59
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   0.39
  Tc(MIN.) =    3.52
  SUBAREA AREA(ACRES) =     0.03       SUBAREA RUNOFF(CFS) =    0.16
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.595
  TOTAL AREA(ACRES) =        0.1         PEAK FLOW RATE(CFS) =       0.31

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.08   FLOW VELOCITY(FEET/SEC.) =   3.04
  LONGEST FLOWPATH FROM NODE    100.40 TO NODE    100.20 =     110.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    100.20 TO NODE    100.10 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   353.50  DOWNSTREAM(FEET) =   351.33
  FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.35
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.31
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =    3.86
  LONGEST FLOWPATH FROM NODE    100.40 TO NODE    100.10 =     200.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    100.11 TO NODE    100.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8100
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7693
  SUBAREA AREA(ACRES) =    0.26   SUBAREA RUNOFF(CFS) =    1.78
```

```
  TOTAL AREA(ACRES) =        0.3   TOTAL RUNOFF(CFS) =       2.09
  TC(MIN.) =    3.86

****************************************************************************
  FLOW PROCESS FROM NODE    100.10 TO NODE    100.07 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   351.33  DOWNSTREAM(FEET) =   349.00
  FLOW LENGTH(FEET) =    26.00   MANNING'S N =  0.011
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.64
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.09
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    3.90
  LONGEST FLOWPATH FROM NODE    100.40 TO NODE    100.07 =     226.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    100.09 TO NODE    100.07 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7571
  SUBAREA AREA(ACRES) =    0.01   SUBAREA RUNOFF(CFS) =    0.02
  TOTAL AREA(ACRES) =        0.3   TOTAL RUNOFF(CFS) =       2.11
  TC(MIN.) =    3.90

****************************************************************************
  FLOW PROCESS FROM NODE    100.08 TO NODE    100.07 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7633
  SUBAREA AREA(ACRES) =    0.01   SUBAREA RUNOFF(CFS) =    0.11
  TOTAL AREA(ACRES) =        0.3   TOTAL RUNOFF(CFS) =       2.23
  TC(MIN.) =    3.90

