Appendix G Hydrology and Water Quality Study

Appendices

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OAK GLEN CREEK SPECIFIC PLAN EIR HYDROLOGY AND WATER QUALITY TECHNICAL STUDY

Prepared For:

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1 Introduction

This Hydrology and Water Quality Technical Study is a technical engineering study/evaluation and program-level document supporting the Oak Glen Creek Specific Plan Environmental Impact Report (EIR). It presents issues related to drainage, surface hydrology and water quality. The level of analysis prepared is compatible with the level of planning information available.

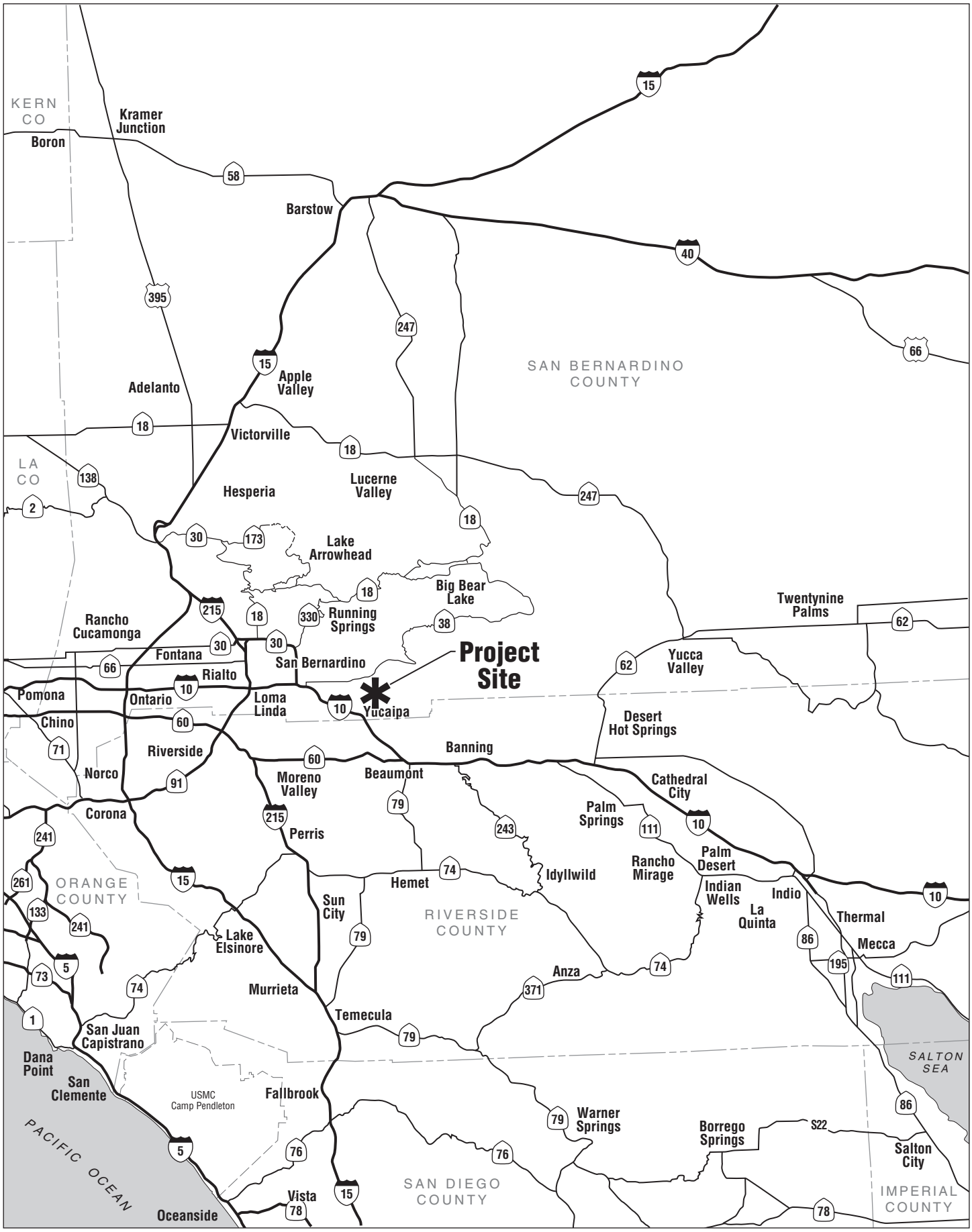
All assessments and technical analysis in this report comply with the local drainage policies and requirements of the San Bernardino County Hydrology Manual.

1.1 Project Description

The project site is located in the City of Yucaipa, San Bernardino County. Figure 1 is the Regional Vicinity Map.

The Oak Glen Creek Specific Plan is 109 acres in size and is located south of Oak Glen Road and west of Bryant Street. Figure 2 is the Local Vicinity Map. Both the Oak Glen Creek and the Wilson Creek run through the project site. The surrounding area consists of industrial, residential, open space, and privately owned properties. The Oak Glen Creek Specific Plan would provide approximately 45 acres of single-family residential homes and includes 64 acres of open space, recreation, and flood control improvements.

The existing site is located on land owned by the San Bernardino County Flood Control District and Yucaipa Valley Water District. It consists of two intersecting creeks: Wilson Creek and Oak Glen Creek.



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APPROXIMATE

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OAK GLEN CREEK SPECIFIC PLAN

Regional Vicinity Map

Figure 1

Source: Aerial - Google Earth Pro, April 28, 2014.

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OAK GLEN CREEK SPECIFIC PLAN

Local Vicinity Map

Figure 2

2 Definition of Level of Significance

The purpose of this technical evaluation is to determine the impact of the proposed project on surface water drainage and storm water quality within the City of Yucaipa. If the analysis indicates that it will result in significant impacts, then appropriate mitigation measures will be identified to minimize the potential project's impacts to a less than significant level.

Federal, state, and local drainage laws and regulations govern the evaluation of impacts to surface water drainage. For this evaluation, the impacts to surface water drainage would be considered significant if any of the following were to occur:

- Violation of any water quality standards or waste discharge requirements.
- Interference with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level.
- Alteration of the drainage patterns of the site which would result in substantial erosion, siltation, or runoff that would result in increased flooding on-, or off-site.
- Creation of runoff that would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff.
- Substantial degradation of water quality.
- The placing of housing within a 100-year flood hazard area structures which would impede or redirect flood flows.

3 Existing Condition

The purpose of the existing condition evaluation is to establish a baseline to compare the potential post-project impacts to the project site. The baseline conditions investigated include land use, hydrology, floodplain mapping, and surface water quality.

The 109-acre site is on the south side of Oak Glen Road and west of Bryant Street. Oak Glen Creek is a major tributary to Wilson Creek and forms a confluence with Wilson Creek near 2nd Street within the proposed project site. The existing land use includes open brush and natural fair cover along Wilson Creek and Oak Glen Creek. Surrounding land uses include institutional and residential. The site is currently undeveloped.

3.1 Hydrology

Hydrology calculations to evaluate surface runoff associated with 2-year, 10-year, and 100-year hypothetical design storm frequencies from the tributary drainage areas were performed using the San Bernardino County Rational Method in the Advanced Engineering Software computer program (AES, 2013). The rational method estimates peak discharges from small urban and developed areas. Hydrologic parameters used in the analysis, such as rainfall and soil classification, are presented in the San Bernardino County Hydrology Manual. Figure 3 is the hydrology map for the existing condition.

The drainage for the overall site is surface runoff flowing southwesterly from Oak Glen Road to 2nd Street, through Wilson Creek and Oak Glen Creek. The existing flows eventually discharge into the Live Oak Creek and San Timoteo Creek located west of the proposed project.

3.1.1 **Rational Method**

The Rational Method equation is based on the assumption that the peak flow rate is directly proportional to the drainage area, rainfall intensity, and a loss coefficient, which describes the effects of land use and soil type. The design discharges were computed by generating a hydrologic “link-node” model that divides the area into sub-areas, each tributary to a concentration point or hydrologic “node” point determined by the existing terrain or proposed site layout. The following assumptions and guidelines were applied for use of the Rational Method.

1. The Rational Method Hydrology includes the effects of infiltration caused by soil surface characteristics. Hydrologic soils ratings are based on a scale of A through D, where A is the most pervious, providing the least runoff. For this study, soil types A and B were used based on the Hydrologic Soils Group Map in the San Bernardino County Hydrology Manual.
2. The infiltration rate is also affected by the type of vegetation or ground cover and percentage of impervious surfaces. For this development, the typical land use applied is “open brush - fair.”
3. Standard intensity-duration curve data was taken from the San Bernardino County Hydrology Manual.