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

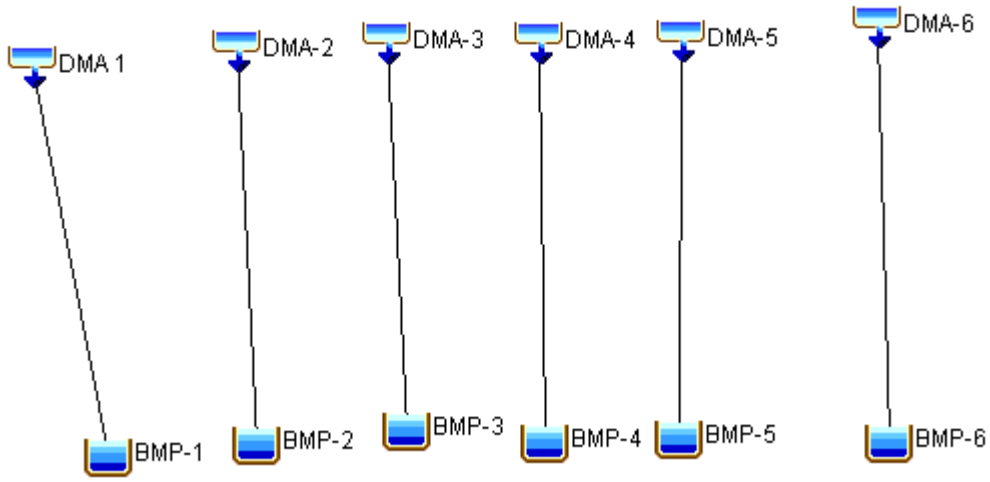
```
 FLOW PROCESS FROM NODE    100.07 TO NODE    100.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   345.00  DOWNSTREAM(FEET) =   338.00
 FLOW LENGTH(FEET) =    93.00   MANNING'S N =  0.011
 DEPTH OF FLOW IN   8.0 INCH PIPE IS   4.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.14
 GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.23
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    4.04
 LONGEST FLOWPATH FROM NODE    100.40 TO NODE    100.00 =     319.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    100.00 TO NODE    100.00 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.) =    4.04
 RAINFALL INTENSITY(INCH/HR) =   8.43
 TOTAL STREAM AREA(ACRES) =     0.35
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.23

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       14.33    13.89        4.363          5.46
     2        2.23     4.04        8.431          0.35

 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        6.40     4.04       8.431
     2       15.49    13.89       4.363

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      15.49   Tc(MIN.) =   13.89
 TOTAL AREA(ACRES) =        5.8
 LONGEST FLOWPATH FROM NODE    180.00 TO NODE    100.00 =    2179.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        5.8  TC(MIN.) =     13.89
 PEAK FLOW RATE(CFS)   =      15.49
```

```
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Kensho Housing – HEC HMS Analysis Summary

12/21/2022

Analysis Model Layout:



Global Summary Table of Mitigated Flows:

Global Summary Results for Run "KENPOST"

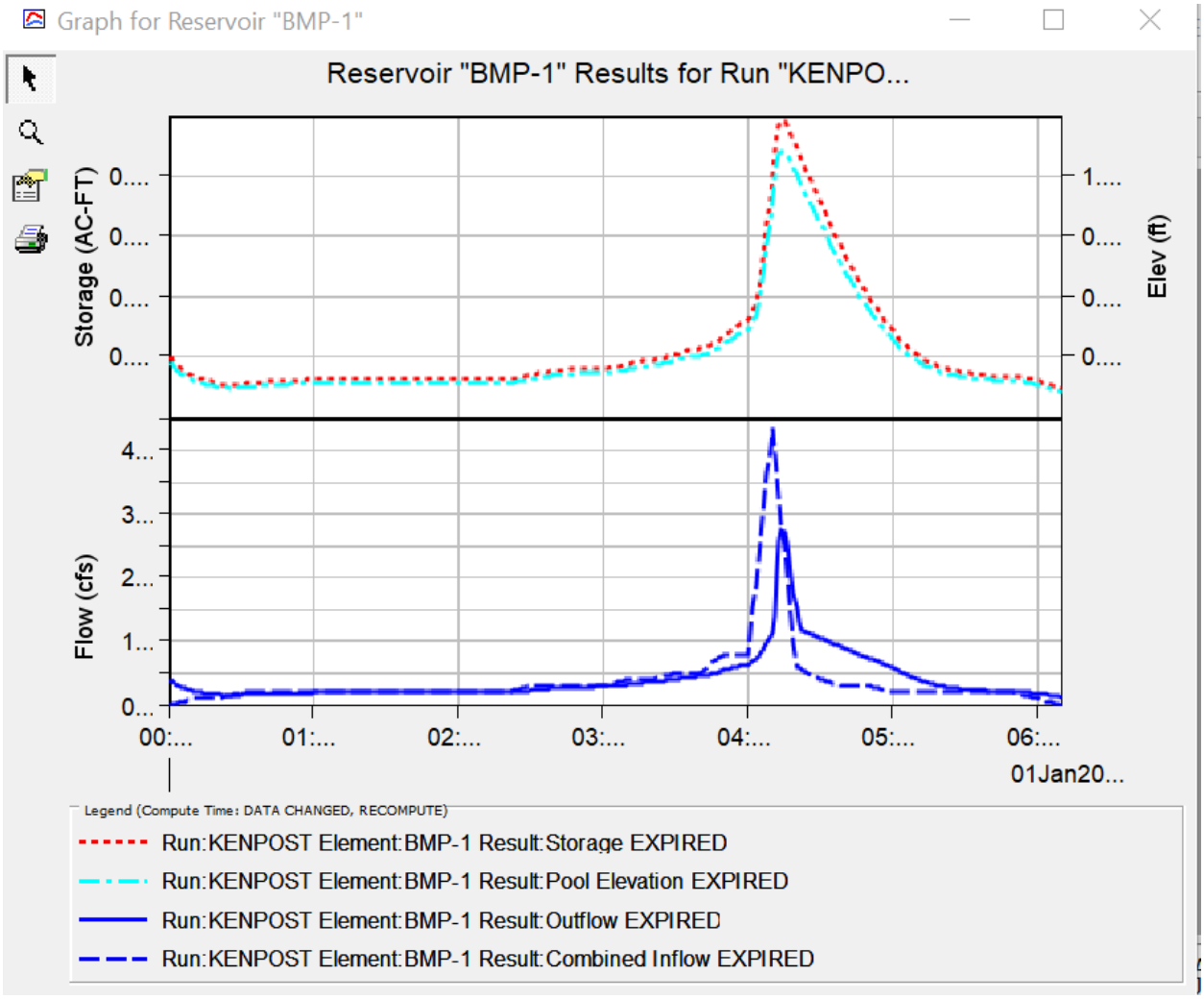
Project: KENSHO Simulation Run: KENPOST

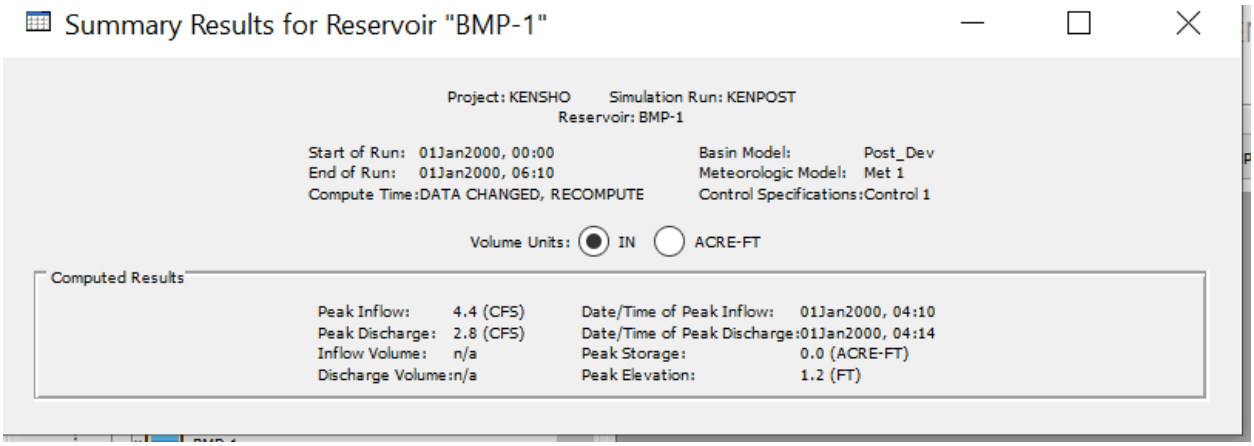
Start of Run: 01Jan2000, 00:00
End of Run: 01Jan2000, 06:10
Compute Time: DATA CHANGED, RECOMPUTE

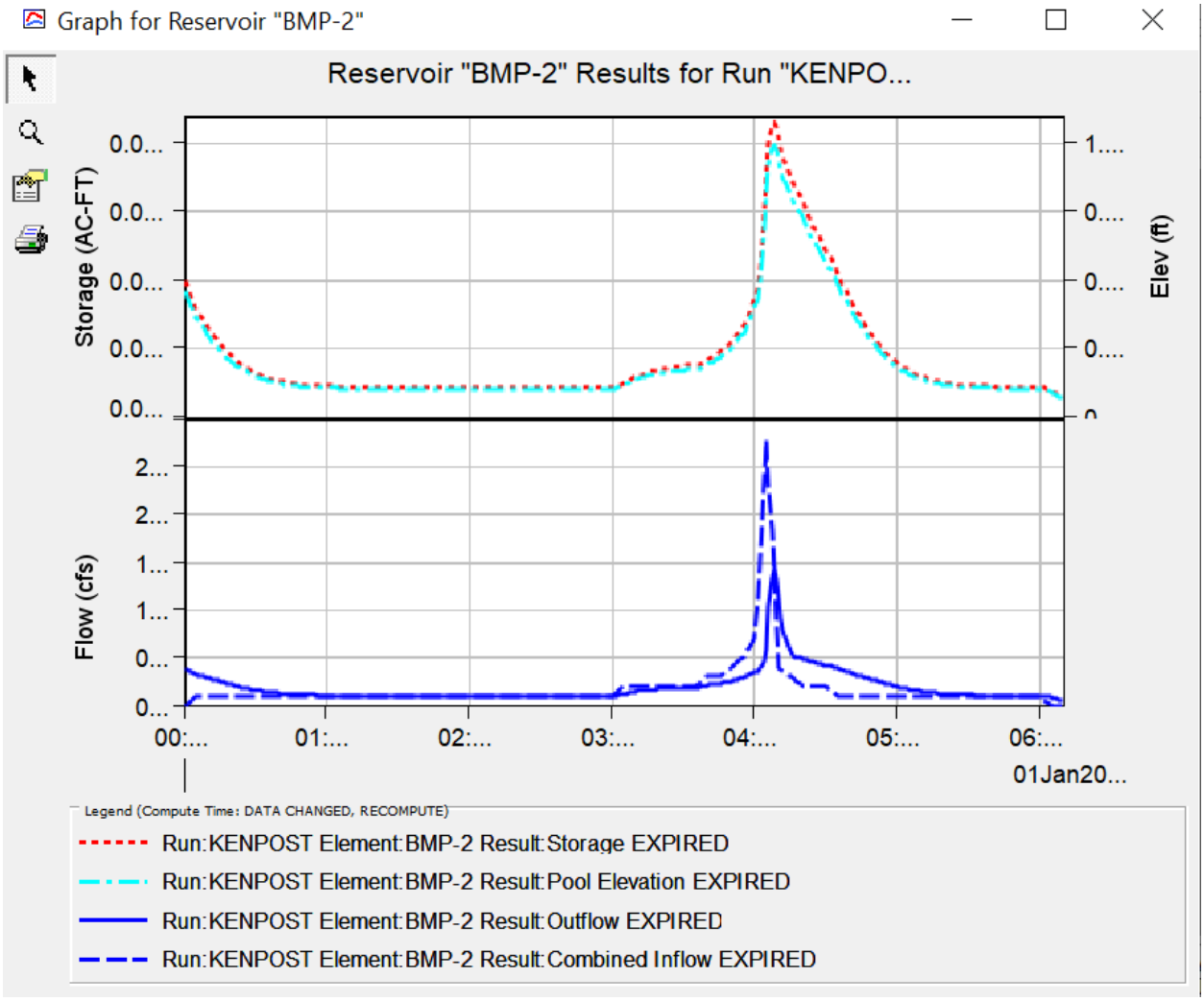
Basin Model: Post_Dev
Meteorologic Model: Met 1
Control Specifications: Control 1

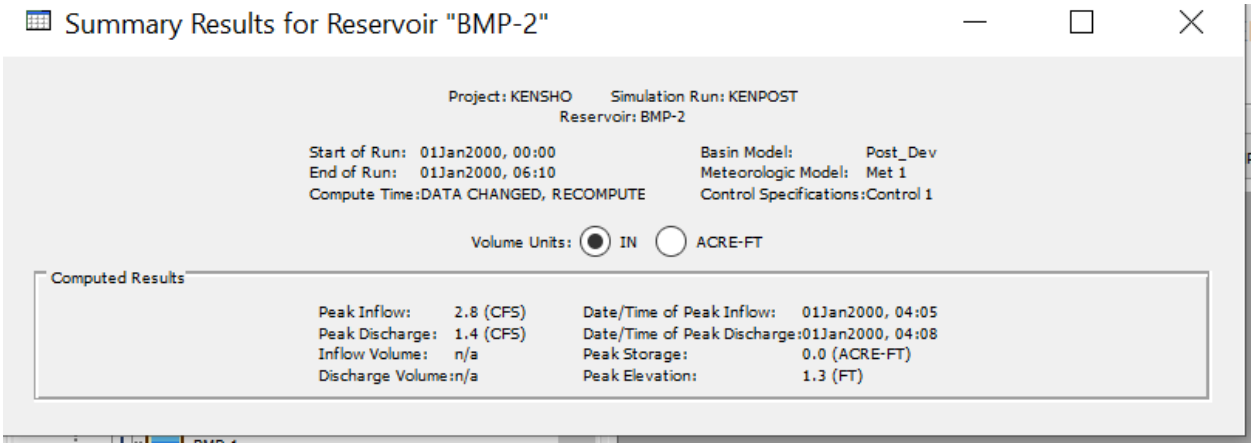
Show Elements: All Elem... Volume Units: IN ACRE-FT Sorting: Hydro...

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
DMA 1	Not Specified	4.4	01Jan2000, 04:10	n/a
BMP-1	Not Specified	2.8	01Jan2000, 04:14	n/a
DMA-2	Not Specified	2.8	01Jan2000, 04:05	n/a
BMP-2	Not Specified	1.4	01Jan2000, 04:08	n/a
DMA-3	Not Specified	4.8	01Jan2000, 04:05	n/a
BMP-3	Not Specified	4.2	01Jan2000, 04:06	n/a
DMA-4	Not Specified	0.7	01Jan2000, 04:10	n/a
BMP-4	Not Specified	0.3	01Jan2000, 04:17	n/a
DMA-5	Not Specified	1.8	01Jan2000, 04:20	n/a
BMP-5	Not Specified	1.1	01Jan2000, 04:29	n/a
DMA-6	Not Specified	2.1	01Jan2000, 04:05	n/a
BMP-6	Not Specified	0.9	01Jan2000, 04:08	n/a

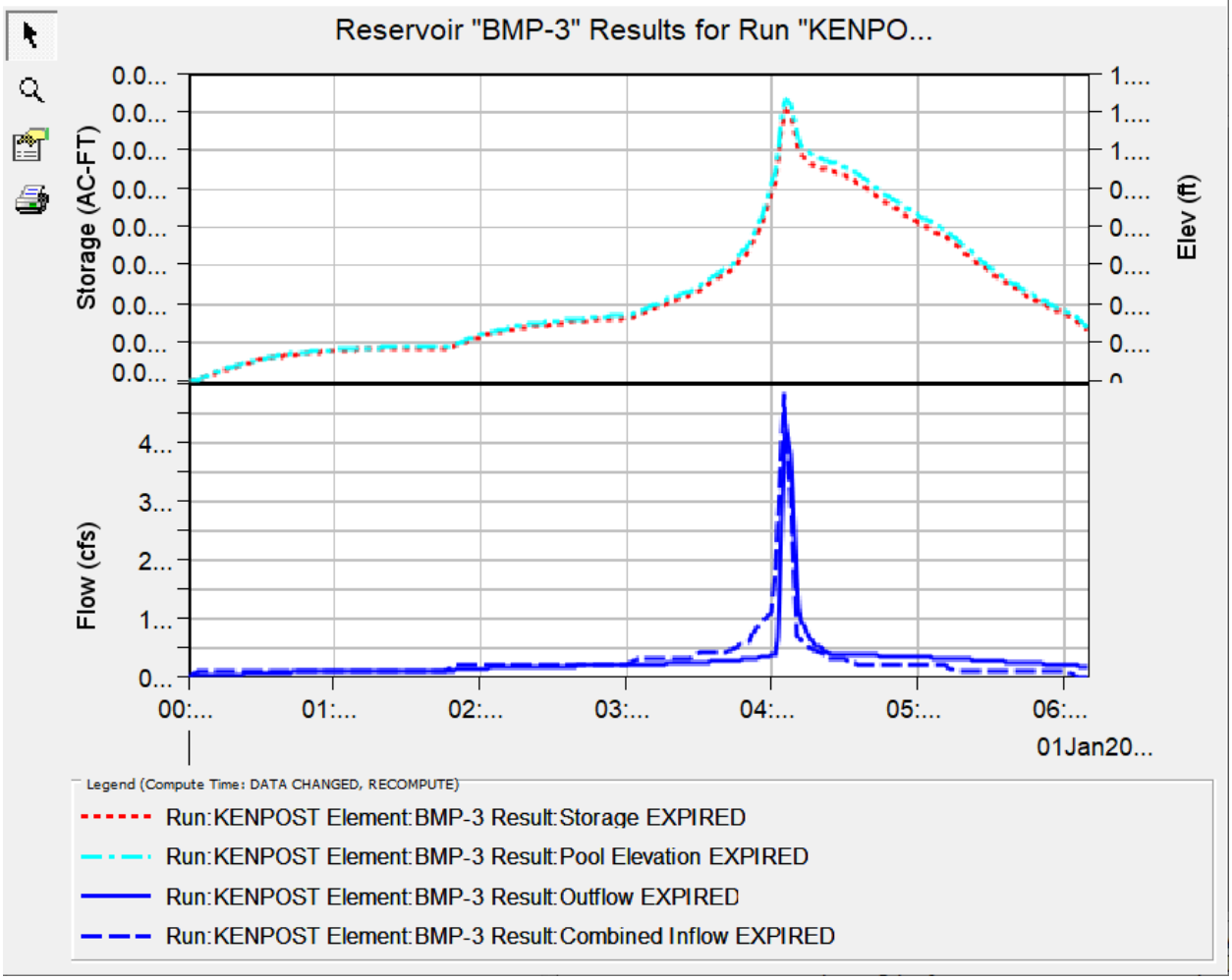

Graph for Reservoir "BMP-1"
Reservoir "BMP-1" Results for Run "KENPO...
Storage (AC-FT)
0....
0....
0....
0....
Elev (ft)
1....
0....
0....
0....
Flow (cfs)
4...
3...
2...
1...
0...
00:...
01:...
02:...
03:...
04:...
05:...
06:...
01Jan20...
Legend (Compute Time: DATA CHANGED, RECOMPUTE)
Run:KENPOST Element:BMP-1 Result:Storage EXPIRED
Run:KENPOST Element:BMP-1 Result:Pool Elevation EXPIRED
Run:KENPOST Element:BMP-1 Result:Outflow EXPIRED
Run:KENPOST Element:BMP-1 Result:Combined Inflow EXPIRED


Summary Results for Reservoir "BMP-1"
Project: KENSHO Simulation Run: KENPOST
Reservoir: BMP-1
Start of Run: 01Jan2000, 00:00
End of Run: 01Jan2000, 06:10
Compute Time: DATA CHANGED, RECOMPUTE
Basin Model: Post_Dev
Meteorologic Model: Met 1
Control Specifications: Control 1
Volume Units: IN ACRE-FT
Computed Results
Peak Inflow: 4.4 (CFS)
Peak Discharge: 2.8 (CFS)
Inflow Volume: n/a
Discharge Volume: n/a
Date/Time of Peak Inflow: 01Jan2000, 04:10
Date/Time of Peak Discharge: 01Jan2000, 04:14
Peak Storage: 0.0 (ACRE-FT)
Peak Elevation: 1.2 (FT)


Graph for Reservoir "BMP-2"
Reservoir "BMP-2" Results for Run "KENPO...
Storage (AC-FT)
Elev (ft)
Flow (cfs)
00:...
01:...
02:...
03:...
04:...
05:...
06:...
01Jan20...
Legend (Compute Time: DATA CHANGED, RECOMPUTE)
Run:KENPOST Element:BMP-2 Result:Storage EXPIRED
Run:KENPOST Element:BMP-2 Result:Pool Elevation EXPIRED
Run:KENPOST Element:BMP-2 Result:Outflow EXPIRED
Run:KENPOST Element:BMP-2 Result:Combined Inflow EXPIRED


Summary Results for Reservoir "BMP-2"
Project: KENSHO Simulation Run: KENPOST
Reservoir: BMP-2
Start of Run: 01Jan2000, 00:00
End of Run: 01Jan2000, 06:10
Compute Time: DATA CHANGED, RECOMPUTE
Basin Model: Post_Dev
Meteorologic Model: Met 1
Control Specifications: Control 1
Volume Units: IN ACRE-FT
Computed Results
Peak Inflow: 2.8 (CFS)
Peak Discharge: 1.4 (CFS)
Inflow Volume: n/a
Discharge Volume: n/a
Date/Time of Peak Inflow: 01Jan2000, 04:05
Date/Time of Peak Discharge: 01Jan2000, 04:08
Peak Storage: 0.0 (ACRE-FT)
Peak Elevation: 1.3 (FT)

Graph for Reservoir "BMP-3"



Summary Results for Reservoir "BMP-3"

Project: KENSHO Simulation Run: KENPOST
Reservoir: BMP-3

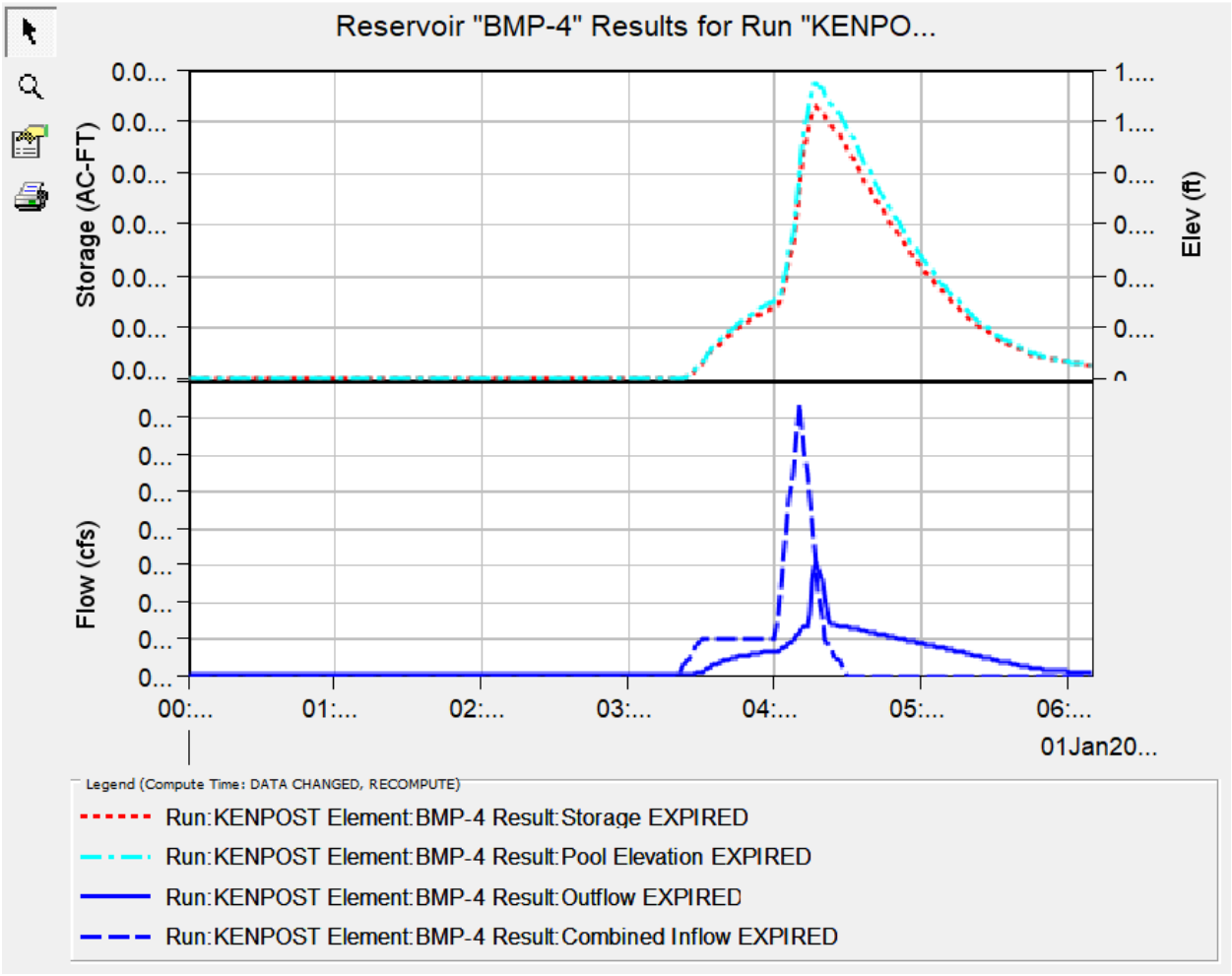
Start of Run:	01Jan2000, 00:00	Basin Model:	Post_Dev
End of Run:	01Jan2000, 06:10	Meteorologic Model:	Met 1
Compute Time:	DATA CHANGED, RECOMPUTE	Control Specifications:	Control 1

Volume Units: (•) IN ( ) ACRE-FT

Computed Results

Peak Inflow:	4.8 (CFS)	Date/Time of Peak Inflow:	01Jan2000, 04:05
Peak Discharge:	4.2 (CFS)	Date/Time of Peak Discharge:	01Jan2000, 04:06
Inflow Volume:	n/a	Peak Storage:	0.0 (ACRE-FT)
Discharge Volume:	n/a	Peak Elevation:	1.3 (FT)

Graph for Reservoir "BMP-4"



Summary Results for Reservoir "BMP-4"

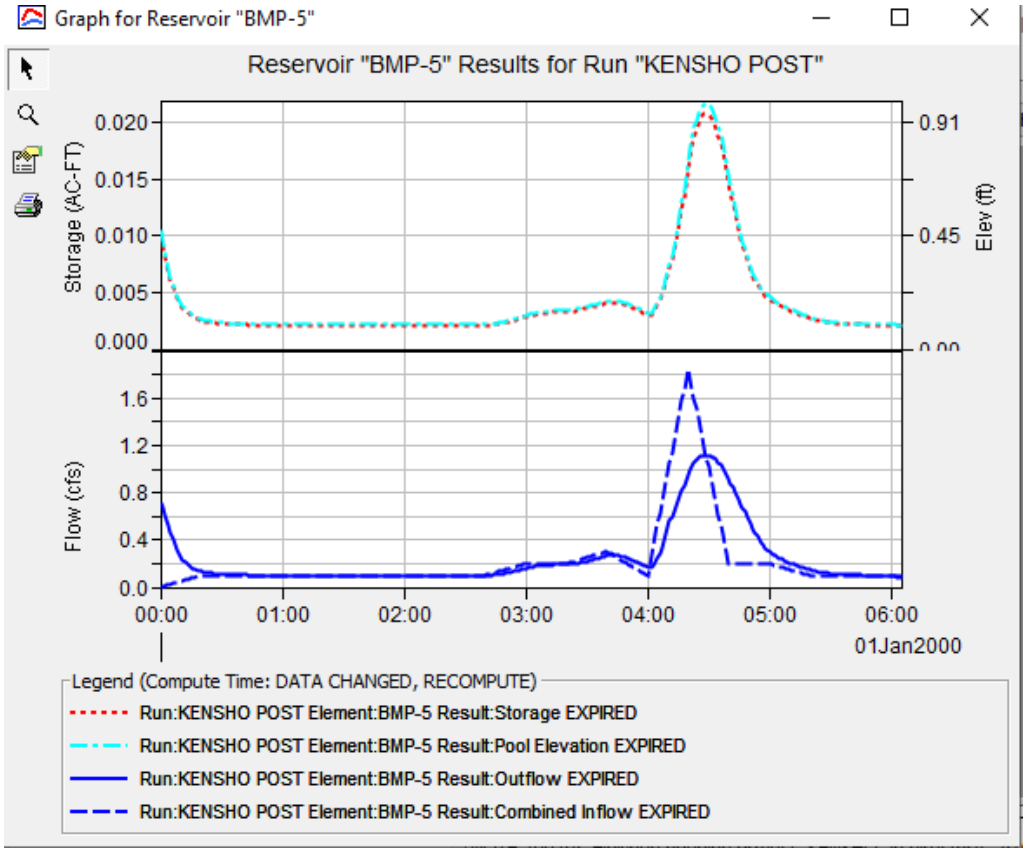
Project: KENSHO Simulation Run: KENPOST
Reservoir: BMP-4

Start of Run:	01Jan2000, 00:00	Basin Model:	Post_Dev
End of Run:	01Jan2000, 06:10	Meteorologic Model:	Met 1
Compute Time:	DATA CHANGED, RECOMPUTE	Control Specifications:	Control 1

Volume Units: (●) IN ( ) ACRE-FT

Computed Results

Peak Inflow:	0.7 (CFS)	Date/Time of Peak Inflow:	01Jan2000, 04:10
Peak Discharge:	0.3 (CFS)	Date/Time of Peak Discharge:	01Jan2000, 04:17
Inflow Volume:	n/a	Peak Storage:	0.0 (ACRE-FT)
Discharge Volume:	n/a	Peak Elevation:	1.3 (FT)



Summary Results for Reservoir "BMP-5"

Project: KENSHO Simulation Run: KENSHO POST
Reservoir: BMP-5

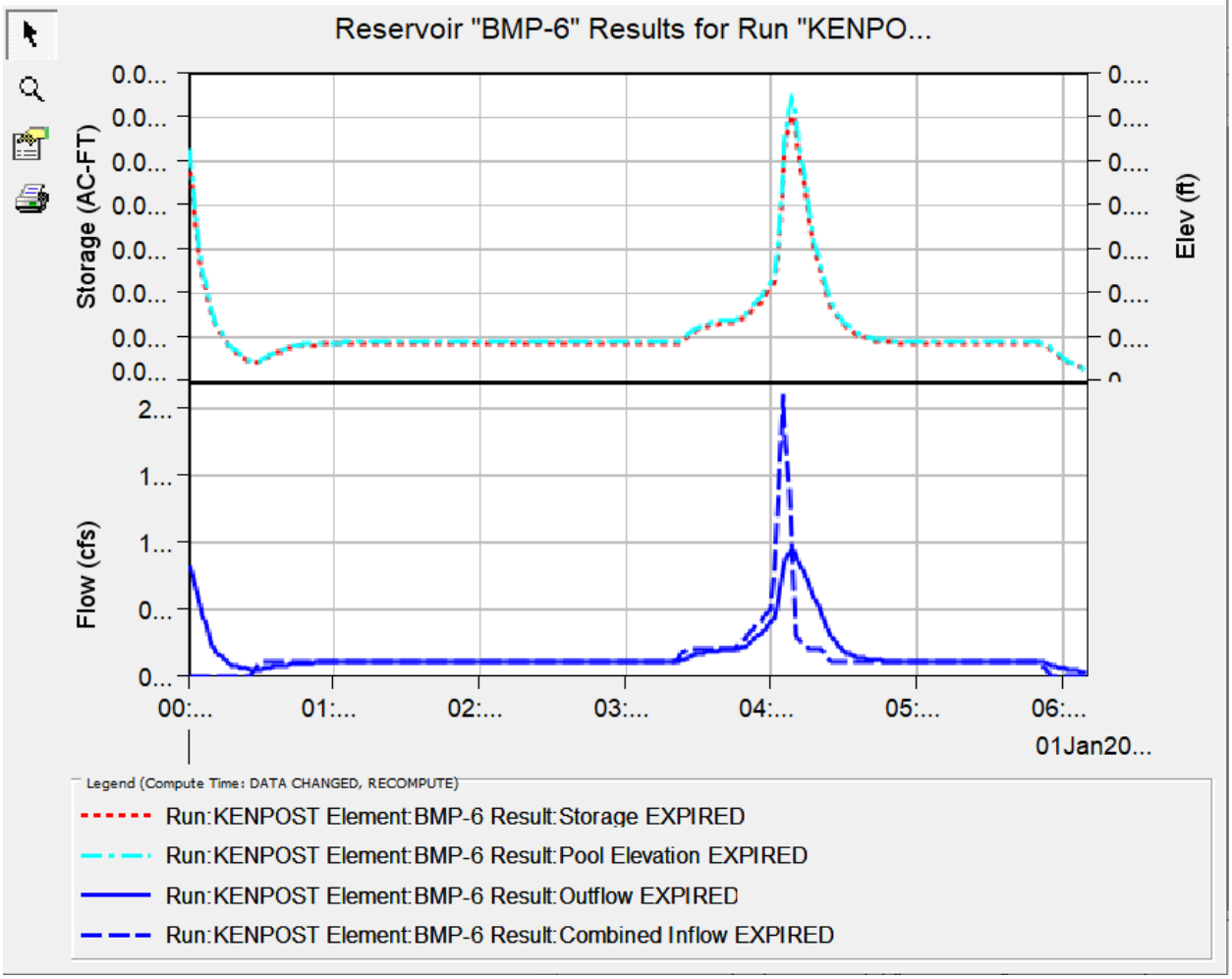
Start of Run:	01Jan2000, 00:00	Basin Model:	Post_Dev
End of Run:	01Jan2000, 06:10	Meteorologic Model:	Met 1
Compute Time:	DATA CHANGED, RECOMPUTE	Control Specifications:	Control 1

Volume Units: (•) IN ( ) ACRE-FT

Computed Results

Peak Inflow:	1.8 (CFS)	Date/Time of Peak Inflow:	01Jan2000, 04:20
Peak Discharge:	1.1 (CFS)	Date/Time of Peak Discharge:	01Jan2000, 04:29
Inflow Volume:	n/a	Peak Storage:	0.0 (ACRE-FT)
Discharge Volume:	n/a	Peak Elevation:	1.0 (FT)

Graph for Reservoir "BMP-6"



Summary Results for Reservoir "BMP-6"

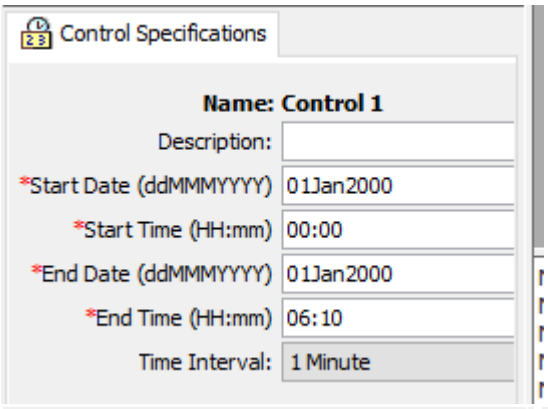
Project: KENSHO Simulation Run: KENPOST
Reservoir: BMP-6

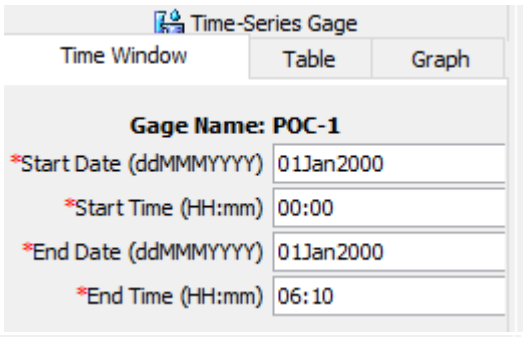
Start of Run:	01Jan2000, 00:00	Basin Model:	Post_Dev
End of Run:	01Jan2000, 06:10	Meteorologic Model:	Met 1
Compute Time:	DATA CHANGED, RECOMPUTE	Control Specifications:	Control 1

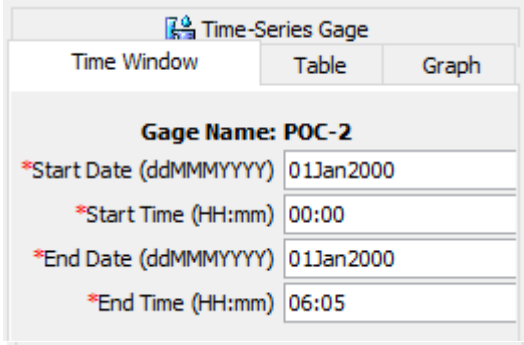
Volume Units: (•) IN ( ) ACRE-FT

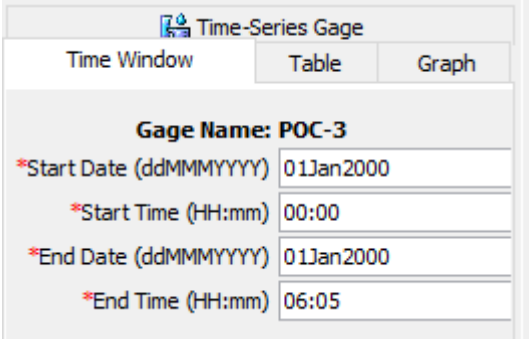
Computed Results

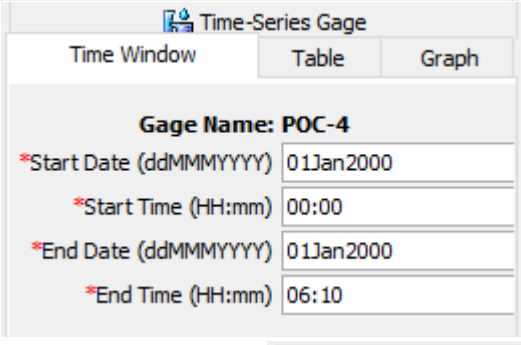
Peak Inflow:	2.1 (CFS)	Date/Time of Peak Inflow:	01Jan2000, 04:05
Peak Discharge:	0.9 (CFS)	Date/Time of Peak Discharge:	01Jan2000, 04:08
Inflow Volume:	n/a	Peak Storage:	0.0 (ACRE-FT)
Discharge Volume:	n/a	Peak Elevation:	0.7 (FT)

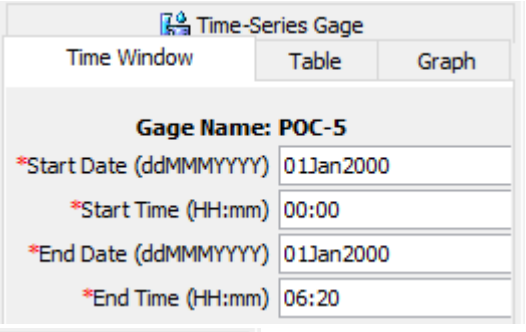

Control Specifications
Name: Control 1
Description:
*Start Date (ddMMMYYYY) 01Jan2000
*Start Time (HH:mm) 00:00
*End Date (ddMMMYYYY) 01Jan2000
*End Time (HH:mm) 06:10
Time Interval: 1 Minute

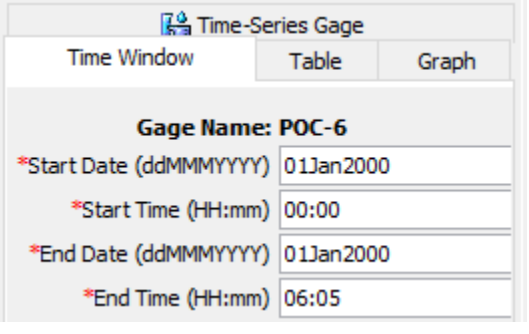

Time-Series Gage
Time Window
Table
Graph
Gage Name: POC-1
*Start Date (ddMMMYYYY) 01Jan2000
*Start Time (HH:mm) 00:00
*End Date (ddMMMYYYY) 01Jan2000
*End Time (HH:mm) 06:10


Time-Series Gage
Time Window
Table
Graph
Gage Name: POC-2
*Start Date (ddMMMYYYY) 01Jan2000
*Start Time (HH:mm) 00:00
*End Date (ddMMMYYYY) 01Jan2000
*End Time (HH:mm) 06:05


Time-Series Gage
Time Window
Table
Graph
Gage Name: POC-3
*Start Date (ddMMMYYYY) 01Jan2000
*Start Time (HH:mm) 00:00
*End Date (ddMMMYYYY) 01Jan2000
*End Time (HH:mm) 06:05


Time-Series Gage
Time Window
Table
Graph
Gage Name: POC-4
*Start Date (ddMMMYYYY) 01Jan2000
*Start Time (HH:mm) 00:00
*End Date (ddMMMYYYY) 01Jan2000
*End Time (HH:mm) 06:10


Time-Series Gage
Time Window
Table
Graph
Gage Name: POC-5
*Start Date (ddMMMYYYY) 01Jan2000
*Start Time (HH:mm) 00:00
*End Date (ddMMMYYYY) 01Jan2000
*End Time (HH:mm) 06:20


Time-Series Gage
Time Window
Table
Graph
Gage Name: POC-6
*Start Date (ddMMMYYYY) 01Jan2000
*Start Time (HH:mm) 00:00
*End Date (ddMMMYYYY) 01Jan2000
*End Time (HH:mm) 06:05

RICK RAT HYDRO INPUTS						
	Basin 1	Basin 2	Basin 3	Basin 4	Basin 5	Basin 6
Node	140	123	114	113.1	111.3	112.1
Tributary Area	1.1	0.4	0.7	0.1	0.5	0.3
C	0.68	0.81	0.78	0.87	0.87	0.82
P6	3.2	3.2	3.2	3.2	3.2	3.2
Tc	8.8	3.39	4.7	7.65	18.16	4.55
Q	4.36	2.78	4.83	0.74	1.84	2.11
Tc Rick Rat	10	5	5	10	20	5

BMP-1 RICK RAT OUTPUT

TIME (MIN) =	0	DISCHARGE (CFS) =	0
TIME (MIN) =	10	DISCHARGE (CFS) =	0.1
TIME (MIN) =	20	DISCHARGE (CFS) =	0.1
TIME (MIN) =	30	DISCHARGE (CFS) =	0.2
TIME (MIN) =	40	DISCHARGE (CFS) =	0.2
TIME (MIN) =	50	DISCHARGE (CFS) =	0.2
TIME (MIN) =	60	DISCHARGE (CFS) =	0.2
TIME (MIN) =	70	DISCHARGE (CFS) =	0.2
TIME (MIN) =	80	DISCHARGE (CFS) =	0.2
TIME (MIN) =	90	DISCHARGE (CFS) =	0.2
TIME (MIN) =	100	DISCHARGE (CFS) =	0.2
TIME (MIN) =	110	DISCHARGE (CFS) =	0.2
TIME (MIN) =	120	DISCHARGE (CFS) =	0.2
TIME (MIN) =	130	DISCHARGE (CFS) =	0.2
TIME (MIN) =	140	DISCHARGE (CFS) =	0.2
TIME (MIN) =	150	DISCHARGE (CFS) =	0.3
TIME (MIN) =	160	DISCHARGE (CFS) =	0.3
TIME (MIN) =	170	DISCHARGE (CFS) =	0.3
TIME (MIN) =	180	DISCHARGE (CFS) =	0.3
TIME (MIN) =	190	DISCHARGE (CFS) =	0.4
TIME (MIN) =	200	DISCHARGE (CFS) =	0.4
TIME (MIN) =	210	DISCHARGE (CFS) =	0.5
TIME (MIN) =	220	DISCHARGE (CFS) =	0.5
TIME (MIN) =	230	DISCHARGE (CFS) =	0.8
TIME (MIN) =	240	DISCHARGE (CFS) =	0.8
TIME (MIN) =	250	DISCHARGE (CFS) =	4.36
TIME (MIN) =	260	DISCHARGE (CFS) =	0.6
TIME (MIN) =	270	DISCHARGE (CFS) =	0.4
TIME (MIN) =	280	DISCHARGE (CFS) =	0.3
TIME (MIN) =	290	DISCHARGE (CFS) =	0.3
TIME (MIN) =	300	DISCHARGE (CFS) =	0.2
TIME (MIN) =	310	DISCHARGE (CFS) =	0.2
TIME (MIN) =	320	DISCHARGE (CFS) =	0.2
TIME (MIN) =	330	DISCHARGE (CFS) =	0.2
TIME (MIN) =	340	DISCHARGE (CFS) =	0.2
TIME (MIN) =	350	DISCHARGE (CFS) =	0.2
TIME (MIN) =	360	DISCHARGE (CFS) =	0.1
TIME (MIN) =	370	DISCHARGE (CFS) =	0

BMP-2 RICK RAT OUTPUT

TIME (MIN) =	0	DISCHARGE (CFS) =	0
TIME (MIN) =	5	DISCHARGE (CFS) =	0.1
TIME (MIN) =	10	DISCHARGE (CFS) =	0.1
TIME (MIN) =	15	DISCHARGE (CFS) =	0.1
TIME (MIN) =	20	DISCHARGE (CFS) =	0.1
TIME (MIN) =	25	DISCHARGE (CFS) =	0.1
TIME (MIN) =	30	DISCHARGE (CFS) =	0.1
TIME (MIN) =	35	DISCHARGE (CFS) =	0.1
TIME (MIN) =	40	DISCHARGE (CFS) =	0.1
TIME (MIN) =	45	DISCHARGE (CFS) =	0.1
TIME (MIN) =	50	DISCHARGE (CFS) =	0.1
TIME (MIN) =	55	DISCHARGE (CFS) =	0.1
TIME (MIN) =	60	DISCHARGE (CFS) =	0.1
TIME (MIN) =	65	DISCHARGE (CFS) =	0.1
TIME (MIN) =	70	DISCHARGE (CFS) =	0.1
TIME (MIN) =	75	DISCHARGE (CFS) =	0.1
TIME (MIN) =	80	DISCHARGE (CFS) =	0.1
TIME (MIN) =	85	DISCHARGE (CFS) =	0.1
TIME (MIN) =	90	DISCHARGE (CFS) =	0.1
TIME (MIN) =	95	DISCHARGE (CFS) =	0.1
TIME (MIN) =	100	DISCHARGE (CFS) =	0.1
TIME (MIN) =	105	DISCHARGE (CFS) =	0.1
TIME (MIN) =	110	DISCHARGE (CFS) =	0.1
TIME (MIN) =	115	DISCHARGE (CFS) =	0.1
TIME (MIN) =	120	DISCHARGE (CFS) =	0.1