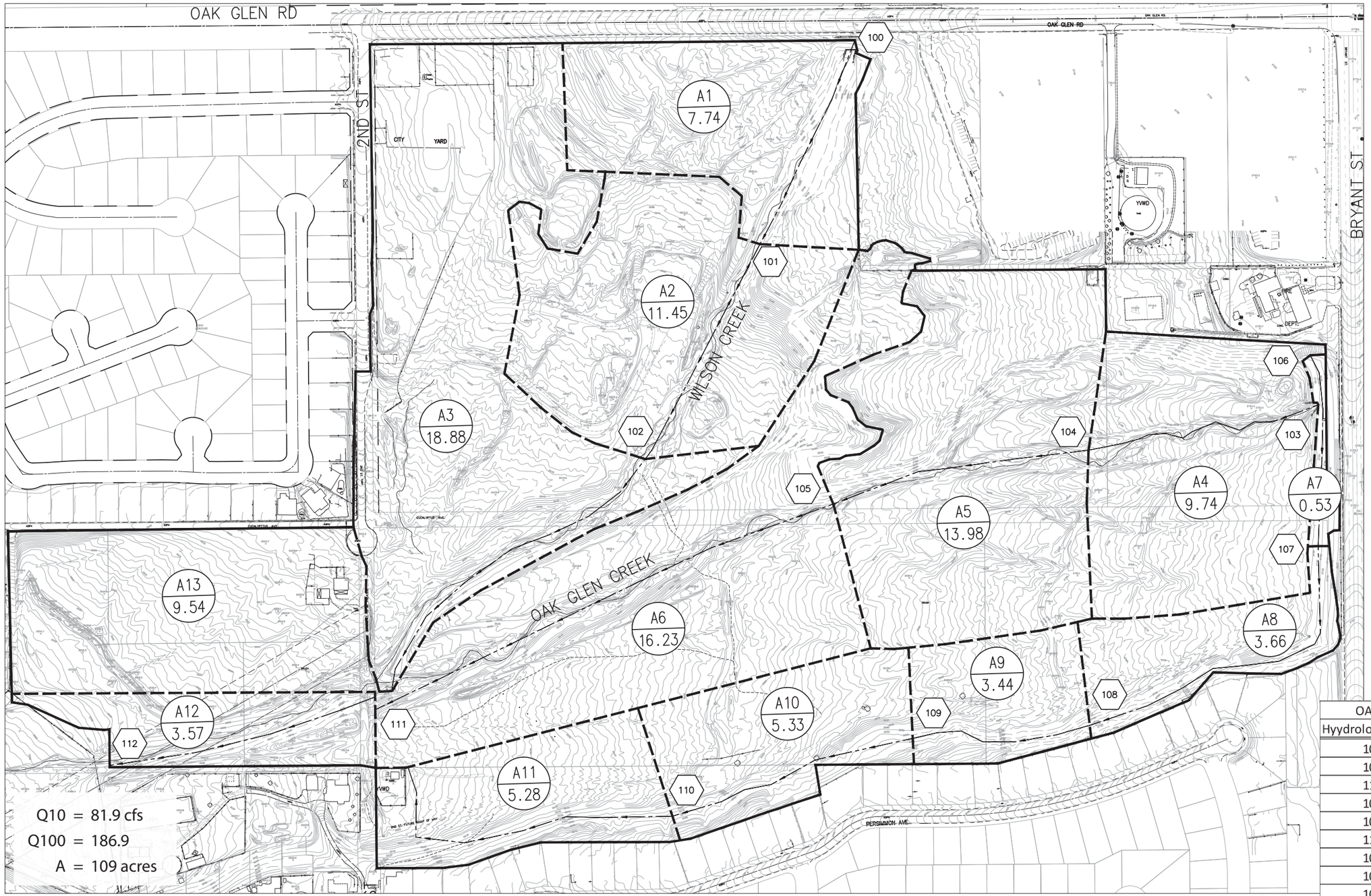
3.1.2 **Summary of Results**

Appendix A contains the results from the analysis for the 2-year, 10-year, and 100-year storm events for the existing conditions. The flows for the 2-year storm are typically used to determine the water quality design capture volume. The 10-year storm flows are used to determine the local drain sizing, while the 100-year analysis is used for large master plan facilities and flood plan mapping.

Table 1 shows the existing condition peak flow rates for each drainage area.

Table 1: Existing Condition Peak Flow Rates

Drainage Area	Area (ac)	2-year Q (cfs)	10-year Q (cfs)	100-year Q (cfs)
A1	7.7	1.9	8.3	17.3
A2	11.5	0.6	9.6	22.3
A3	18.9	4.3	16.7	35.2
A4	9.7	2.5	10.7	21.3
A5	14.0	1.8	13.0	28.0
A6	16.2	3.3	12.7	29.3
A7	0.5	0.1	0.5	1.1
A8	3.7	0.04	2.6	5.8
A9	3.4	0.1	2.2	5.2
A10	5.3	0.1	3.1	7.7
A11	5.3	0.1	2.9	7.3
A12	3.6	0.5	3.2	7.0
A13	9.5	1.1	8.2	18.5



LEGEND

- DRAINAGE BOUNDARY
- FLOW PATH
- A1 / 7.74 — SUBAREA DESIGNATION / AREA (ACRES)
- 101 — HYDROLOGY NODE

OAK GLEN CREEK HYDROLOGY SUMMARY			
Hyydrology Node	Area (Acres)	Q10 (cfs)	Q100 (cfs)
101	7.74	8.26	17.32
102	11.45	9.6	22.33
111	18.88	16.65	35.22
104	9.74	10.65	21.34
105	13.98	13.04	27.97
111	16.23	12.73	29.32
107	1.81	0.52	1.08
108	2.38	2.56	5.8
109	3.44	2.24	5.24
110	5.33	3.14	7.71
111	5.28	2.85	7.32
112	13.11	8.23	18.46

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OAK GLEN CREEK SPECIFIC PLAN

Existing Condition Hydrology Map

Figure 3

3.2 Floodplain Mapping

The City of Yucaipa is a participant in the National Flood Insurance Program (NFIP). Communities participating in the NFIP must adopt and enforce minimum floodplain management standards, including identification of flood hazards and flooding risks. Participation in the NFIP allows communities to purchase low-cost insurance protection against losses from flooding.

Significant portions of the project site are located within a 100-year flood plain due to Wilson Creek and Oak Glen Creek traversing the northerly and southerly portions of the property, respectively. The project site can be found on Flood Insurance Rate Map (FIRM) No. 06071C8745H, effective on August 28, 2008. Refer to Figure 4 – Existing FEMA Floodplain.

Wilson Creek is a regional channel that provides major flood control protection for a large part of the City, and is critical to the City's flood control plan. Wilson Creek is tributary to Zone X, which is defined as areas protected by levees from a 1% annual chance flood. Oak Glen Creek is tributary to Zone A, which is defined as an area of 100-year flooding, where no flood elevations and flood hazards have been determined.

3.3 Storm Water Quality

This section discusses the pollutants typically found in storm water runoff and the contaminants that may be found in existing storm water runoff.

3.3.1 Potential Storm Water Pollutants

The net effect of urbanization could be an increase in pollutant discharge over naturally occurring conditions. The higher discharge could impact adjacent streams and downstream receiving waters. However, an important consideration in evaluating storm water quality from the proposed project is to assess if it impairs the beneficial uses of the receiving waters. Nonpoint source pollutants have been characterized by the following major categories to assist with determining the pertinent data and its use. Receiving waters can assimilate a limited quantity of various constituents, but there are thresholds beyond which the measured amount becomes a pollutant and results in an undesirable impact. The descriptions of these standard water quality categories provide insight into their impacts on downstream receiving waters.

- *Sediment* - Sediment is made up of tiny soil particles that are washed or blown into surface waters. It is the major pollutant by volume in surface water. Suspended soil particles can cause the water to look cloudy or turbid. The fine sediment particles also act as a vehicle to transport other pollutants including nutrients, trace metals, and hydrocarbons. Construction sites are the largest source of sediment for urban areas under development. Another major source of sediment is streambank erosion, which may be accelerated by increases in peak rates and volumes of runoff due to urbanization.
- *Nutrients* - Nutrients are a major concern for surface water quality, especially phosphorus and nitrogen, which can cause algal blooms and excessive vegetative growth. Of the two, phosphorus is usually the limiting nutrient that controls the growth of algae in lakes. When phosphorus is in its orthophosphorus form, it is readily available for plant growth. The ammonium form of nitrogen can also have severe effects on surface water quality, when it is converted to the nitrate and nitrite forms of nitrogen in a process called nitrification. This process consumes large amounts of oxygen, which can impair the dissolved oxygen (DO) levels in water. The nitrate form of nitrogen is very soluble and is found naturally at low levels in

water. When nitrogen fertilizer is applied to lawns or other vegetation in excess of plant needs, nitrates can leach below the root zone, eventually reaching ground water. Orthophosphate from auto emissions also contributes phosphorus in areas with heavy automobile traffic. Generally, nutrient discharge is greatest from development sites with the most impervious areas. Other problems resulting from excess nutrients are 1) surface algal scums, 2) water discoloration, 3) odors, 4) toxic releases, and 5) overgrowth of plants. The common chemical measures for nutrients are total nitrogen, organic nitrogen, total Kjeldahl nitrogen (TKN), nitrate, ammonia, total phosphate, and total organic carbon (TOC).