TIME (MIN) =	125	DISCHARGE (CFS) =	0.1
TIME (MIN) =	130	DISCHARGE (CFS) =	0.1
TIME (MIN) =	135	DISCHARGE (CFS) =	0.1
TIME (MIN) =	140	DISCHARGE (CFS) =	0.1
TIME (MIN) =	145	DISCHARGE (CFS) =	0.1
TIME (MIN) =	150	DISCHARGE (CFS) =	0.1
TIME (MIN) =	155	DISCHARGE (CFS) =	0.1
TIME (MIN) =	160	DISCHARGE (CFS) =	0.1
TIME (MIN) =	165	DISCHARGE (CFS) =	0.1
TIME (MIN) =	170	DISCHARGE (CFS) =	0.1
TIME (MIN) =	175	DISCHARGE (CFS) =	0.1
TIME (MIN) =	180	DISCHARGE (CFS) =	0.1
TIME (MIN) =	185	DISCHARGE (CFS) =	0.2
TIME (MIN) =	190	DISCHARGE (CFS) =	0.2
TIME (MIN) =	195	DISCHARGE (CFS) =	0.2
TIME (MIN) =	200	DISCHARGE (CFS) =	0.2
TIME (MIN) =	205	DISCHARGE (CFS) =	0.2
TIME (MIN) =	210	DISCHARGE (CFS) =	0.2
TIME (MIN) =	215	DISCHARGE (CFS) =	0.2
TIME (MIN) =	220	DISCHARGE (CFS) =	0.3
TIME (MIN) =	225	DISCHARGE (CFS) =	0.3

TIME (MIN) =	230	DISCHARGE (CFS) =	0.4
TIME (MIN) =	235	DISCHARGE (CFS) =	0.5
TIME (MIN) =	240	DISCHARGE (CFS) =	0.7
TIME (MIN) =	245	DISCHARGE (CFS) =	2.78
TIME (MIN) =	250	DISCHARGE (CFS) =	0.4
TIME (MIN) =	255	DISCHARGE (CFS) =	0.3
TIME (MIN) =	260	DISCHARGE (CFS) =	0.2
TIME (MIN) =	265	DISCHARGE (CFS) =	0.2
TIME (MIN) =	270	DISCHARGE (CFS) =	0.2
TIME (MIN) =	275	DISCHARGE (CFS) =	0.1
TIME (MIN) =	280	DISCHARGE (CFS) =	0.1
TIME (MIN) =	285	DISCHARGE (CFS) =	0.1
TIME (MIN) =	290	DISCHARGE (CFS) =	0.1
TIME (MIN) =	295	DISCHARGE (CFS) =	0.1
TIME (MIN) =	300	DISCHARGE (CFS) =	0.1
TIME (MIN) =	305	DISCHARGE (CFS) =	0.1
TIME (MIN) =	310	DISCHARGE (CFS) =	0.1
TIME (MIN) =	315	DISCHARGE (CFS) =	0.1
TIME (MIN) =	320	DISCHARGE (CFS) =	0.1
TIME (MIN) =	325	DISCHARGE (CFS) =	0.1
TIME (MIN) =	330	DISCHARGE (CFS) =	0.1
TIME (MIN) =	335	DISCHARGE (CFS) =	0.1
TIME (MIN) =	340	DISCHARGE (CFS) =	0.1
TIME (MIN) =	345	DISCHARGE (CFS) =	0.1
TIME (MIN) =	350	DISCHARGE (CFS) =	0.1
TIME (MIN) =	355	DISCHARGE (CFS) =	0.1
TIME (MIN) =	360	DISCHARGE (CFS) =	0.1
TIME (MIN) =	365	DISCHARGE (CFS) =	0

BMP-3 RICK RAT OUTPUT

TIME (MIN) =	0	DISCHARGE (CFS) =	0
TIME (MIN) =	5	DISCHARGE (CFS) =	0.1
TIME (MIN) =	10	DISCHARGE (CFS) =	0.1
TIME (MIN) =	15	DISCHARGE (CFS) =	0.1
TIME (MIN) =	20	DISCHARGE (CFS) =	0.1
TIME (MIN) =	25	DISCHARGE (CFS) =	0.1
TIME (MIN) =	30	DISCHARGE (CFS) =	0.1
TIME (MIN) =	35	DISCHARGE (CFS) =	0.1
TIME (MIN) =	40	DISCHARGE (CFS) =	0.1
TIME (MIN) =	45	DISCHARGE (CFS) =	0.1
TIME (MIN) =	50	DISCHARGE (CFS) =	0.1
TIME (MIN) =	55	DISCHARGE (CFS) =	0.1
TIME (MIN) =	60	DISCHARGE (CFS) =	0.1
TIME (MIN) =	65	DISCHARGE (CFS) =	0.1
TIME (MIN) =	70	DISCHARGE (CFS) =	0.1
TIME (MIN) =	75	DISCHARGE (CFS) =	0.1
TIME (MIN) =	80	DISCHARGE (CFS) =	0.1
TIME (MIN) =	85	DISCHARGE (CFS) =	0.1
TIME (MIN) =	90	DISCHARGE (CFS) =	0.1
TIME (MIN) =	95	DISCHARGE (CFS) =	0.1
TIME (MIN) =	100	DISCHARGE (CFS) =	0.1
TIME (MIN) =	105	DISCHARGE (CFS) =	0.1
TIME (MIN) =	110	DISCHARGE (CFS) =	0.2
TIME (MIN) =	115	DISCHARGE (CFS) =	0.2
TIME (MIN) =	120	DISCHARGE (CFS) =	0.2
TIME (MIN) =	125	DISCHARGE (CFS) =	0.2
TIME (MIN) =	130	DISCHARGE (CFS) =	0.2
TIME (MIN) =	135	DISCHARGE (CFS) =	0.2
TIME (MIN) =	140	DISCHARGE (CFS) =	0.2
TIME (MIN) =	145	DISCHARGE (CFS) =	0.2
TIME (MIN) =	150	DISCHARGE (CFS) =	0.2
TIME (MIN) =	155	DISCHARGE (CFS) =	0.2
TIME (MIN) =	160	DISCHARGE (CFS) =	0.2
TIME (MIN) =	165	DISCHARGE (CFS) =	0.2
TIME (MIN) =	170	DISCHARGE (CFS) =	0.2
TIME (MIN) =	175	DISCHARGE (CFS) =	0.2
TIME (MIN) =	180	DISCHARGE (CFS) =	0.2
TIME (MIN) =	185	DISCHARGE (CFS) =	0.3
TIME (MIN) =	190	DISCHARGE (CFS) =	0.3
TIME (MIN) =	195	DISCHARGE (CFS) =	0.3
TIME (MIN) =	200	DISCHARGE (CFS) =	0.3
TIME (MIN) =	205	DISCHARGE (CFS) =	0.3
TIME (MIN) =	210	DISCHARGE (CFS) =	0.4
TIME (MIN) =	215	DISCHARGE (CFS) =	0.4
TIME (MIN) =	220	DISCHARGE (CFS) =	0.4
TIME (MIN) =	225	DISCHARGE (CFS) =	0.5

TIME (MIN) =	230	DISCHARGE (CFS) =	0.6
TIME (MIN) =	235	DISCHARGE (CFS) =	0.9
TIME (MIN) =	240	DISCHARGE (CFS) =	1.1
TIME (MIN) =	245	DISCHARGE (CFS) =	4.83
TIME (MIN) =	250	DISCHARGE (CFS) =	0.7
TIME (MIN) =	255	DISCHARGE (CFS) =	0.5
TIME (MIN) =	260	DISCHARGE (CFS) =	0.4
TIME (MIN) =	265	DISCHARGE (CFS) =	0.3
TIME (MIN) =	270	DISCHARGE (CFS) =	0.3
TIME (MIN) =	275	DISCHARGE (CFS) =	0.2
TIME (MIN) =	280	DISCHARGE (CFS) =	0.2
TIME (MIN) =	285	DISCHARGE (CFS) =	0.2
TIME (MIN) =	290	DISCHARGE (CFS) =	0.2
TIME (MIN) =	295	DISCHARGE (CFS) =	0.2
TIME (MIN) =	300	DISCHARGE (CFS) =	0.2
TIME (MIN) =	305	DISCHARGE (CFS) =	0.2
TIME (MIN) =	310	DISCHARGE (CFS) =	0.2
TIME (MIN) =	315	DISCHARGE (CFS) =	0.1
TIME (MIN) =	320	DISCHARGE (CFS) =	0.1
TIME (MIN) =	325	DISCHARGE (CFS) =	0.1
TIME (MIN) =	330	DISCHARGE (CFS) =	0.1
TIME (MIN) =	335	DISCHARGE (CFS) =	0.1
TIME (MIN) =	340	DISCHARGE (CFS) =	0.1
TIME (MIN) =	345	DISCHARGE (CFS) =	0.1
TIME (MIN) =	350	DISCHARGE (CFS) =	0.1
TIME (MIN) =	355	DISCHARGE (CFS) =	0.1
TIME (MIN) =	360	DISCHARGE (CFS) =	0.1
TIME (MIN) =	365	DISCHARGE (CFS) =	0

BMP-4 RICK RAT OUTPUT

TIME (MIN) =	0	DISCHARGE (CFS) =	0
TIME (MIN) =	10	DISCHARGE (CFS) =	0
TIME (MIN) =	20	DISCHARGE (CFS) =	0
TIME (MIN) =	30	DISCHARGE (CFS) =	0
TIME (MIN) =	40	DISCHARGE (CFS) =	0
TIME (MIN) =	50	DISCHARGE (CFS) =	0
TIME (MIN) =	60	DISCHARGE (CFS) =	0
TIME (MIN) =	70	DISCHARGE (CFS) =	0
TIME (MIN) =	80	DISCHARGE (CFS) =	0
TIME (MIN) =	90	DISCHARGE (CFS) =	0
TIME (MIN) =	100	DISCHARGE (CFS) =	0
TIME (MIN) =	110	DISCHARGE (CFS) =	0
TIME (MIN) =	120	DISCHARGE (CFS) =	0
TIME (MIN) =	130	DISCHARGE (CFS) =	0
TIME (MIN) =	140	DISCHARGE (CFS) =	0
TIME (MIN) =	150	DISCHARGE (CFS) =	0
TIME (MIN) =	160	DISCHARGE (CFS) =	0
TIME (MIN) =	170	DISCHARGE (CFS) =	0
TIME (MIN) =	180	DISCHARGE (CFS) =	0
TIME (MIN) =	190	DISCHARGE (CFS) =	0
TIME (MIN) =	200	DISCHARGE (CFS) =	0
TIME (MIN) =	210	DISCHARGE (CFS) =	0.1
TIME (MIN) =	220	DISCHARGE (CFS) =	0.1
TIME (MIN) =	230	DISCHARGE (CFS) =	0.1
TIME (MIN) =	240	DISCHARGE (CFS) =	0.1
TIME (MIN) =	250	DISCHARGE (CFS) =	0.74
TIME (MIN) =	260	DISCHARGE (CFS) =	0.1
TIME (MIN) =	270	DISCHARGE (CFS) =	0
TIME (MIN) =	280	DISCHARGE (CFS) =	0
TIME (MIN) =	290	DISCHARGE (CFS) =	0
TIME (MIN) =	300	DISCHARGE (CFS) =	0
TIME (MIN) =	310	DISCHARGE (CFS) =	0
TIME (MIN) =	320	DISCHARGE (CFS) =	0
TIME (MIN) =	330	DISCHARGE (CFS) =	0
TIME (MIN) =	340	DISCHARGE (CFS) =	0
TIME (MIN) =	350	DISCHARGE (CFS) =	0
TIME (MIN) =	360	DISCHARGE (CFS) =	0
TIME (MIN) =	370	DISCHARGE (CFS) =	0

BMP-5 RICK RAT OUTPUT

TIME (MIN) =	0	DISCHARGE (CFS) =	0
TIME (MIN) =	20	DISCHARGE (CFS) =	0.1
TIME (MIN) =	40	DISCHARGE (CFS) =	0.1
TIME (MIN) =	60	DISCHARGE (CFS) =	0.1
TIME (MIN) =	80	DISCHARGE (CFS) =	0.1
TIME (MIN) =	100	DISCHARGE (CFS) =	0.1
TIME (MIN) =	120	DISCHARGE (CFS) =	0.1
TIME (MIN) =	140	DISCHARGE (CFS) =	0.1
TIME (MIN) =	160	DISCHARGE (CFS) =	0.1
TIME (MIN) =	180	DISCHARGE (CFS) =	0.2
TIME (MIN) =	200	DISCHARGE (CFS) =	0.2
TIME (MIN) =	220	DISCHARGE (CFS) =	0.3
TIME (MIN) =	240	DISCHARGE (CFS) =	0.1
TIME (MIN) =	260	DISCHARGE (CFS) =	1.84
TIME (MIN) =	280	DISCHARGE (CFS) =	0.2
TIME (MIN) =	300	DISCHARGE (CFS) =	0.2
TIME (MIN) =	320	DISCHARGE (CFS) =	0.1
TIME (MIN) =	340	DISCHARGE (CFS) =	0.1
TIME (MIN) =	360	DISCHARGE (CFS) =	0.1
TIME (MIN) =	380	DISCHARGE (CFS) =	0

BMP-6 RICK RAT OUTPUT

TIME (MIN) =	0	DISCHARGE (CFS) =	0
TIME (MIN) =	5	DISCHARGE (CFS) =	0
TIME (MIN) =	10	DISCHARGE (CFS) =	0
TIME (MIN) =	15	DISCHARGE (CFS) =	0
TIME (MIN) =	20	DISCHARGE (CFS) =	0
TIME (MIN) =	25	DISCHARGE (CFS) =	0
TIME (MIN) =	30	DISCHARGE (CFS) =	0.1
TIME (MIN) =	35	DISCHARGE (CFS) =	0.1
TIME (MIN) =	40	DISCHARGE (CFS) =	0.1
TIME (MIN) =	45	DISCHARGE (CFS) =	0.1
TIME (MIN) =	50	DISCHARGE (CFS) =	0.1
TIME (MIN) =	55	DISCHARGE (CFS) =	0.1
TIME (MIN) =	60	DISCHARGE (CFS) =	0.1
TIME (MIN) =	65	DISCHARGE (CFS) =	0.1
TIME (MIN) =	70	DISCHARGE (CFS) =	0.1
TIME (MIN) =	75	DISCHARGE (CFS) =	0.1
TIME (MIN) =	80	DISCHARGE (CFS) =	0.1
TIME (MIN) =	85	DISCHARGE (CFS) =	0.1
TIME (MIN) =	90	DISCHARGE (CFS) =	0.1
TIME (MIN) =	95	DISCHARGE (CFS) =	0.1
TIME (MIN) =	100	DISCHARGE (CFS) =	0.1
TIME (MIN) =	105	DISCHARGE (CFS) =	0.1
TIME (MIN) =	110	DISCHARGE (CFS) =	0.1
TIME (MIN) =	115	DISCHARGE (CFS) =	0.1
TIME (MIN) =	120	DISCHARGE (CFS) =	0.1
TIME (MIN) =	125	DISCHARGE (CFS) =	0.1
TIME (MIN) =	130	DISCHARGE (CFS) =	0.1
TIME (MIN) =	135	DISCHARGE (CFS) =	0.1
TIME (MIN) =	140	DISCHARGE (CFS) =	0.1
TIME (MIN) =	145	DISCHARGE (CFS) =	0.1
TIME (MIN) =	150	DISCHARGE (CFS) =	0.1
TIME (MIN) =	155	DISCHARGE (CFS) =	0.1
TIME (MIN) =	160	DISCHARGE (CFS) =	0.1
TIME (MIN) =	165	DISCHARGE (CFS) =	0.1
TIME (MIN) =	170	DISCHARGE (CFS) =	0.1
TIME (MIN) =	175	DISCHARGE (CFS) =	0.1
TIME (MIN) =	180	DISCHARGE (CFS) =	0.1
TIME (MIN) =	185	DISCHARGE (CFS) =	0.1
TIME (MIN) =	190	DISCHARGE (CFS) =	0.1
TIME (MIN) =	195	DISCHARGE (CFS) =	0.1
TIME (MIN) =	200	DISCHARGE (CFS) =	0.1
TIME (MIN) =	205	DISCHARGE (CFS) =	0.2
TIME (MIN) =	210	DISCHARGE (CFS) =	0.2
TIME (MIN) =	215	DISCHARGE (CFS) =	0.2
TIME (MIN) =	220	DISCHARGE (CFS) =	0.2
TIME (MIN) =	225	DISCHARGE (CFS) =	0.2

TIME (MIN) =	230	DISCHARGE (CFS) =	0.3
TIME (MIN) =	235	DISCHARGE (CFS) =	0.4
TIME (MIN) =	240	DISCHARGE (CFS) =	0.5
TIME (MIN) =	245	DISCHARGE (CFS) =	2.11
TIME (MIN) =	250	DISCHARGE (CFS) =	0.3
TIME (MIN) =	255	DISCHARGE (CFS) =	0.2
TIME (MIN) =	260	DISCHARGE (CFS) =	0.2
TIME (MIN) =	265	DISCHARGE (CFS) =	0.1
TIME (MIN) =	270	DISCHARGE (CFS) =	0.1
TIME (MIN) =	275	DISCHARGE (CFS) =	0.1
TIME (MIN) =	280	DISCHARGE (CFS) =	0.1
TIME (MIN) =	285	DISCHARGE (CFS) =	0.1
TIME (MIN) =	290	DISCHARGE (CFS) =	0.1
TIME (MIN) =	295	DISCHARGE (CFS) =	0.1
TIME (MIN) =	300	DISCHARGE (CFS) =	0.1
TIME (MIN) =	305	DISCHARGE (CFS) =	0.1
TIME (MIN) =	310	DISCHARGE (CFS) =	0.1
TIME (MIN) =	315	DISCHARGE (CFS) =	0.1
TIME (MIN) =	320	DISCHARGE (CFS) =	0.1
TIME (MIN) =	325	DISCHARGE (CFS) =	0.1
TIME (MIN) =	330	DISCHARGE (CFS) =	0.1
TIME (MIN) =	335	DISCHARGE (CFS) =	0.1
TIME (MIN) =	340	DISCHARGE (CFS) =	0.1
TIME (MIN) =	345	DISCHARGE (CFS) =	0.1
TIME (MIN) =	350	DISCHARGE (CFS) =	0.1
TIME (MIN) =	355	DISCHARGE (CFS) =	0
TIME (MIN) =	360	DISCHARGE (CFS) =	0
TIME (MIN) =	365	DISCHARGE (CFS) =	0

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2016 Advanced Engineering Software (aes)
              Ver. 23.0 Release Date: 07/01/2016  License ID 1452

            Kensho Post-Project Mitigated Hydrology Analysis

                          Analysis prepared by:

                            PLSA ENGINEERING
--------------------------------------------------------------------------
  FILE NAME: KENPOST.DAT
  TIME/DATE OF STUDY: 09:24 12/06/2022
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.200
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   4.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  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 0.0313 0.167 0.0150

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

**************************************************************************
  FLOW PROCESS FROM NODE    180.00 TO NODE    170.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5300
  S.C.S. CURVE NUMBER (AMC II) =   0
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    48.00
  UPSTREAM ELEVATION(FEET) =    398.00
  DOWNSTREAM ELEVATION(FEET) =    397.50
  ELEVATION DIFFERENCE(FEET) =      0.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.012
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.779
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE    170.00 TO NODE    160.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   396.30  DOWNSTREAM(FEET) =   385.40
  FLOW LENGTH(FEET) =   295.00   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   1.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.34
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.17