- *Trace Metals* - Trace metals are primarily a concern because of their toxic effects on aquatic life, and their potential to contaminate drinking water supplies. The most common trace metals found in urban runoff are lead, zinc, and copper. A large fraction of the trace metals in urban runoff are attached to sediment and this effectively reduces the level that is immediately available for biological uptake and subsequent bioaccumulation. Metals associated with the sediment settle out rapidly and accumulate in the soils. In addition, urban runoff events typically occur over a shorter duration, which reduces the amount of exposure, but could be toxic to the aquatic environment. The toxicity of trace metals in runoff varies with the hardness of the receiving water. As total hardness of the water increases, the threshold concentration levels for adverse effects increases.

- *Oxygen-Demanding Substances* - Aquatic life is dependent on the DO in the water, and when organic matter is consumed by microorganisms, DO is consumed in the process. A rainfall event can deposit large quantities of oxygen demanding substances in lakes and streams. The biochemical oxygen demand of typical urban runoff is on the same order of magnitude as the effluent from an effective secondary wastewater treatment plant. A problem from low DO results when the rate of oxygen-demanding material exceeds the rate of replenishment. Oxygen demand is estimated by direct measure of DO and indirect measures such as biochemical oxygen demand (BOD), chemical oxygen demand (COD), oil and grease, and TOC.

- *Bacteria* - Bacteria levels in undiluted urban runoff exceed public health standards for water contact recreation almost without exception. Studies have found that total coliform counts exceeded EPA water quality criteria at almost every site and almost every time it rained. The coliform bacteria that are detected may not be a health risk, but are often associated with human pathogens.

- *Oil and Grease* - Oil and grease contain a wide variety of hydrocarbons, some of which could be toxic to aquatic life in low concentrations. These constituents initially float on water and create the familiar rainbow-colored film. Hydrocarbons have a strong affinity for sediment and quickly become absorbed in it. The major source of hydrocarbons, primarily crankcase oil and other lubricating agents, in urban runoff is from leaking automobile engines. Residential land uses typically have a lower discharge of hydrocarbons; however, the illegal disposal of waste oil into storm drains and urban runoff can be a local problem.

- *Other Toxic Chemicals* - Priority pollutants are generally related to hazardous wastes or toxic chemicals and can sometimes be detected in storm water. Priority pollutant tests have been conducted in previous studies of urban runoff, which evaluated the presence of over 120 toxic chemicals and compounds. The scans rarely revealed toxins that exceeded the current safety criteria, and were primarily conducted in suburban areas not expected to have many sources of toxic pollutants (with the possible exception of illegally disposed or applied household hazardous wastes). Measures of priority pollutants in storm water include 1) phthalate

(plasticizer compound), 2) phenols and creosols (wood preservatives), 3) pesticides and herbicides, 4) oils and greases, and 5) metals.

3.3.2 Existing Storm Water Quality

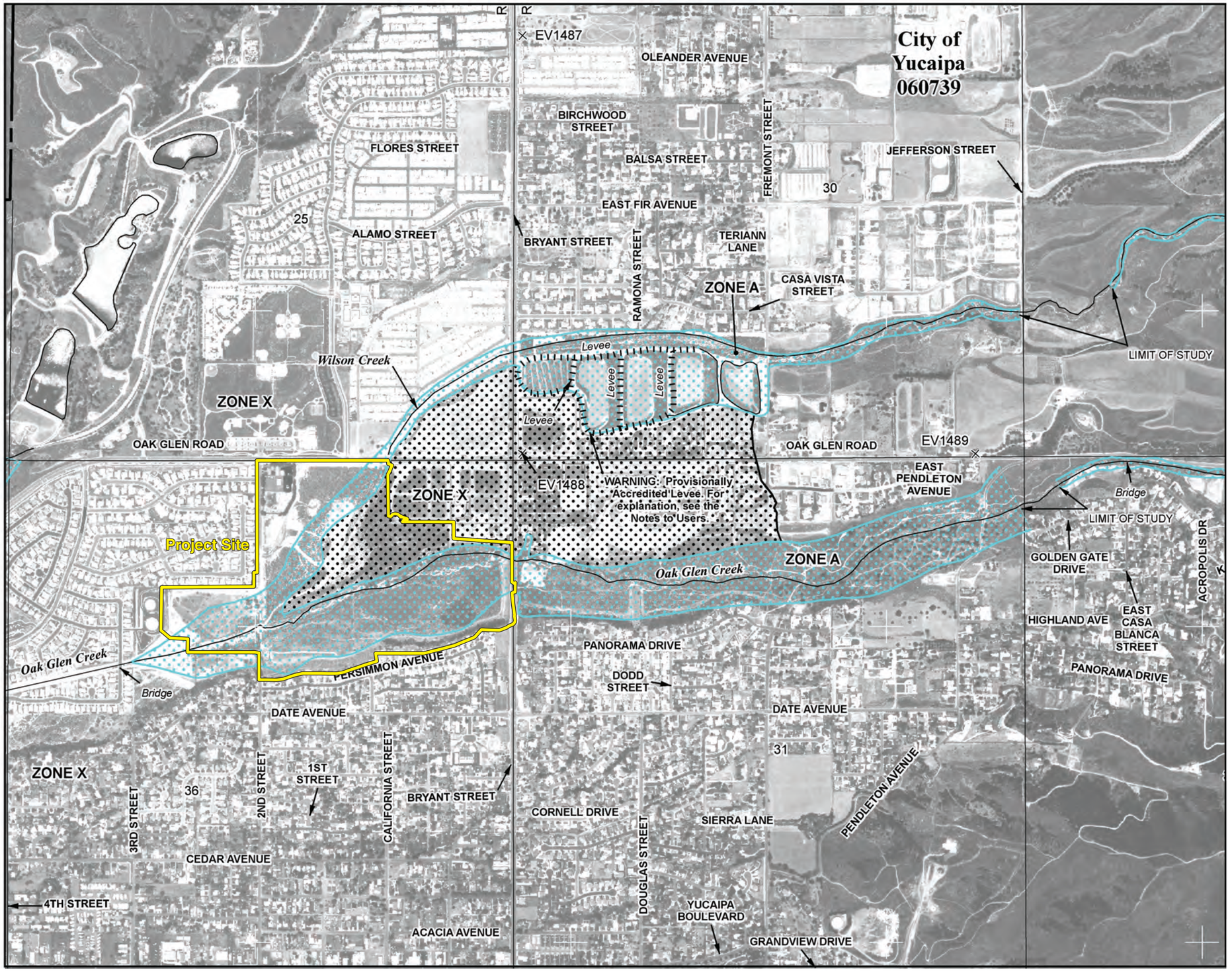
The project site lacks data on storm water runoff quality. In the absence of site-specific data, expected storm water quality can be qualitatively discussed by relating typical pollutants to specific land uses.

To meet the requirements of the Porter-Cologne Act, the Santa Ana Regional Water Quality Control Board defined the beneficial uses of its water bodies in the Santa Ana River Basin Water Quality Control Plan (Basin Plan) (October 22, 1993). Beneficial uses are the uses of water necessary for the survival or well-being of humans, plants, and wildlife. If pollutant concentrations in water bodies cause impairments to their beneficial uses, then the water body is placed on the State of California's list of impaired water bodies (303(d) List) until a TMDL is established for the water body (maximum discharge of pollutants). The beneficial uses of San Timoteo Creek are Agricultural Supply (AGR), Ground Water Recharge (GWR), Water Contact Recreation (REC1), Non-Contact Water Recreation (REC2), Warm Freshwater Habitat (WARM), and Wildlife Habitat (WILD).

Table 2 summarizes the latest water quality data for the receiving waters of the project, including pollutants that are 303(d) listed, and if Total Maximum Daily Loads (TMDLs) have been developed for each pollutant.

Table 2: Water Quality Data

Receiving Water	303(d) Listed	Pollutants	TMDL Developed
Wilson Creek	No	N/A	N/A
Live Oak Creek	No	N/A	N/A
San Timoteo Creek	No	N/A	N/A
Santa Ana River			
Reach 4	Yes	Pathogens	No
Reach 3	Yes	Copper	No
		Lead	No
		Pathogens	Yes (2007)
Reach 2		Indicator Bacteria	No
Reach 1		None	N/A



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NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 8745H

FIRM

FLOOD INSURANCE RATE MAP

SAN BERNARDINO COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 8745 OF 9400

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
SAN BERNARDINO COUNTY	060270	8745	H
YUCAIPA, CITY OF	060739	8745	H

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

MAP NUMBER 06071C8745H

MAP REVISED AUGUST 28, 2008

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

4 Proposed Project

This section discusses how the proposed project was evaluated for impacts to hydrology and water quality. The evaluation includes investigation of proposed conditions land use, proposed storm drain configuration, hydrology, floodplain mapping, and surface water quality.

4.1 Hydrology

The hydrology methodology and parameters for the proposed condition are the same as discussed in the existing condition, except for the land use. The proposed site surrounding the basin will be redeveloped into two land use districts: the Residential District, encompassing single-family housing east and southwest of 2nd Street, and the Open Space District along Oak Glen Creek and the proposed flood attenuation basin. Refer to Figure 5 – Proposed Development Land Use. The proposed land use types for this development are “open brush - fair” for the Open Space District and “11+ Dwellings” for the Residential District. The impervious value in the proposed condition is greater than in the existing condition due to the change in land use. The proposed impervious value for “11+ Dwellings” is 80% based on the San Bernardino County Hydrology Manual.

4.2 Proposed Improvements

The project area surrounds the proposed flood attenuation basin, Wilson III. The basin is a proposed flood control facility designed to reduce the peak flow rates to the downstream Wilson Creek channel. The City’s General Plan shows, in an ultimate condition, the 2nd Street cul-de-sac being extended across the existing creek bed, and will function as the downstream embankment for the Wilson Basin. The proposed realignment of Wilson Creek will run parallel to 2nd and Bryant Street, south of Oak Glen Road and will enter the Wilson Basin at the proposed Eucalyptus Road. Wilson Creek upstream of the basin is proposed as an open trapezoidal channel. Due to the realignment of Wilson Creek and the development of the site, the proposed project’s drainage pattern will change compared to the existing condition. Refer to Figure 6 – Proposed Condition Hydrology Map. Surface runoff will flow from Oak Glen Road at the north end of the project site, through catch basins and storm drain lines to discharge south at the proposed Wilson detention basin. On-site flood attenuation will be achieved through this basin.

4.2.1 **Proposed Condition Surface Water Hydrology**

Appendix B contains the analysis results for the 2-year, 10-year, and 100-year storm events for the proposed conditions. The flows for the 2-year storm are typically used to determine the water quality design capture volume. The flows for the 10-year storm are used to determine the local drain sizing, while the 100-year analysis is used for larger master plan facilities and floodplain mapping.

Table 3 shows the proposed condition peak flow rates for each drainage area.

Table 3: Proposed Condition Peak Flow Rates

Drainage Area	Area (ac)	2-year Q (cfs)	10-year Q (cfs)	100-year Q (cfs)
A1	6.7	8.6	15.4	23.7
A2	10.6	11.9	21.8	34.1
A3	17.2	18.2	33.4	52.7
A4	2.4	0.3	2.1	4.7
A5	5.6	0.0	3.4	8.9
A6	4.2	0.9	4.3	8.9
A7	5.1	0.4	4.4	9.8
A8	24.7	1.2	17.9	42.2
A9	9.6	0.0	7.2	16.7
A10	0.9	0.3	1.0	1.9
A11	4.5	0.1	3.1	7.6
A12	2.1	0.01	1.4	3.4
A13	5.6	7.0	12.6	19.3
A14	4.6	4.5	8.4	13.4
A15	5.7	0.3	4.3	9.9

Source: Aerial - Google Earth Pro, April 28, 2014.

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not to scale

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OAK GLEN CREEK SPECIFIC PLAN

Proposed Development Land Use Map

Figure 5

LEGEND

- DRAINAGE BOUNDARY
- FLOW PATH
- A1 / 7.74 — SUBAREA DESIGNATION / AREA (ACRES)
- 101 — HYDROLOGY NODE

OAK GLEN CREEK HYDROLOGY SUMMARY			
Hyydrology Node	Area (Acres)	Q10 (cfs)	Q100 (cfs)
102	6.73	15.39	23.68
103	10.6	21.82	55.79
105	2.36	2.11	4.68
107	4.17	4.32	8.86
108	10.75	7.8	18.71
111	0.85	0.98	1.92
113	23.73	37.95	63.72
116	5.6	12.55	19.32
117	4.55	8.39	13.36
119	34.34	25.13	58.9
121	5.7	4.34	9.89

5 Impacts and Proposed Mitigation

5.1 Hydrology and Drainage Runoff

The proposed project would alter drainage patterns due to onsite grading and increases in the amount of impervious area. This could result in increased local erosion and runoff. The impacts are considered potentially significant if not mitigated.

In the proposed condition, the watershed delineation changes from the existing condition due to the realignment of Wilson Creek, grading, and increases of impervious areas (roads and lots). Table 4 compares the existing and proposed condition peak flows at the southwest end of the project site, where the creeks outflow to an existing channel.

Table 4: Local Flow Rates Comparison

Condition	Node	2-year Flowrate (cfs)	10-year Flowrate (cfs)	100-year Flowrate (cfs)
Existing	112	9.3	81.9	186.9
Proposed	121	47.3	128.8	222.8

With the construction of single-family residential dwellings, as well as roads, the impervious area of the project site is increased. This causes both an increase in storm water runoff and volume. An on-site drainage system will help to prevent flooding, and reduce the impacts of erosion. Appropriate storm drain and catch basin sizing must be completed such that the 10-year runoff will not exceed top of curb and the 100-year runoff will flow below the right-of-way. Due to the programmatic level of the site plan and available grading, there is not enough information to outline a preliminary storm drain system.

As further developments are made on the proposed site plan, a proposed storm drain system will convey all onsite flows to the Wilson basin. The basin is a regional flood attenuation facility that is designed to reduce the ultimate condition flooding down to levels outlined in the City's Master Plan of Drainage (MPD). As part of the tributary area, the proposed project run-off will be mitigated through this regional facility, reducing the potential impacts of increased flows.

Drainage impacts are considered potentially significant if not mitigated. However, providing protection to minimize erosion and designing cross culverts for the realignment of Wilson Creek based on San Bernardino County requirements would reduce the impacts of drainage to a less than significant level.

5.2 Flood Attenuation

The Wilson Basin is being constructed as part of the proposed development. The primary goal of the basin is flood attenuation to alleviate existing downstream flooding along Wilson Creek thus providing protection for private properties, roadways, and other public infrastructure.

5.2.1 **Inundation**

The project area is also not subject to tsunamis due the inland location of the proposed development. The portion of the site that would be in the Residential District is relatively flat and does not have a high risk for mudslides. In addition, no body of water in or near the Specific Plan area of the size could produce an oscillating standing wave (a seiche).

Another purpose of the project is to increase opportunities for groundwater recharge of natural stream flows. The basin is designed such that opportunities for ground water recharge are present. The City will provide the assessment on ground water impacts as outlined in the Environmental Analysis portion of the Notice of Preparation and Initial Study.

5.3 Proposed Impacts on Floodplain Mapping

The proposed development would impact mapped 100-year floodplains. Portions of the project site are located in Zone "A" floodplain along Oak Glen and Wilson Creek. Other portions of Wilson Creek and adjacent tributary areas of the project site are located in Zone "X" floodplain.

The proposed improvements and realignment of Wilson Creek will result in the channelization of the 100-year flows. The 1% annual chance flood will remain within the limits of the proposed channel.

5.3.1 Mitigation

The culverts located within the Wilson and Oak Glen Creeks shall be designed to convey 100-year flow. Before grading permits can be achieved for a tentative tract map, a Condition Letter of Map Revision must be obtained from FEMA. A Letter of Map Revision from FEMA must be obtained prior to issuance of occupancy permits.

Completion of the above mitigation measures would reduce flooding impacts, such as placing housing and structures within a 100-year floodplain to a less than significant level.