  PIPE TRAVEL TIME(MIN.) =   1.13    Tc(MIN.) =    8.14
  LONGEST FLOWPATH FROM NODE    180.00 TO NODE    160.00 =     343.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    160.10 TO NODE    160.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.155
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6209
  SUBAREA AREA(ACRES) =    0.46   SUBAREA RUNOFF(CFS) =    1.78
  TOTAL AREA(ACRES) =        0.5   TOTAL RUNOFF(CFS) =       1.93
  TC(MIN.) =    8.14

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    150.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   385.40  DOWNSTREAM(FEET) =   367.00
  FLOW LENGTH(FEET) =   326.00   MANNING'S N =  0.011
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.66
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.93
```

```
  PIPE TRAVEL TIME(MIN.) =   0.56    Tc(MIN.) =    8.71
  LONGEST FLOWPATH FROM NODE    180.00 TO NODE    150.00 =     669.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.10 TO NODE    150.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.895
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .7700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6979
  SUBAREA AREA(ACRES) =    0.54   SUBAREA RUNOFF(CFS) =    2.45
  TOTAL AREA(ACRES) =        1.0   TOTAL RUNOFF(CFS) =       4.30
  TC(MIN.) =    8.71

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    140.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    367.00  DOWNSTREAM(FEET) =    365.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =    17.00   CHANNEL SLOPE =  0.0882
  CHANNEL BASE(FEET) =   11.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   1.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.856
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.35
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.12
  AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   0.09
  Tc(MIN.) =    8.80
  SUBAREA AREA(ACRES) =     0.04       SUBAREA RUNOFF(CFS) =    0.09
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.684
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       4.36

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   3.13
  LONGEST FLOWPATH FROM NODE    180.00 TO NODE    140.00 =     686.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    140.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  12.80   RAIN INTENSITY(INCH/HOUR) =  4.60
```

```
  TOTAL AREA(ACRES) =     1.14   TOTAL RUNOFF(CFS) =      2.80

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    130.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    364.00  DOWNSTREAM(FEET) =    361.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   447.00   CHANNEL SLOPE =  0.0067
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.106
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.92
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.04
  AVERAGE FLOW DEPTH(FEET) =   0.27   TRAVEL TIME(MIN.) =   2.45
  Tc(MIN.) =   15.25
  SUBAREA AREA(ACRES) =     0.15       SUBAREA RUNOFF(CFS) =    0.25
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.520
  TOTAL AREA(ACRES) =        1.3         PEAK FLOW RATE(CFS) =       2.80

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.26   FLOW VELOCITY(FEET/SEC.) =   3.00
  LONGEST FLOWPATH FROM NODE    180.00 TO NODE    130.00 =    1133.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   15.25
  RAINFALL INTENSITY(INCH/HR) =   4.11
  TOTAL STREAM AREA(ACRES) =     1.29
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.80

****************************************************************************
  FLOW PROCESS FROM NODE    136.00 TO NODE    135.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    432.00
```

```
  DOWNSTREAM ELEVATION(FEET) =    410.50
  ELEVATION DIFFERENCE(FEET) =     21.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.684
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.991
  SUBAREA RUNOFF(CFS) =      0.18
  TOTAL AREA(ACRES) =      0.09   TOTAL RUNOFF(CFS) =      0.18

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    134.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   409.00  DOWNSTREAM(FEET) =   401.00
  FLOW LENGTH(FEET) =   237.00   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   1.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.30
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.18
  PIPE TRAVEL TIME(MIN.) =   0.92    Tc(MIN.) =    7.60
  LONGEST FLOWPATH FROM NODE    136.00 TO NODE    134.00 =     337.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    134.10 TO NODE    134.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.434
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3000
  SUBAREA AREA(ACRES) =    0.71   SUBAREA RUNOFF(CFS) =    1.37
  TOTAL AREA(ACRES) =        0.8   TOTAL RUNOFF(CFS) =       1.53
  TC(MIN.) =    7.60

****************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    133.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   401.00  DOWNSTREAM(FEET) =   374.00
  FLOW LENGTH(FEET) =   438.00   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.05
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.53
  PIPE TRAVEL TIME(MIN.) =   0.81    Tc(MIN.) =    8.41
```

```
 LONGEST FLOWPATH FROM NODE    136.00 TO NODE    133.00 =     775.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    133.00 TO NODE    132.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   374.00  DOWNSTREAM(FEET) =   367.00
 FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.015
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   2.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.85
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.53
 PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =    8.57
 LONGEST FLOWPATH FROM NODE    136.00 TO NODE    132.00 =     850.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    132.00 TO NODE    131.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   367.00  DOWNSTREAM(FEET) =   363.00
 FLOW LENGTH(FEET) =    58.00   MANNING'S N =  0.015
 DEPTH OF FLOW IN  24.0 INCH PIPE IS   2.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.06
 GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.53
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    8.71
 LONGEST FLOWPATH FROM NODE    136.00 TO NODE    131.00 =     908.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    131.10 TO NODE    131.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.896
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .3000
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3000
 SUBAREA AREA(ACRES) =    0.05   SUBAREA RUNOFF(CFS) =    0.09
 TOTAL AREA(ACRES) =        0.8   TOTAL RUNOFF(CFS) =       1.53
 TC(MIN.) =    8.71
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE    131.00 TO NODE    130.00 IS CODE =  51
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    363.00  DOWNSTREAM(FEET) =    361.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    19.00   CHANNEL SLOPE =  0.1053
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.53
  FLOW VELOCITY(FEET/SEC.) =   2.36   FLOW DEPTH(FEET) =   0.09
  TRAVEL TIME(MIN.) =   0.13   Tc(MIN.) =    8.84
  LONGEST FLOWPATH FROM NODE    136.00 TO NODE    130.00 =     927.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    130.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.84
  RAINFALL INTENSITY(INCH/HR) =   5.84
  TOTAL STREAM AREA(ACRES) =     0.85
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.53

  ** CONFLUENCE DATA **
  STREAM     RUNOFF        Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        2.80    15.25        4.106          1.29
      2        1.53     8.84        5.838          0.85

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF       Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        3.16     8.84       5.838
      2        3.88    15.25       4.106

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       3.88   Tc(MIN.) =   15.25
  TOTAL AREA(ACRES) =        2.1
  LONGEST FLOWPATH FROM NODE    180.00 TO NODE    130.00 =    1133.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    120.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    361.00  DOWNSTREAM(FEET) =    349.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   531.00   CHANNEL SLOPE =  0.0217
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.826
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.20
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.01
  AVERAGE FLOW DEPTH(FEET) =   0.23   TRAVEL TIME(MIN.) =   1.77
  Tc(MIN.) =   17.02
  SUBAREA AREA(ACRES) =     0.40       SUBAREA RUNOFF(CFS) =    0.63
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.429
  TOTAL AREA(ACRES) =        2.5         PEAK FLOW RATE(CFS) =       4.16

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.23   FLOW VELOCITY(FEET/SEC.) =   4.97
  LONGEST FLOWPATH FROM NODE    180.00 TO NODE    120.00 =    1664.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   17.02
  RAINFALL INTENSITY(INCH/HR) =   3.83
  TOTAL STREAM AREA(ACRES) =     2.54
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.16

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    124.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    74.00
  UPSTREAM ELEVATION(FEET) =    382.48
  DOWNSTREAM ELEVATION(FEET) =    381.00
  ELEVATION DIFFERENCE(FEET) =      1.48
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.458
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.52
  TOTAL AREA(ACRES) =      0.07   TOTAL RUNOFF(CFS) =      0.52
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    124.10 TO NODE    124.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.9000
  SUBAREA AREA(ACRES) =    0.27   SUBAREA RUNOFF(CFS) =    2.02
  TOTAL AREA(ACRES) =        0.3   TOTAL RUNOFF(CFS) =       2.54
  TC(MIN.) =    2.46

****************************************************************************
  FLOW PROCESS FROM NODE    124.00 TO NODE    123.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    381.00  DOWNSTREAM(FEET) =    378.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =    93.00   CHANNEL SLOPE =  0.0269
  CHANNEL BASE(FEET) =   13.00   "Z" FACTOR =   4.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   4.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3800
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.66
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.66
  AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   0.94
  Tc(MIN.) =    3.39
  SUBAREA AREA(ACRES) =     0.08       SUBAREA RUNOFF(CFS) =    0.24
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.805
  TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       2.78

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =   1.65
  LONGEST FLOWPATH FROM NODE    125.00 TO NODE    123.00 =     167.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    123.00 TO NODE    123.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   6.39   RAIN INTENSITY(INCH/HOUR) =  7.20
```

```
  TOTAL AREA(ACRES) =     0.41   TOTAL RUNOFF(CFS) =      1.40

****************************************************************************
  FLOW PROCESS FROM NODE    123.00 TO NODE    122.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   374.00  DOWNSTREAM(FEET) =   362.00
  FLOW LENGTH(FEET) =    85.00   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.52
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.40
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    6.50
  LONGEST FLOWPATH FROM NODE    125.00 TO NODE    122.00 =     252.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    121.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    362.00  DOWNSTREAM(FEET) =    359.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   110.00   CHANNEL SLOPE =  0.0227
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.774
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4300
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.49
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.55
  AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   0.52
  Tc(MIN.) =    7.02
  SUBAREA AREA(ACRES) =     0.06       SUBAREA RUNOFF(CFS) =    0.19
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.468
  TOTAL AREA(ACRES) =        0.5         PEAK FLOW RATE(CFS) =       1.50

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   3.57
  LONGEST FLOWPATH FROM NODE    125.00 TO NODE    121.00 =     362.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    120.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    359.50  DOWNSTREAM(FEET) =    349.50
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =    23.00   CHANNEL SLOPE =  0.4348
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.50
  FLOW VELOCITY(FEET/SEC.) =   8.51   FLOW DEPTH(FEET) =   0.06
  TRAVEL TIME(MIN.) =   0.05   Tc(MIN.) =    7.06
  LONGEST FLOWPATH FROM NODE    125.00 TO NODE    120.00 =     385.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.06
  RAINFALL INTENSITY(INCH/HR) =   6.75
  TOTAL STREAM AREA(ACRES) =     0.47
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.50

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        4.16    17.02        3.826          2.54
      2        1.50     7.06        6.746          0.47

  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        3.87     7.06       6.746
      2        5.02    17.02       3.826

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.02   Tc(MIN.) =   17.02
  TOTAL AREA(ACRES) =        3.0
  LONGEST FLOWPATH FROM NODE    180.00 TO NODE    120.00 =    1664.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    110.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    349.50  DOWNSTREAM(FEET) =    340.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   422.00   CHANNEL SLOPE =  0.0225
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.500
```

```
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.650
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.27
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.45
  AVERAGE FLOW DEPTH(FEET) =   0.26   TRAVEL TIME(MIN.) =   1.29
  Tc(MIN.) =   18.31
  SUBAREA AREA(ACRES) =     0.34       SUBAREA RUNOFF(CFS) =    0.50
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.432
  TOTAL AREA(ACRES) =        3.4         PEAK FLOW RATE(CFS) =       5.28

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.26   FLOW VELOCITY(FEET/SEC.) =   5.46
  LONGEST FLOWPATH FROM NODE    180.00 TO NODE    110.00 =    2086.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    116.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8900
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    53.00
  UPSTREAM ELEVATION(FEET) =    379.50
  DOWNSTREAM ELEVATION(FEET) =    378.40
  ELEVATION DIFFERENCE(FEET) =      1.10
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.157
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    115.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  378.40  DOWNSTREAM ELEVATION(FEET) =  369.40
  STREET LENGTH(FEET) =   213.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 30.00
```

```
  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.001
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.001

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.005
  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) =       1.06
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.18   FLOOD WIDTH(FEET) =   30.00
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    1.48
    SPLIT DEPTH(FEET) =    0.16   SPLIT FLOOD WIDTH(FEET) =    2.34
    SPLIT FLOW(CFS) =    0.19   SPLIT VELOCITY(FEET/SEC.) =    1.36
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.18
    HALFSTREET FLOOD WIDTH(FEET) =   30.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.48
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.27
  STREET FLOW TRAVEL TIME(MIN.) =   2.41   Tc(MIN.) =    4.56
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.825
  SUBAREA AREA(ACRES) =    0.26      SUBAREA RUNOFF(CFS) =    1.80
  TOTAL AREA(ACRES) =        0.3        PEAK FLOW RATE(CFS) =       1.96

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.19   HALFSTREET FLOOD WIDTH(FEET) =  30.00
  FLOW VELOCITY(FEET/SEC.) =  1.52   DEPTH*VELOCITY(FT*FT/SEC.) =   0.28
  LONGEST FLOWPATH FROM NODE    117.00 TO NODE    115.00 =     266.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    115.10 TO NODE    115.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8281
  SUBAREA AREA(ACRES) =    0.38   SUBAREA RUNOFF(CFS) =    2.62
  TOTAL AREA(ACRES) =        0.7   TOTAL RUNOFF(CFS) =       4.59
  TC(MIN.) =    4.56
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    114.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    362.50  DOWNSTREAM(FEET) =    361.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =    23.00   CHANNEL SLOPE =  0.0435
  CHANNEL BASE(FEET) =    9.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3700
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.71
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.81
  AVERAGE FLOW DEPTH(FEET) =   0.19   TRAVEL TIME(MIN.) =   0.14
  Tc(MIN.) =    4.70
  SUBAREA AREA(ACRES) =     0.08       SUBAREA RUNOFF(CFS) =    0.24
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.780
  TOTAL AREA(ACRES) =        0.7         PEAK FLOW RATE(CFS) =       4.83

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =   2.85
  LONGEST FLOWPATH FROM NODE    117.00 TO NODE    114.00 =     289.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    114.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   5.70   RAIN INTENSITY(INCH/HOUR) =  7.75
  TOTAL AREA(ACRES) =     0.71   TOTAL RUNOFF(CFS) =      4.20

****************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    113.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    358.00  DOWNSTREAM(FEET) =    352.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   253.00   CHANNEL SLOPE =  0.0237
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.108
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4300
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.33
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.17
  AVERAGE FLOW DEPTH(FEET) =   0.23   TRAVEL TIME(MIN.) =   0.81
  Tc(MIN.) =    6.51
  SUBAREA AREA(ACRES) =     0.09       SUBAREA RUNOFF(CFS) =    0.27
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.727
  TOTAL AREA(ACRES) =        0.8         PEAK FLOW RATE(CFS) =       4.20

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.23   FLOW VELOCITY(FEET/SEC.) =   5.06
  LONGEST FLOWPATH FROM NODE    117.00 TO NODE    113.00 =     542.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 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.) =    6.51
  RAINFALL INTENSITY(INCH/HR) =   7.11
  TOTAL STREAM AREA(ACRES) =     0.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.20

****************************************************************************
  FLOW PROCESS FROM NODE    113.40 TO NODE    113.30 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4700
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    31.00
  UPSTREAM ELEVATION(FEET) =    374.50
  DOWNSTREAM ELEVATION(FEET) =    373.50
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.273
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.05
  TOTAL AREA(ACRES) =      0.01   TOTAL RUNOFF(CFS) =      0.05

****************************************************************************
  FLOW PROCESS FROM NODE    113.30 TO NODE    113.30 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   5.00   RAIN INTENSITY(INCH/HOUR) =  8.43
```

```
  TOTAL AREA(ACRES) =     0.01   TOTAL RUNOFF(CFS) =      0.10

****************************************************************************
  FLOW PROCESS FROM NODE    113.30 TO NODE    113.20 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  373.50  DOWNSTREAM ELEVATION(FEET) =  367.40
  STREET LENGTH(FEET) =   136.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 24.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.025
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.025

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.47
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.16
    HALFSTREET FLOOD WIDTH(FEET) =    1.50
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.99
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.62
  STREET FLOW TRAVEL TIME(MIN.) =   0.57   Tc(MIN.) =    5.57
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.866
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.889
  SUBAREA AREA(ACRES) =    0.11      SUBAREA RUNOFF(CFS) =    0.75
  TOTAL AREA(ACRES) =        0.1        PEAK FLOW RATE(CFS) =       0.84

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.20   HALFSTREET FLOOD WIDTH(FEET) =   3.15
  FLOW VELOCITY(FEET/SEC.) =  3.55   DEPTH*VELOCITY(FT*FT/SEC.) =   0.70
  LONGEST FLOWPATH FROM NODE    113.40 TO NODE    113.20 =     167.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.20 TO NODE    113.10 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    359.50  DOWNSTREAM(FEET) =    358.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =    50.00   CHANNEL SLOPE =  0.0200
  CHANNEL BASE(FEET) =    7.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.320
```

```
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.85
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.27
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   0.66
  Tc(MIN.) =    6.23
  SUBAREA AREA(ACRES) =     0.01       SUBAREA RUNOFF(CFS) =    0.03
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.852
  TOTAL AREA(ACRES) =        0.1         PEAK FLOW RATE(CFS) =       0.84

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   1.24
  LONGEST FLOWPATH FROM NODE    113.40 TO NODE    113.10 =     217.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.10 TO NODE    113.10 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  14.65   RAIN INTENSITY(INCH/HOUR) =  4.21
  TOTAL AREA(ACRES) =     0.11   TOTAL RUNOFF(CFS) =      0.30

****************************************************************************
  FLOW PROCESS FROM NODE    113.10 TO NODE    113.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    355.00  DOWNSTREAM(FEET) =    352.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    23.00   CHANNEL SLOPE =  0.1304
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.30
  FLOW VELOCITY(FEET/SEC.) =   1.49   FLOW DEPTH(FEET) =   0.04
  TRAVEL TIME(MIN.) =   0.26   Tc(MIN.) =   14.91
  LONGEST FLOWPATH FROM NODE    113.40 TO NODE    113.00 =     240.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.91
  RAINFALL INTENSITY(INCH/HR) =   4.17
  TOTAL STREAM AREA(ACRES) =     0.11
```

```
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.30

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        4.20     6.51        7.108          0.80
      2        0.30    14.91        4.168          0.11

  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        4.33     6.51       7.108