5.4 Proposed Impacts on Storm Water Quality

The development of the proposed residential areas affects project site imperviousness, resulting in impacts to both pre- and post-construction storm water quality. In addition, increased pollutant loading can occur immediately offsite. Best Management Practices (BMPs) are treatment methods to reduce or prevent pollution of surface water and groundwater by controlling releases of pollutants to receiving waters. Implementation of construction and post-construction BMPs, including the preparation of a plan (i.e., Water Quality Management Plan (WQMP) or functional equivalent document), a Notice of Intent, and a Storm Water Pollution Prevention Plan, would aim to reduce water quality impacts to required levels.

According to Order No. R8-2010-0036 NPDES Permit No. CAS618036 (Permit), a project of this type of work is classified as a Priority Development Project (New Development Project), because proposed construction will take place on previously undeveloped land. The Permit requires the proposed project to meet two separate requirements for storm water quality: Low Impact Development (LID) and Hydromodification Management.

5.4.1 Low Impact Design

The primary goal of LID is to preserve the pre-development hydrology of a project site, and address post-development runoff through structural and non-structural BMPs that store, infiltrate, evaporate, and detain runoff. The proposed project will implement BMPs to meet LID performance criteria according to the Municipal Storm Water Permitting Program (MS4 Permit). BMP implementation shall be evaluated by site design components and performance feasibility within preventive and mitigative measures. Preventive measures are site planning, design and construction practices that focus on minimizing the amount of land disturbed and retained to the maximum extent practicable (MEP), the project site's natural drainage characteristics. Mitigative measures include structural BMPs that manage

impacts from storm water runoff and provide pollutant reduction for mitigating the design capture volume (DCV) associated with each drainage area on the project site. Evaluation and implementation of LID BMPs to the MEP uses the following hierarchy of priority:

1. retention and infiltration BMPs,
2. harvest and use BMPs,
3. volume-based biotreatment BMPs,
4. flow-based biotreatment BMPs, and
5. an alternative compliance plan including off-site BMPs.

Guidance and procedures used to calculate the DCV for the project and design of BMPs can be found in the San Bernardino County Technical Guidance Document for Water Quality Management Plans. The required DCV calculated is 4.2 ac-ft of volume that must be treated. DCV calculations can be found in Appendix C.

5.4.2 **Hydromodification**

Hydromodification control refers to the methods used to address Hydrologic Conditions of Concern (HCOC) in a project's Water Quality Management Plan (WQMP). Hydromodification control BMPs range from structural BMPs designed to control flow duration to in-stream measures such as grade control structures. In-stream measures can be desirable where stream channels are already degraded due to hydromodification caused by existing development. There are various alternatives for siting hydromodification control measures, including on-site, in-stream, and regional.

The BMPs included in the WQMP will help contribute to meeting HCOC requirements. The volume of runoff retained by BMPs to meet the water quality DCV will typically serve to reduce the volume computed for the post-developed condition for a 2-year, 24-hour storm event. BMPs will also substantially reduce the post-developed condition runoff hydrograph, including the time of concentration and peak runoff when compared to the potential resulting post-development hydrograph if no BMPs were incorporated. HCOC performance criteria for time of concentration and peak runoff require matching of pre- and post- developed conditions within 5 percent.

Inclusion of mitigative BMPs that retain or detain on-site runoff, may make it physically impossible for a project to avoid increasing the time of concentration of a site and reducing peak runoff by more than five percent. These changes to a site's hydrologic regime are less of a concern for downstream HCOCs, as they serve to reduce the frequency of erosive conditions. Therefore, it is interpreted that the five percent post-developed matching criteria only applies to decreases in time of concentration and increases in runoff volume and peak flow rate, which could cause increases in frequency of erosive conditions.

Guidance and procedures used to perform hydromodification analysis for the project and design of BMPs can be found in the *San Bernardino County Technical Guidance Document for Water Quality Management Plans*. Per hydrologic analysis, the HCOC volume is 2.5 ac-ft of volume that must be detained. HCOC calculations can be found in Appendix C.

5.4.3 **Water Quality Solutions**

Percolation tests have yielded infiltration rates as shown in geotechnical analysis, however were performed outside of the proposed residential developed areas. Thus, barring any conflicts with existing utilities (gas, sewer, electrical, etc.). Further percolation testing, specifically within the proposed residential developments, will help to determine infiltration feasibility and subsequent BMP selection.

Downstream drainage areas in the residential developments (e.g., parking lots) are sensible locations for underground infiltration BMPs. Following the natural on-site drainage characteristics, the southwest corners of both proposed residential developments are practical drainage areas. Furthermore, water quality BMPs to be considered include a bioretention basin, incorporating treatment BMPs that tie into storm drain infrastructure along streets (e.g., biofiltration BMPs), or other BMP options that satisfy water quality volume project requirements.

5.4.4 Construction

During construction, the necessary soil excavation and compaction activities will impact the beneficial uses of downstream water bodies. The proposed project has the potential to produce typical pollutants such as nutrients, heavy metals, pesticides and herbicides, toxic chemicals related to construction and cleaning, waste materials including wash water, paints, wood, paper, concrete, food containers, and sanitary wastes, fuel, and lubricants. Prior to construction, the permit requires the following:

- Electronic submittal of the Permit Registration Documents (PRD) to the SWRCB at least 30 days before the start of construction, which includes submittal of a Notice of Intent (NOI), risk assessment, site map, SWPPP, annual fee, and a signed certification statement;
- Preparation and implementation of a SWPPP; and
- Electronic submittal of a Notice of Termination (NOT) to the SWRCB upon completion of construction and stabilization of the site.

As a result of construction, the impacts to water quality will be less than significant if mitigated.

5.4.5 Mitigation

The long-term operation and maintenance of the proposed project will be a source of pollutants, including suspended solids/sediment, nutrients, heavy metals, pathogens (bacteria/virus), pesticides, oil and grease, toxic organic compounds, trash and debris, and household hazardous wastes. The vegetated areas are likely to produce suspended solids/sediment, nutrients, and pesticides. The following water quality mitigation measures were identified:

- Applicants shall prepare and electronically submit the Permit Registration Documents (PRD) to the SWRCB at least 30 days before the start of construction, which includes submittal of a Notice of Intent (NOI), risk assessment, site map, SWPPP, annual fee, and a signed certification statement.
- Applicants shall prepare and implement a SWPPP.
- Applicants shall electronically submit a Notice of Termination (NOT) to the SWRCB upon completion of construction and stabilization of the site.
- Applicant shall prepare a plan (i.e., WQMP or functional equivalent document) in accordance with the guidance to be developed by the NPDES Permit (Order No. R8-2010-0036 NPDES Permit No. CAS618036), which addresses post-construction BMPs. A plan (i.e., WQMP or functional equivalent document) will be required prior to issuance of a grading permit. The post-construction BMPs may include but are not limited to the following:
    - Bioretention
        - Rainfall Harvest and Use (i.e., cisterns, rain barrels, planter areas, permeable surfaces, drywells, French drains, etc.)
        - Vegetated Swales
        - Vegetated Filter Strips
        - Green Roofs

- Infiltration Trenches
- Media Filtration

- Porous Pavement
  - Permeable Surfaces (i.e., porous concrete/asphalt, Hollywood driveways, block pavers, open cell concrete, plastic grid systems, reinforced turf, etc.)
  - Other applicable BMPs that may be approved by the City of Yucaipa or the county-wide program to address the 2010 NPDES Permit requirements

6 References

AES (2013). Advanced Engineering Software, Garden Grove, California.

Wilson III Basin Project: Multi-Purposed Flood Control Basin Alternative Analysis, (2013) by RBF Consulting.

Wilson III Multi-Purpose Flood Control Basin: Basis of Design Report, (2016) by Michael Baker International.