      2        2.76    14.91       4.168

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       4.33   Tc(MIN.) =    6.51
  TOTAL AREA(ACRES) =        0.9
  LONGEST FLOWPATH FROM NODE    117.00 TO NODE    113.00 =     542.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    112.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    352.00  DOWNSTREAM(FEET) =    349.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   108.00   CHANNEL SLOPE =  0.0278
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.886
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.42
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.49
  AVERAGE FLOW DEPTH(FEET) =   0.23   TRAVEL TIME(MIN.) =   0.33
  Tc(MIN.) =    6.84
  SUBAREA AREA(ACRES) =     0.06       SUBAREA RUNOFF(CFS) =    0.18
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.697
  TOTAL AREA(ACRES) =        1.0         PEAK FLOW RATE(CFS) =       4.66

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.23   FLOW VELOCITY(FEET/SEC.) =   5.56
  LONGEST FLOWPATH FROM NODE    117.00 TO NODE    112.00 =     650.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 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.) =    6.84
  RAINFALL INTENSITY(INCH/HR) =   6.89
  TOTAL STREAM AREA(ACRES) =     0.97
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.66

****************************************************************************
  FLOW PROCESS FROM NODE    112.50 TO NODE    112.40 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8100
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    370.50
  DOWNSTREAM ELEVATION(FEET) =    368.50
  ELEVATION DIFFERENCE(FEET) =      2.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.707
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.24
  TOTAL AREA(ACRES) =      0.04   TOTAL RUNOFF(CFS) =      0.24

****************************************************************************
  FLOW PROCESS FROM NODE    112.40 TO NODE    112.30 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  368.50  DOWNSTREAM ELEVATION(FEET) =  355.95
  STREET LENGTH(FEET) =   279.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 24.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.025
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.025

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.15
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.22
    HALFSTREET FLOOD WIDTH(FEET) =    3.98
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.69
```

```
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.80
  STREET FLOW TRAVEL TIME(MIN.) =   1.26   Tc(MIN.) =    3.97
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.854
  SUBAREA AREA(ACRES) =    0.25      SUBAREA RUNOFF(CFS) =    1.81
  TOTAL AREA(ACRES) =        0.3        PEAK FLOW RATE(CFS) =       2.05

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   5.61
  FLOW VELOCITY(FEET/SEC.) =  4.06   DEPTH*VELOCITY(FT*FT/SEC.) =   1.05
  LONGEST FLOWPATH FROM NODE    112.50 TO NODE    112.30 =     339.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.30 TO NODE    112.20 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   354.95  DOWNSTREAM(FEET) =   354.50
  FLOW LENGTH(FEET) =    43.00   MANNING'S N =  0.011
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.45
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.05
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    4.04
  LONGEST FLOWPATH FROM NODE    112.50 TO NODE    112.20 =     382.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.20 TO NODE    112.10 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    354.50  DOWNSTREAM(FEET) =    353.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =    47.00   CHANNEL SLOPE =  0.0213
  CHANNEL BASE(FEET) =   11.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.08
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.51
  AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   0.52
```

```
  Tc(MIN.) =    4.55
  SUBAREA AREA(ACRES) =     0.02       SUBAREA RUNOFF(CFS) =    0.06
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.821
  TOTAL AREA(ACRES) =        0.3         PEAK FLOW RATE(CFS) =       2.11

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =   1.54
  LONGEST FLOWPATH FROM NODE    112.50 TO NODE    112.10 =     429.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.10 TO NODE    112.10 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   7.55   RAIN INTENSITY(INCH/HOUR) =  6.46
  TOTAL AREA(ACRES) =     0.31   TOTAL RUNOFF(CFS) =      0.90

****************************************************************************
  FLOW PROCESS FROM NODE    112.10 TO NODE    112.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    351.50  DOWNSTREAM(FEET) =    349.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    37.00   CHANNEL SLOPE =  0.0676
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.90
  FLOW VELOCITY(FEET/SEC.) =   4.32   FLOW DEPTH(FEET) =   0.07
  TRAVEL TIME(MIN.) =   0.14   Tc(MIN.) =    7.69
  LONGEST FLOWPATH FROM NODE    112.50 TO NODE    112.00 =     466.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.69
  RAINFALL INTENSITY(INCH/HR) =   6.39
  TOTAL STREAM AREA(ACRES) =     0.31
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.90

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        4.66     6.84        6.886          0.97
```

```
     2        0.90     7.69        6.386          0.31

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        5.46     6.84       6.886
      2        5.22     7.69       6.386

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.46   Tc(MIN.) =    6.84
  TOTAL AREA(ACRES) =        1.3
  LONGEST FLOWPATH FROM NODE    117.00 TO NODE    112.00 =     650.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    111.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    349.00  DOWNSTREAM(FEET) =    346.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =    87.00   CHANNEL SLOPE =  0.0287
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.733
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.58
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.98
  AVERAGE FLOW DEPTH(FEET) =   0.26   TRAVEL TIME(MIN.) =   0.24
  Tc(MIN.) =    7.09
  SUBAREA AREA(ACRES) =     0.09       SUBAREA RUNOFF(CFS) =    0.25
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.622
  TOTAL AREA(ACRES) =        1.4         PEAK FLOW RATE(CFS) =       5.74

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.26   FLOW VELOCITY(FEET/SEC.) =   5.99
  LONGEST FLOWPATH FROM NODE    117.00 TO NODE    111.00 =     737.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.09
```

```
  RAINFALL INTENSITY(INCH/HR) =   6.73
  TOTAL STREAM AREA(ACRES) =     1.37
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.74

****************************************************************************
  FLOW PROCESS FROM NODE    111.60 TO NODE    111.50 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    391.50
  DOWNSTREAM ELEVATION(FEET) =    391.00
  ELEVATION DIFFERENCE(FEET) =      0.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.182
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.329
  SUBAREA RUNOFF(CFS) =      0.02
  TOTAL AREA(ACRES) =      0.01   TOTAL RUNOFF(CFS) =      0.02

****************************************************************************
  FLOW PROCESS FROM NODE    111.50 TO NODE    111.50 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  10.18   RAIN INTENSITY(INCH/HOUR) =  5.33
  TOTAL AREA(ACRES) =     0.01   TOTAL RUNOFF(CFS) =      0.10

****************************************************************************
  FLOW PROCESS FROM NODE    111.50 TO NODE    111.40 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    391.00  DOWNSTREAM(FEET) =    378.51
  CHANNEL LENGTH THRU SUBAREA(FEET) =   264.00   CHANNEL SLOPE =  0.0473
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.361
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.15
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.19
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   3.71
  Tc(MIN.) =   13.89
  SUBAREA AREA(ACRES) =     0.05       SUBAREA RUNOFF(CFS) =    0.10
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.724
```

```
  TOTAL AREA(ACRES) =        0.1         PEAK FLOW RATE(CFS) =       0.18

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   1.35
  LONGEST FLOWPATH FROM NODE    111.60 TO NODE    111.40 =     314.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.41 TO NODE    111.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.361
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8791
  SUBAREA AREA(ACRES) =    0.42   SUBAREA RUNOFF(CFS) =    1.66
  TOTAL AREA(ACRES) =        0.5   TOTAL RUNOFF(CFS) =       1.84
  TC(MIN.) =   13.89

****************************************************************************
  FLOW PROCESS FROM NODE    111.40 TO NODE    111.30 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    378.51  DOWNSTREAM(FEET) =    378.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =    82.00   CHANNEL SLOPE =  0.0001
  CHANNEL BASE(FEET) =    9.00   "Z" FACTOR =   0.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.670
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .5800
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.86
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.32
  AVERAGE FLOW DEPTH(FEET) =   0.65   TRAVEL TIME(MIN.) =   4.26
  Tc(MIN.) =   18.16
  SUBAREA AREA(ACRES) =     0.02       SUBAREA RUNOFF(CFS) =    0.04
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.867
  TOTAL AREA(ACRES) =        0.5         PEAK FLOW RATE(CFS) =       1.84

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.64   FLOW VELOCITY(FEET/SEC.) =   0.32
  LONGEST FLOWPATH FROM NODE    111.60 TO NODE    111.30 =     396.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.30 TO NODE    111.30 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
```

```
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  27.16   RAIN INTENSITY(INCH/HOUR) =  2.83
  TOTAL AREA(ACRES) =     0.51   TOTAL RUNOFF(CFS) =      1.00

****************************************************************************
  FLOW PROCESS FROM NODE    111.30 TO NODE    111.20 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   374.00  DOWNSTREAM(FEET) =   371.50
  FLOW LENGTH(FEET) =    18.00   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.49
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.00
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   27.19
  LONGEST FLOWPATH FROM NODE    111.60 TO NODE    111.20 =     414.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.21 TO NODE    111.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.829
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6311
  SUBAREA AREA(ACRES) =    0.14   SUBAREA RUNOFF(CFS) =    0.15
  TOTAL AREA(ACRES) =        0.6   TOTAL RUNOFF(CFS) =       1.15
  TC(MIN.) =   27.19

****************************************************************************
  FLOW PROCESS FROM NODE    111.20 TO NODE    111.10 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   371.50  DOWNSTREAM(FEET) =   350.00
  FLOW LENGTH(FEET) =   148.00   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.10
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.15
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   27.39
  LONGEST FLOWPATH FROM NODE    111.60 TO NODE    111.10 =     562.00 FEET.

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