San Bernardino County Hydrology Manual (1986)

San Bernardino County Technical Guidance Document for Water Quality Management Plans

Santa Ana River Watershed Technical Guidance Document for WQMP Final – September 2013

Appendix A: Existing Condition Hydrology

2-Year, 10-Year, & 100-Year

```
 ************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
         (c) Copyright 1983-2013 Advanced Engineering Software (aes)
             Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                          Analysis prepared by:

                              RBF Consulting
                            14257 Alton Parkway
                                 Irvine, CA
                                   92618

 ************************* DESCRIPTION OF STUDY *************************
* City of Yuciapa EIR Hydrology Support                                 *
* Existing Condition - 2 Year Model                                     *
* JN 144187 APRIL 2016 IE                                               *
 ************************************************************************

  FILE NAME: Y_EX_2.DAT
  TIME/DATE OF STUDY: 10:46 04/25/2016
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.5500

  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
```



```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   600.00
  ELEVATION DATA: UPSTREAM(FEET) =    667.00  DOWNSTREAM(FEET) =    617.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.993
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.264
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               A        7.74      1.00     1.000    28   14.99
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.00
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.87
  TOTAL AREA(ACRES) =      7.74   PEAK FLOW RATE(CFS) =      1.87

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    617.00  DOWNSTREAM(FEET) =    586.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   954.00   CHANNEL SLOPE =  0.0325
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.87
  FLOW VELOCITY(FEET/SEC) =   3.06 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.20   Tc(MIN.) =   20.19
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =    1554.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.19
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.057
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.02      0.85     1.000    46
  NATURAL FAIR COVER
  "OPEN BRUSH"               A       11.43      1.00     1.000    28
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.00
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   11.45      SUBAREA RUNOFF(CFS) =    0.63
  EFFECTIVE AREA(ACRES) =     19.19   AREA-AVERAGED Fm(INCH/HR) =  1.00
  AREA-AVERAGED Fp(INCH/HR) =  1.00  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       19.2       PEAK FLOW RATE(CFS) =       1.87
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    111.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    586.00  DOWNSTREAM(FEET) =    567.00
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   946.00   CHANNEL SLOPE =  0.0201
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.87
  FLOW VELOCITY(FEET/SEC) =   2.40 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.56   Tc(MIN.) =   26.75
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    111.00 =    2500.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   26.75
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.893
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.03      0.85     1.000    46
  NATURAL FAIR COVER
  "OPEN BRUSH"               A       12.97      1.00     1.000    28
  COMMERCIAL                 B        3.63      0.94     0.100    36
  COMMERCIAL                 A        2.25      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.00
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.720
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  SUBAREA AREA(ACRES) =   18.88      SUBAREA RUNOFF(CFS) =    4.25
  EFFECTIVE AREA(ACRES) =     38.07   AREA-AVERAGED Fm(INCH/HR) =  0.86
  AREA-AVERAGED Fp(INCH/HR) =  1.00  AREA-AVERAGED Ap =  0.86
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TOTAL AREA(ACRES) =       38.1       PEAK FLOW RATE(CFS) =       4.25

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   648.00
  ELEVATION DATA: UPSTREAM(FEET) =    674.00  DOWNSTREAM(FEET) =    642.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.168
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.165
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        7.51      0.85     1.000    46   17.17
  NATURAL FAIR COVER
  "OPEN BRUSH"               A        2.23      1.00     1.000    28   17.17
```



```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.88
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.48
  TOTAL AREA(ACRES) =      9.74   PEAK FLOW RATE(CFS) =      2.48

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    642.00  DOWNSTREAM(FEET) =    611.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   702.00   CHANNEL SLOPE =  0.0442
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.48
  FLOW VELOCITY(FEET/SEC) =   3.79 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.09   Tc(MIN.) =   20.26
  LONGEST FLOWPATH FROM NODE    103.00 TO NODE    105.00 =    1350.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.26
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.055
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        8.05      0.85     1.000    46
  NATURAL FAIR COVER
  "OPEN BRUSH"               A        5.93      1.00     1.000    28
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.91
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   13.98      SUBAREA RUNOFF(CFS) =    1.82
  EFFECTIVE AREA(ACRES) =     23.72   AREA-AVERAGED Fm(INCH/HR) =  0.90
  AREA-AVERAGED Fp(INCH/HR) =  0.90  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       23.7       PEAK FLOW RATE(CFS) =       3.33

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    111.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    611.00  DOWNSTREAM(FEET) =    567.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1336.00   CHANNEL SLOPE =  0.0329
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.33
  FLOW VELOCITY(FEET/SEC) =   3.49 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.38   Tc(MIN.) =   26.64
  LONGEST FLOWPATH FROM NODE    103.00 TO NODE    111.00 =    2686.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   26.64
```

```
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.895
SUBAREA LOSS RATE DATA(AMC  I ):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"                B       10.72      0.85     1.000    46
NATURAL FAIR COVER
"OPEN BRUSH"                A        5.51      1.00     1.000    28
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.90
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
* RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
* IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
SUBAREA AREA(ACRES) =   16.23      SUBAREA RUNOFF(CFS) =    0.00
EFFECTIVE AREA(ACRES) =     39.95   AREA-AVERAGED Fm(INCH/HR) =  0.90
AREA-AVERAGED Fp(INCH/HR) =  0.90  AREA-AVERAGED Ap =  1.00
* RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
* IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
TOTAL AREA(ACRES) =       39.9       PEAK FLOW RATE(CFS) =       3.33
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
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.) =   26.64
RAINFALL INTENSITY(INCH/HR) =   0.90
AREA-AVERAGED Fm(INCH/HR) =  0.90
AREA-AVERAGED Fp(INCH/HR) =  0.90
AREA-AVERAGED Ap =  1.00
EFFECTIVE STREAM AREA(ACRES) =      39.95
TOTAL STREAM AREA(ACRES) =      39.95
PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.33

****************************************************************************
FLOW PROCESS FROM NODE    106.00 TO NODE    107.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   515.00
ELEVATION DATA: UPSTREAM(FEET) =    692.00  DOWNSTREAM(FEET) =    682.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   18.875
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.101
SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
NATURAL FAIR COVER
"OPEN BRUSH"                A        0.15      1.00     1.000    28   18.88
NATURAL FAIR COVER
"OPEN BRUSH"                B        0.38      0.85     1.000    46   18.88
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.89
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA RUNOFF(CFS) =      0.10
```



```
TOTAL AREA(ACRES) =      0.53   PEAK FLOW RATE(CFS) =      0.10

****************************************************************************
FLOW PROCESS FROM NODE    107.00 TO NODE    108.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    682.00  DOWNSTREAM(FEET) =    672.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   911.00   CHANNEL SLOPE =  0.0110
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =       0.10
FLOW VELOCITY(FEET/SEC) =   1.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   9.66   Tc(MIN.) =   28.54
LONGEST FLOWPATH FROM NODE    106.00 TO NODE    108.00 =    1426.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   28.54
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.859
SUBAREA LOSS RATE DATA(AMC  I ):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"                B        3.66      0.85     1.000    46
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.85
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =    3.66      SUBAREA RUNOFF(CFS) =    0.04
EFFECTIVE AREA(ACRES) =      4.19   AREA-AVERAGED Fm(INCH/HR) =  0.85
AREA-AVERAGED Fp(INCH/HR) =  0.85  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =        4.2       PEAK FLOW RATE(CFS) =       0.10
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
FLOW PROCESS FROM NODE    108.00 TO NODE    109.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    672.00  DOWNSTREAM(FEET) =    647.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   486.00   CHANNEL SLOPE =  0.0514
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =       0.10
FLOW VELOCITY(FEET/SEC) =   3.40 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.38   Tc(MIN.) =   30.92
LONGEST FLOWPATH FROM NODE    106.00 TO NODE    109.00 =    1912.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    109.00 TO NODE    109.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   30.92
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.819
SUBAREA LOSS RATE DATA(AMC  I ):
```

```
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"                B        3.44      0.85     1.000    46
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.85
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
* RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
* IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
SUBAREA AREA(ACRES) =    3.44      SUBAREA RUNOFF(CFS) =    0.00
EFFECTIVE AREA(ACRES) =      7.63   AREA-AVERAGED Fm(INCH/HR) =  0.85
AREA-AVERAGED Fp(INCH/HR) =  0.85  AREA-AVERAGED Ap =  1.00
* RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
* IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
TOTAL AREA(ACRES) =        7.6       PEAK FLOW RATE(CFS) =       0.10
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
FLOW PROCESS FROM NODE    109.00 TO NODE    110.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    647.00  DOWNSTREAM(FEET) =    622.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   679.00   CHANNEL SLOPE =  0.0368
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =       0.10
FLOW VELOCITY(FEET/SEC) =   2.88 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   3.93   Tc(MIN.) =   34.85
LONGEST FLOWPATH FROM NODE    106.00 TO NODE    110.00 =    2591.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   34.85
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.762
SUBAREA LOSS RATE DATA(AMC  I ):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"                B        5.33      0.85     1.000    46
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.85
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
* RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
* IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
SUBAREA AREA(ACRES) =    5.33      SUBAREA RUNOFF(CFS) =    0.00
EFFECTIVE AREA(ACRES) =     12.96   AREA-AVERAGED Fm(INCH/HR) =  0.85
AREA-AVERAGED Fp(INCH/HR) =  0.85  AREA-AVERAGED Ap =  1.00
* RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
* IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
TOTAL AREA(ACRES) =       13.0       PEAK FLOW RATE(CFS) =       0.10
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
FLOW PROCESS FROM NODE    110.00 TO NODE    111.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
```



```
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    622.00  DOWNSTREAM(FEET) =    567.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   885.00   CHANNEL SLOPE =  0.0621
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =       0.10
FLOW VELOCITY(FEET/SEC) =   3.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   3.94   Tc(MIN.) =   38.79
LONGEST FLOWPATH FROM NODE    106.00 TO NODE    111.00 =    3476.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   38.79
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.714
SUBAREA LOSS RATE DATA(AMC  I ):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"                B        5.28      0.85     1.000    46
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.85
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
* RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
* IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
SUBAREA AREA(ACRES) =    5.28      SUBAREA RUNOFF(CFS) =    0.00
EFFECTIVE AREA(ACRES) =     18.24   AREA-AVERAGED Fm(INCH/HR) =  0.85
AREA-AVERAGED Fp(INCH/HR) =  0.85  AREA-AVERAGED Ap =  1.00
* RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
* IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
TOTAL AREA(ACRES) =       18.2       PEAK FLOW RATE(CFS) =       0.10