```
  FLOW PROCESS FROM NODE    111.10 TO NODE    111.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    350.00  DOWNSTREAM(FEET) =    346.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =    22.00   CHANNEL SLOPE =  0.1591
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.15
  FLOW VELOCITY(FEET/SEC.) =   2.51   FLOW DEPTH(FEET) =   0.07
  TRAVEL TIME(MIN.) =   0.15   Tc(MIN.) =   27.54
  LONGEST FLOWPATH FROM NODE    111.60 TO NODE    111.00 =     584.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 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.) =   27.54
  RAINFALL INTENSITY(INCH/HR) =   2.81
  TOTAL STREAM AREA(ACRES) =     0.65
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.15

  ** CONFLUENCE DATA **
  STREAM     RUNOFF        Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        5.74     7.09        6.733          1.37
      2        1.15    27.54        2.805          0.65

  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        6.04     7.09       6.733
      2        3.55    27.54       2.805

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       6.04   Tc(MIN.) =    7.09
  TOTAL AREA(ACRES) =        2.0
  LONGEST FLOWPATH FROM NODE    117.00 TO NODE    111.00 =     737.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    110.00 IS CODE =  51
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    346.50  DOWNSTREAM(FEET) =    340.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    15.00   CHANNEL SLOPE =  0.4333
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       6.04
  FLOW VELOCITY(FEET/SEC.) =  15.36   FLOW DEPTH(FEET) =   0.12
  TRAVEL TIME(MIN.) =   0.02   Tc(MIN.) =    7.10
  LONGEST FLOWPATH FROM NODE    117.00 TO NODE    110.00 =     752.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 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        6.04     7.10       6.723        2.02
  LONGEST FLOWPATH FROM NODE    117.00 TO NODE    110.00 =     752.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        5.28    18.31       3.650        3.35
  LONGEST FLOWPATH FROM NODE    180.00 TO NODE    110.00 =    2086.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1       8.09       7.10        6.723
      2       8.56      18.31        3.650

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       8.56   Tc(MIN.) =   18.31
  TOTAL AREA(ACRES) =        5.4

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    100.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    340.00  DOWNSTREAM(FEET) =    338.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    93.00   CHANNEL SLOPE =  0.0215
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.618
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .3900
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.64
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.24
 AVERAGE FLOW DEPTH(FEET) =   0.36   TRAVEL TIME(MIN.) =   0.25
 Tc(MIN.) =   18.56
 SUBAREA AREA(ACRES) =     0.11       SUBAREA RUNOFF(CFS) =    0.15
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.502
 TOTAL AREA(ACRES) =        5.5         PEAK FLOW RATE(CFS) =       9.95

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.38   FLOW VELOCITY(FEET/SEC.) =   6.53
 LONGEST FLOWPATH FROM NODE    180.00 TO NODE    100.00 =    2179.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    100.00 TO NODE    100.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   18.56
 RAINFALL INTENSITY(INCH/HR) =   3.62
 TOTAL STREAM AREA(ACRES) =     5.48
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.95

****************************************************************************
 FLOW PROCESS FROM NODE    100.40 TO NODE    100.30 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .5700
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
 UPSTREAM ELEVATION(FEET) =    378.00
 DOWNSTREAM ELEVATION(FEET) =    367.50
 ELEVATION DIFFERENCE(FEET) =     10.50
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.131
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
 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    100.30 TO NODE    100.20 IS CODE =  51
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    367.50  DOWNSTREAM(FEET) =    357.25
  CHANNEL LENGTH THRU SUBAREA(FEET) =    60.00   CHANNEL SLOPE =  0.1708
  CHANNEL BASE(FEET) =    1.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6200
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.23
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.59
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   0.39
  Tc(MIN.) =    3.52
  SUBAREA AREA(ACRES) =     0.03       SUBAREA RUNOFF(CFS) =    0.16
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.595
  TOTAL AREA(ACRES) =        0.1         PEAK FLOW RATE(CFS) =       0.31

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.08   FLOW VELOCITY(FEET/SEC.) =   3.04
  LONGEST FLOWPATH FROM NODE    100.40 TO NODE    100.20 =     110.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    100.20 TO NODE    100.10 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   353.50  DOWNSTREAM(FEET) =   351.33
  FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.011
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.35
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.31
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =    3.86
  LONGEST FLOWPATH FROM NODE    100.40 TO NODE    100.10 =     200.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    100.11 TO NODE    100.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8100
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7693
```

```
  SUBAREA AREA(ACRES) =    0.26   SUBAREA RUNOFF(CFS) =    1.78
  TOTAL AREA(ACRES) =        0.3   TOTAL RUNOFF(CFS) =       2.09
  TC(MIN.) =    3.86

****************************************************************************
  FLOW PROCESS FROM NODE    100.10 TO NODE    100.07 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   351.33  DOWNSTREAM(FEET) =   349.00
  FLOW LENGTH(FEET) =    26.00   MANNING'S N =  0.011
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.64
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.09
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    3.90
  LONGEST FLOWPATH FROM NODE    100.40 TO NODE    100.07 =     226.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    100.09 TO NODE    100.07 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7571
  SUBAREA AREA(ACRES) =    0.01   SUBAREA RUNOFF(CFS) =    0.02
  TOTAL AREA(ACRES) =        0.3   TOTAL RUNOFF(CFS) =       2.11
  TC(MIN.) =    3.90

****************************************************************************
  FLOW PROCESS FROM NODE    100.08 TO NODE    100.07 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.431
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7633
  SUBAREA AREA(ACRES) =    0.01   SUBAREA RUNOFF(CFS) =    0.11
  TOTAL AREA(ACRES) =        0.3   TOTAL RUNOFF(CFS) =       2.23
  TC(MIN.) =    3.90
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    100.07 TO NODE    100.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   345.00  DOWNSTREAM(FEET) =   338.00
  FLOW LENGTH(FEET) =    93.00   MANNING'S N =  0.011
  DEPTH OF FLOW IN   8.0 INCH PIPE IS   4.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.14
  GIVEN PIPE DIAMETER(INCH) =   8.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.23
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    4.04
  LONGEST FLOWPATH FROM NODE    100.40 TO NODE    100.00 =     319.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    100.00 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.) =    4.04
  RAINFALL INTENSITY(INCH/HR) =   8.43
  TOTAL STREAM AREA(ACRES) =     0.35
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.23

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        9.95    18.56        3.618          5.48
      2        2.23     4.04        8.431          0.35

  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        4.39     4.04       8.431
      2       10.90    18.56       3.618

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      10.90   Tc(MIN.) =   18.56
  TOTAL AREA(ACRES) =        5.8
  LONGEST FLOWPATH FROM NODE    180.00 TO NODE    100.00 =    2179.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        5.8  TC(MIN.) =     18.56
```

```
  PEAK FLOW RATE(CFS)   =      10.90
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

4.0 BMP DIMENSIONS AND DETAILS

4.1 BMP Summaries and Calculations

Drawdown Calculation - BMP-1

Surface Ponding Depth:	PD	8	in
Ponding Depth Surface Area:	A_{PD}	1738	ft^2
Surface Ponding Volume:	V_{PD}	1,159	ft^3
Low Flow Orifice Diameter:	D	0.8125	in
Flow Rate (volumetric):	Q	0.032	ft^3/s
Drawdown Time:		9.93	hrs

Stage-Storage & Stage-Discharge Relationship for BMP-1

Discharge vs. Elevation Table

Basin Dimensions

Area: 1,738 ft^2

***Note: h = head above the invert of the lowest surface discharge opening.**

Basin Elev.	Area (ft^2)	Volume (ft^3)	Basin Depth (ft)	h* (ft)	Volume (acre-ft)	Q_{total} (cfs)	
365.67	1,738	0	0.667	0.000	0.0000	0.0000	LOWER OUTLET ORIFICE
365.75	1,738	144	0.750	0.083	0.0033	0.0746	
365.84	1,738	289	0.834	0.167	0.0066	0.2109	
365.92	1,738	433	0.917	0.250	0.0099	0.3875	
366.00	1,738	577	1.000	0.333	0.0132	0.5494	
366.09	1,738	721	1.084	0.417	0.0166	0.6501	
366.17	1,738	866	1.167	0.500	0.0199	0.7371	
366.25	1,738	1010	1.250	0.583	0.0232	0.8149	
366.34	1,738	1154	1.334	0.667	0.0265	0.8859	
366.42	1,738	1298	1.417	0.750	0.0298	0.9516	
366.50	1,738	1443	1.500	0.833	0.0331	1.0131	
366.59	1,738	1587	1.584	0.917	0.0364	1.0710	
366.67	1,738	1731	1.667	1.000	0.0397	1.1260	
366.75	1,738	1875	1.750	1.083	0.0431	1.1784	RISER STRUCTURE
366.84	1,738	2020	1.834	1.167	0.0464	1.8287	
366.92	1,738	2164	1.917	1.250	0.0497	2.9693	
367.00	1,738	2308	2.000	1.333	0.0530	4.4294	

Drawdown Calculation - BMP-2

Surface Ponding Depth:	PD	6	in
Ponding Depth Surface Area:	A_{PD}	744	ft^2
Surface Ponding Volume:	V_{PD}	372	ft^3
Low Flow Orifice Diameter:	D	0.5625	in
Flow Rate (volumetric):	Q	0.015	ft^3/s
Drawdown Time:		6.81	hrs

Stage-Storage & Stage-Discharge Relationship for BMP-2

Discharge vs. Elevation Table

Basin Dimensions

Area: 744 ft^2

***Note: h = head above the invert of the lowest surface discharge opening.**

Basin Elev.	Area (ft^2)	Volume (ft^3)	Basin Depth (ft)	h* (ft)	Volume (acre-ft)	Q_{total} (cfs)	
377.50	744	0	0.500	0.000	0.0000	0.0000	LOWER OUTLET ORIFICE
377.58	744	62	0.583	0.083	0.0014	0.0492	
377.67	744	124	0.667	0.167	0.0028	0.1392	
377.75	744	185	0.750	0.250	0.0043	0.2166	
377.83	744	247	0.833	0.333	0.0057	0.2653	
377.92	744	309	0.917	0.417	0.0071	0.3063	
378.00	744	371	1.000	0.500	0.0085	0.3425	
378.08	744	432	1.083	0.583	0.0099	0.3752	
378.17	744	494	1.167	0.667	0.0113	0.4053	
378.25	744	556	1.250	0.750	0.0128	0.4333	
378.33	744	618	1.333	0.833	0.0142	0.4596	
378.42	744	679	1.417	0.917	0.0156	0.4844	
378.50	744	741	1.500	1.000	0.0170	0.5081	RISER STRUCTURE
378.58	744	803	1.583	1.083	0.0184	0.6798	
378.67	744	865	1.667	1.167	0.0198	0.9742	
378.75	744	926	1.750	1.250	0.0213	1.3482	
378.83	744	988	1.833	1.333	0.0227	1.7865	
378.92	744	1050	1.917	1.417	0.0241	2.2803	
379.00	744	1112	2.000	1.500	0.0255	2.8237	