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
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.) =   38.79
RAINFALL INTENSITY(INCH/HR) =   0.71
AREA-AVERAGED Fm(INCH/HR) =  0.85
AREA-AVERAGED Fp(INCH/HR) =  0.85
AREA-AVERAGED Ap =  1.00
EFFECTIVE STREAM AREA(ACRES) =      18.24
TOTAL STREAM AREA(ACRES) =      18.24
PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.10

** CONFLUENCE DATA **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1        3.33   26.64    0.895  0.90( 0.90) 1.00      39.9     103.00
    2        0.10   38.79    0.714  0.85( 0.85) 1.00      18.2     106.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
```

```
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        3.42   26.64    0.895  0.89( 0.89) 1.00      52.5     103.00
      2        2.76   38.79    0.714  0.88( 0.88) 1.00      58.2     106.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       3.42    Tc(MIN.) =    26.64
  EFFECTIVE AREA(ACRES) =      52.48   AREA-AVERAGED Fm(INCH/HR) =  0.89
  AREA-AVERAGED Fp(INCH/HR) =  0.89  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       58.2
  LONGEST FLOWPATH FROM NODE    106.00 TO NODE    111.00 =    3476.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        3.42   26.64    0.895  0.89( 0.89) 1.00      52.5     103.00
      2        2.76   38.79    0.714  0.88( 0.88) 1.00      58.2     106.00
  LONGEST FLOWPATH FROM NODE    106.00 TO NODE    111.00 =    3476.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        4.25   26.75    0.893  1.00( 0.86) 0.86      38.1     100.00
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    111.00 =    2500.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        7.67   26.64    0.895  0.93( 0.88) 0.94      90.4     103.00
      2        7.67   26.75    0.893  0.93( 0.88) 0.94      90.6     100.00
      3        6.16   38.79    0.714  0.92( 0.87) 0.95      96.3     106.00
    TOTAL AREA(ACRES) =        96.3

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =        7.67  Tc(MIN.) =   26.751
  EFFECTIVE AREA(ACRES) =     90.60  AREA-AVERAGED Fm(INCH/HR) =  0.88
  AREA-AVERAGED Fp(INCH/HR) =  0.92  AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =       96.3
  LONGEST FLOWPATH FROM NODE    106.00 TO NODE    111.00 =    3476.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    112.00 IS CODE =  21
----------------------------------------------------------------------------
```



```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   731.00
  ELEVATION DATA: UPSTREAM(FEET) =    567.00  DOWNSTREAM(FEET) =    533.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   18.233
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.124
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               A        2.98      1.00     1.000    28   18.23
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.59      0.85     1.000    46   18.23
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.49
  TOTAL AREA(ACRES) =      3.57   PEAK FLOW RATE(CFS) =      0.49

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.23
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.124
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               A        9.54      1.00     1.000    28
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.00
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    9.54      SUBAREA RUNOFF(CFS) =    1.10
  EFFECTIVE AREA(ACRES) =     13.11   AREA-AVERAGED Fm(INCH/HR) =  0.99
  AREA-AVERAGED Fp(INCH/HR) =  0.99  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       13.1       PEAK FLOW RATE(CFS) =       1.59
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       13.1  TC(MIN.) =     18.23
  EFFECTIVE AREA(ACRES) =     13.11  AREA-AVERAGED Fm(INCH/HR)=  0.99
  AREA-AVERAGED Fp(INCH/HR) =  0.99  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =       1.59
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
 ************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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             Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                          Analysis prepared by:

                              RBF Consulting
                            14257 Alton Parkway
                                 Irvine, CA
                                   92618

 ************************* DESCRIPTION OF STUDY *************************
* City of Yuciapa EIR Hydrology Support                                 *
* Existing Condition - 10 Year Model                                    *
* JN 144817 APRIL 2016 IE                                               *
 ************************************************************************

  FILE NAME: Y_EX_10.DAT
  TIME/DATE OF STUDY: 10:47 04/25/2016
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.8900

  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
```



```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   600.00
  ELEVATION DATA: UPSTREAM(FEET) =    667.00  DOWNSTREAM(FEET) =    617.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.993
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.045
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               A        7.74      0.86     1.000    46   14.99
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.86
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      8.26
  TOTAL AREA(ACRES) =      7.74   PEAK FLOW RATE(CFS) =      8.26

************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  52
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    617.00  DOWNSTREAM(FEET) =    586.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   954.00   CHANNEL SLOPE =  0.0325
  CHANNEL FLOW THRU SUBAREA(CFS) =       8.26
  FLOW VELOCITY(FEET/SEC) =   4.29 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.70   Tc(MIN.) =   18.70
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =    1554.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   18.70
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.792
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.02      0.61     1.000    66
  NATURAL FAIR COVER
  "OPEN BRUSH"               A       11.43      0.86     1.000    46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.86
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   11.45      SUBAREA RUNOFF(CFS) =    9.60
  EFFECTIVE AREA(ACRES) =     19.19   AREA-AVERAGED Fm(INCH/HR) =  0.86
  AREA-AVERAGED Fp(INCH/HR) =  0.86  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       19.2       PEAK FLOW RATE(CFS) =      16.09

************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    111.00 IS CODE =  52
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    586.00  DOWNSTREAM(FEET) =    567.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   946.00   CHANNEL SLOPE =  0.0201
```

```
  CHANNEL FLOW THRU SUBAREA(CFS) =      16.09
  FLOW VELOCITY(FEET/SEC) =   4.01 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.93   Tc(MIN.) =   22.63
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    111.00 =    2500.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   22.63
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.598
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.03      0.61     1.000    66
  NATURAL FAIR COVER
  "OPEN BRUSH"               A       12.97      0.86     1.000    46
  COMMERCIAL                 B        3.63      0.75     0.100    56
  COMMERCIAL                 A        2.25      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.86
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.720
  SUBAREA AREA(ACRES) =   18.88      SUBAREA RUNOFF(CFS) =   16.65
  EFFECTIVE AREA(ACRES) =     38.07   AREA-AVERAGED Fm(INCH/HR) =  0.74
  AREA-AVERAGED Fp(INCH/HR) =  0.86  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =       38.1       PEAK FLOW RATE(CFS) =      29.39

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   648.00
  ELEVATION DATA: UPSTREAM(FEET) =    674.00  DOWNSTREAM(FEET) =    642.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.168
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.886
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        7.51      0.61     1.000    66   17.17
  NATURAL FAIR COVER
  "OPEN BRUSH"               A        2.23      0.86     1.000    46   17.17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.67
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     10.65
  TOTAL AREA(ACRES) =      9.74   PEAK FLOW RATE(CFS) =     10.65
```



```
****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    642.00  DOWNSTREAM(FEET) =    611.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   702.00   CHANNEL SLOPE =  0.0442
  CHANNEL FLOW THRU SUBAREA(CFS) =      10.65
  FLOW VELOCITY(FEET/SEC) =   5.34 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.19   Tc(MIN.) =   19.36
  LONGEST FLOWPATH FROM NODE    103.00 TO NODE    105.00 =    1350.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.36
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.754
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        8.05      0.61     1.000    66
  NATURAL FAIR COVER
  "OPEN BRUSH"               A        5.93      0.86     1.000    46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.72
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   13.98      SUBAREA RUNOFF(CFS) =   13.04
  EFFECTIVE AREA(ACRES) =     23.72   AREA-AVERAGED Fm(INCH/HR) =  0.70
  AREA-AVERAGED Fp(INCH/HR) =  0.70  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       23.7       PEAK FLOW RATE(CFS) =      22.54

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    111.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    611.00  DOWNSTREAM(FEET) =    567.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1336.00   CHANNEL SLOPE =  0.0329
  CHANNEL FLOW THRU SUBAREA(CFS) =      22.54
  FLOW VELOCITY(FEET/SEC) =   5.62 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.96   Tc(MIN.) =   23.32
  LONGEST FLOWPATH FROM NODE    103.00 TO NODE    111.00 =    2686.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   23.32
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.569
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
```

```
  "OPEN BRUSH"               B       10.72      0.61     1.000    66
  NATURAL FAIR COVER
  "OPEN BRUSH"               A        5.51      0.86     1.000    46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.70
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   16.23      SUBAREA RUNOFF(CFS) =   12.73
  EFFECTIVE AREA(ACRES) =     39.95   AREA-AVERAGED Fm(INCH/HR) =  0.70
  AREA-AVERAGED Fp(INCH/HR) =  0.70  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       39.9       PEAK FLOW RATE(CFS) =      31.31

****************************************************************************
  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.) =   23.32
  RAINFALL INTENSITY(INCH/HR) =   1.57
  AREA-AVERAGED Fm(INCH/HR) =  0.70
  AREA-AVERAGED Fp(INCH/HR) =  0.70
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      39.95
  TOTAL STREAM AREA(ACRES) =      39.95
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      31.31

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    107.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   515.00
  ELEVATION DATA: UPSTREAM(FEET) =    692.00  DOWNSTREAM(FEET) =    682.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   18.875
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.781
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               A        0.15      0.86     1.000    46   18.88
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.38      0.61     1.000    66   18.88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.68
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.52
  TOTAL AREA(ACRES) =      0.53   PEAK FLOW RATE(CFS) =      0.52

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    108.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    682.00  DOWNSTREAM(FEET) =    672.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   911.00   CHANNEL SLOPE =  0.0110
```



```
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.52
  FLOW VELOCITY(FEET/SEC) =   1.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   9.66   Tc(MIN.) =   28.54
  LONGEST FLOWPATH FROM NODE    106.00 TO NODE    108.00 =    1426.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   28.54
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.390
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        3.66      0.61     1.000    66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.61
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.66      SUBAREA RUNOFF(CFS) =    2.56
  EFFECTIVE AREA(ACRES) =      4.19   AREA-AVERAGED Fm(INCH/HR) =  0.62
  AREA-AVERAGED Fp(INCH/HR) =  0.62  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        4.2       PEAK FLOW RATE(CFS) =       2.89

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    109.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    672.00  DOWNSTREAM(FEET) =    647.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   486.00   CHANNEL SLOPE =  0.0514
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.89
  FLOW VELOCITY(FEET/SEC) =   4.22 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.92   Tc(MIN.) =   30.45
  LONGEST FLOWPATH FROM NODE    106.00 TO NODE    109.00 =    1912.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    109.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   30.45
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.337
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        3.44      0.61     1.000    66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.61
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.44      SUBAREA RUNOFF(CFS) =    2.24
  EFFECTIVE AREA(ACRES) =      7.63   AREA-AVERAGED Fm(INCH/HR) =  0.62
  AREA-AVERAGED Fp(INCH/HR) =  0.62  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        7.6       PEAK FLOW RATE(CFS) =       4.93

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