Drawdown Calculation - BMP-3

Surface Ponding Depth:	PD	8	in
Ponding Depth Surface Area:	A_{PD}	1197	ft^2
Surface Ponding Volume:	V_{PD}	798	ft^3
Low Flow Orifice Diameter:	D	0.75	in
Flow Rate (volumetric):	Q	0.028	ft^3/s
Drawdown Time:		8.02	hrs

Stage-Storage & Stage-Discharge Relationship for BMP-3

Discharge vs. Elevation Table

Basin Dimensions

Area: 1,197 ft^2

***Note: h = head above the invert of the lowest surface discharge opening.**

Basin Elev.	Area (ft^2)	Volume (ft^3)	Basin Depth (ft)	h* (ft)	Volume (acre-ft)	Q_{total} (cfs)	
377.67	1,197	0	0.667	0.000	0.0000	0.0000	LOWER OUTLET ORIFICE
377.75	1,197	99	0.750	0.083	0.0023	0.0373	
377.84	1,197	199	0.834	0.167	0.0046	0.1055	
377.92	1,197	298	0.917	0.250	0.0068	0.1641	
378.00	1,197	397	1.000	0.333	0.0091	0.2010	
378.09	1,197	497	1.084	0.417	0.0114	0.2321	
378.17	1,197	596	1.167	0.500	0.0137	0.2595	
378.25	1,197	695	1.250	0.583	0.0160	0.2842	
378.34	1,197	795	1.334	0.667	0.0182	0.3070	
378.42	1,197	894	1.417	0.750	0.0205	0.3282	
378.50	1,197	994	1.500	0.833	0.0228	0.3481	
378.59	1,197	1093	1.584	0.917	0.0251	0.3670	
378.67	1,197	1192	1.667	1.000	0.0274	0.3849	RISER STRUCTURE
378.75	1,197	1292	1.750	1.083	0.0297	0.9986	
378.84	1,197	1391	1.834	1.167	0.0319	2.1059	
378.92	1,197	1490	1.917	1.250	0.0342	3.5342	
379.00	1,197	1590	2.000	1.333	0.0365	5.2222	

Drawdown Calculation - BMP-4

Surface Ponding Depth:	PD	6	in
Ponding Depth Surface Area:	A_{PD}	345	ft^2
Surface Ponding Volume:	V_{PD}	173	ft^3
Low Flow Orifice Diameter:	D	0.375	in
Flow Rate (volumetric):	Q	0.007	ft^3/s
Drawdown Time:		7.10	hrs

Stage-Storage & Stage-Discharge Relationship for BMP-4

Discharge vs. Elevation Table

Basin Dimensions

Area: 345 ft^2

***Note: h = head above the invert of the lowest surface discharge opening.**

Basin Elev.	Area (ft^2)	Volume (ft^3)	Basin Depth (ft)	h* (ft)	Volume (acre-ft)	Q_{total} (cfs)	
377.50	345	0	0.500	0.000	0.0000	0.0000	LOWER OUTLET ORIFICE
377.58	345	29	0.583	0.083	0.0007	0.0119	
377.67	345	57	0.667	0.167	0.0013	0.0337	
377.75	345	86	0.750	0.250	0.0020	0.0525	
377.83	345	115	0.833	0.333	0.0026	0.0643	
377.92	345	143	0.917	0.417	0.0033	0.0743	
378.00	345	172	1.000	0.500	0.0039	0.0830	
378.08	345	200	1.083	0.583	0.0046	0.0910	
378.17	345	229	1.167	0.667	0.0053	0.0982	
378.25	345	258	1.250	0.750	0.0059	0.1050	
378.33	345	286	1.333	0.833	0.0066	0.1114	
378.42	345	315	1.417	0.917	0.0072	0.1174	
378.50	345	344	1.500	1.000	0.0079	0.1232	
378.58	345	372	1.583	1.083	0.0085	0.1286	
378.67	345	401	1.667	1.167	0.0092	0.1339	
378.75	345	430	1.750	1.250	0.0099	0.1390	RISER STRUCTURE
378.83	345	458	1.833	1.333	0.0105	0.2930	
378.92	345	487	1.917	1.417	0.0112	0.5704	
379.00	345	515	2.000	1.500	0.0118	0.9281	

Drawdown Calculation - BMP-5

Surface Ponding Depth:	PD	6	in
Ponding Depth Surface Area:	A_{PD}	921	ft^2
Surface Ponding Volume:	V_{PD}	461	ft^3
Low Flow Orifice Diameter:	D	0.625	in
Flow Rate (volumetric):	Q	0.019	ft^3/s
Drawdown Time:		6.83	hrs

Stage-Storage & Stage-Discharge Relationship for BMP-5

Discharge vs. Elevation Table

Basin Dimensions

Area: 921 ft^2

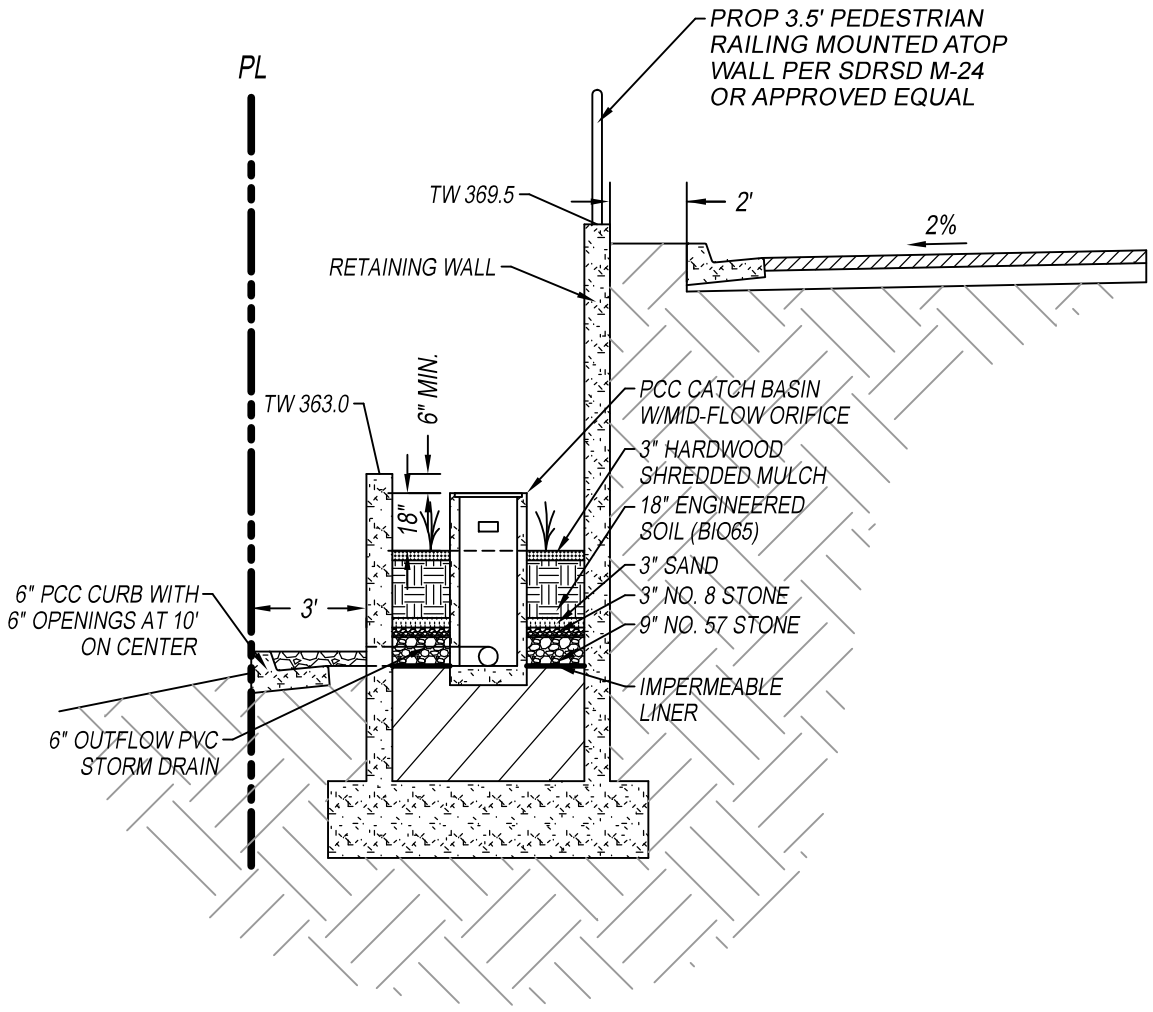
***Note: h = head above the invert of the lowest surface discharge opening.**

Basin Elev.	Area (ft^2)	Volume (ft^3)	Basin Depth (ft)	h* (ft)	Volume (acre-ft)	Q_{total} (cfs)	
377.50	921	0	0.500	0.000	0.0000	0.0000	LOWER OUTLET ORIFICE
377.58	921	76	0.583	0.083	0.0018	0.0626	
377.67	921	153	0.667	0.167	0.0035	0.1772	
377.75	921	229	0.750	0.250	0.0053	0.2756	
377.83	921	306	0.833	0.333	0.0070	0.3376	
377.92	921	382	0.917	0.417	0.0088	0.3899	
378.00	921	459	1.000	0.500	0.0105	0.4359	
378.08	921	535	1.083	0.583	0.0123	0.4775	
378.17	921	612	1.167	0.667	0.0140	0.5158	
378.25	921	688	1.250	0.750	0.0158	0.5514	
378.33	921	764	1.333	0.833	0.0175	0.5849	
378.42	921	841	1.417	0.917	0.0193	0.6165	
378.50	921	917	1.500	1.000	0.0211	0.6466	
378.58	921	994	1.583	1.083	0.0228	0.6754	
378.67	921	1070	1.667	1.167	0.0246	0.7030	RISER STRUCTURE
378.75	921	1147	1.750	1.250	0.0263	0.8778	
378.83	921	1223	1.833	1.333	0.0281	1.1757	
378.92	921	1300	1.917	1.417	0.0298	1.5533	
379.00	921	1376	2.000	1.500	0.0316	1.9953	

Drawdown Calculation - BMP-6

Surface Ponding Depth:	PD	6	in
Ponding Depth Surface Area:	A_{PD}	725	ft^2
Surface Ponding Volume:	V_{PD}	363	ft^3
Low Flow Orifice Diameter:	D	0.5	in
Flow Rate (volumetric):	Q	0.012	ft^3/s
Drawdown Time:		8.39	hrs

4.2 BMP Details



BIOFILTRATION TYPICAL SECTION

NTS

5.0 APPENDIX

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

d = 3.2 inches

Orange County

Riverside County

Imperial County

Pacific Ocean

Mexico

PROJECT SITE

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

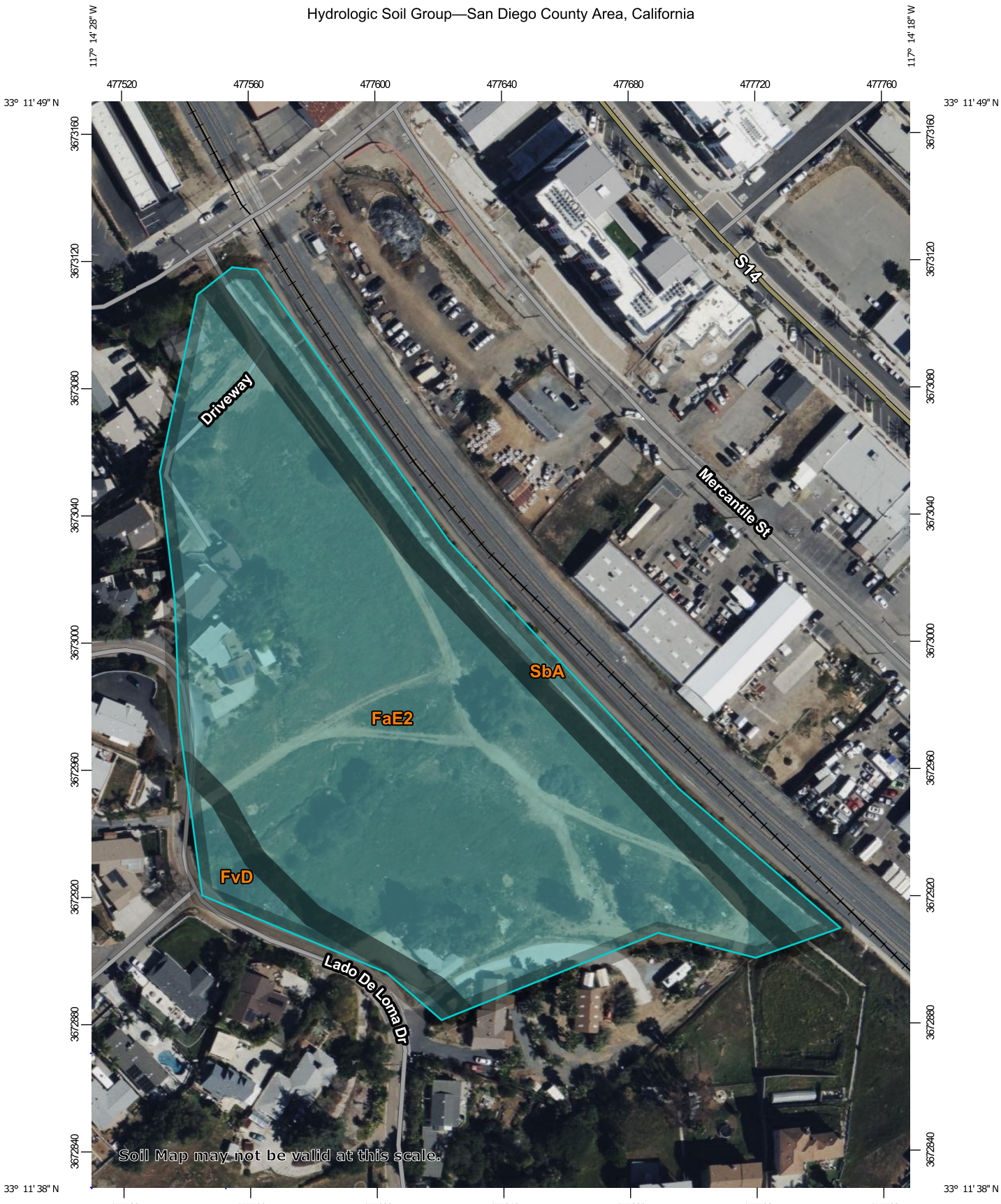
117°30' 117°15' 117°00' 116°45' 116°30' 116°15'
33°30' 33°15' 33°00' 32°45' 32°30'

DPW GIS
Department of Public Works
Geographic Information Services

SanGIS
We Have San Diego Covered!

N W E S

3 0 3 Miles



Map Scale: 1:1,670 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 20 40 80 120

Feet: 0 50 100 200 300

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 16, Sep 13, 2021

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

Date(s) aerial images were photographed: Mar 14, 2022—Mar 17, 2022

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
FaE2	Fallbrook sandy loam, 15 to 30 percent slopes, eroded	C	4.8	81.4%
FvD	Fallbrook-Vista sandy loams, 9 to 15 percent slopes	C	0.3	4.7%
SbA	Salinas clay loam, 0 to 2 percent slopes, warm MAAT, MLRA 19	C	0.8	13.8%
Totals for Area of Interest			**5.9**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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