```
 FLOW PROCESS FROM NODE    109.00 TO NODE    110.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    647.00  DOWNSTREAM(FEET) =    622.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   679.00   CHANNEL SLOPE =  0.0368
 CHANNEL FLOW THRU SUBAREA(CFS) =       4.93
 FLOW VELOCITY(FEET/SEC) =   4.03 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.80   Tc(MIN.) =   33.26
 LONGEST FLOWPATH FROM NODE    106.00 TO NODE    110.00 =    2591.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   33.26
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.268
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        5.33      0.61     1.000    66
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.61
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    5.33      SUBAREA RUNOFF(CFS) =    3.14
 EFFECTIVE AREA(ACRES) =     12.96   AREA-AVERAGED Fm(INCH/HR) =  0.62
 AREA-AVERAGED Fp(INCH/HR) =  0.62  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       13.0       PEAK FLOW RATE(CFS) =       7.60

****************************************************************************
 FLOW PROCESS FROM NODE    110.00 TO NODE    111.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    622.00  DOWNSTREAM(FEET) =    567.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   885.00   CHANNEL SLOPE =  0.0621
 CHANNEL FLOW THRU SUBAREA(CFS) =       7.60
 FLOW VELOCITY(FEET/SEC) =   5.82 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.54   Tc(MIN.) =   35.79
 LONGEST FLOWPATH FROM NODE    106.00 TO NODE    111.00 =    3476.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   35.79
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.213
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"                B        5.28      0.61     1.000    66
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.61
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
```



```
 SUBAREA AREA(ACRES) =    5.28      SUBAREA RUNOFF(CFS) =    2.85
 EFFECTIVE AREA(ACRES) =     18.24   AREA-AVERAGED Fm(INCH/HR) =  0.62
 AREA-AVERAGED Fp(INCH/HR) =  0.62  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       18.2       PEAK FLOW RATE(CFS) =       9.81

****************************************************************************
 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.) =   35.79
 RAINFALL INTENSITY(INCH/HR) =   1.21
 AREA-AVERAGED Fm(INCH/HR) =  0.62
 AREA-AVERAGED Fp(INCH/HR) =  0.62
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =      18.24
 TOTAL STREAM AREA(ACRES) =      18.24
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.81

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       31.31   23.32    1.569  0.70( 0.70) 1.00      39.9     103.00
     2        9.81   35.79    1.213  0.62( 0.62) 1.00      18.2     106.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       41.11   23.32    1.569  0.68( 0.68) 1.00      51.8     103.00
     2       28.33   35.79    1.213  0.67( 0.67) 1.00      58.2     106.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      41.11    Tc(MIN.) =    23.32
 EFFECTIVE AREA(ACRES) =      51.84   AREA-AVERAGED Fm(INCH/HR) =  0.68
 AREA-AVERAGED Fp(INCH/HR) =  0.68  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       58.2
 LONGEST FLOWPATH FROM NODE    106.00 TO NODE    111.00 =    3476.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       41.11   23.32    1.569  0.68( 0.68) 1.00      51.8     103.00
     2       28.33   35.79    1.213  0.67( 0.67) 1.00      58.2     106.00
 LONGEST FLOWPATH FROM NODE    106.00 TO NODE    111.00 =    3476.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
```

```
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1       29.39   22.63    1.598  0.86( 0.74) 0.86      38.1     100.00
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    111.00 =    2500.00 FEET.

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1       70.50   22.63    1.598  0.75( 0.71) 0.94      88.4     100.00
    2       69.52   23.32    1.569  0.75( 0.70) 0.94      89.9     103.00
    3       44.56   35.79    1.213  0.74( 0.70) 0.95      96.3     106.00
  TOTAL AREA(ACRES) =        96.3

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =       70.50  Tc(MIN.) =   22.632
EFFECTIVE AREA(ACRES) =     88.37  AREA-AVERAGED Fm(INCH/HR) =  0.71
AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.95
TOTAL AREA(ACRES) =       96.3
LONGEST FLOWPATH FROM NODE    106.00 TO NODE    111.00 =    3476.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  12
----------------------------------------------------------------------------
>>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
FLOW PROCESS FROM NODE    111.00 TO NODE    112.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   731.00
ELEVATION DATA: UPSTREAM(FEET) =    567.00  DOWNSTREAM(FEET) =    533.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   18.233
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.819
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
NATURAL FAIR COVER
"OPEN BRUSH"               A        2.98      0.86     1.000    46   18.23
NATURAL FAIR COVER
"OPEN BRUSH"               B        0.59      0.61     1.000    66   18.23
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.82
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA RUNOFF(CFS) =      3.21
TOTAL AREA(ACRES) =      3.57   PEAK FLOW RATE(CFS) =      3.21

****************************************************************************
FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   18.23
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.819
SUBAREA LOSS RATE DATA(AMC  II):
```



```
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"               A        9.54      0.86     1.000    46
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.86
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =    9.54      SUBAREA RUNOFF(CFS) =    8.23
EFFECTIVE AREA(ACRES) =     13.11   AREA-AVERAGED Fm(INCH/HR) =  0.85
AREA-AVERAGED Fp(INCH/HR) =  0.85  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =       13.1       PEAK FLOW RATE(CFS) =      11.44
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =       13.1  TC(MIN.) =     18.23
EFFECTIVE AREA(ACRES) =     13.11  AREA-AVERAGED Fm(INCH/HR)=  0.85
AREA-AVERAGED Fp(INCH/HR) =  0.85  AREA-AVERAGED Ap = 1.000
PEAK FLOW RATE(CFS)   =      11.44
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
```

```
 ************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
         (c) Copyright 1983-2013 Advanced Engineering Software (aes)
             Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                          Analysis prepared by:

                              RBF Consulting
                            14257 Alton Parkway
                                 Irvine, CA
                                   92618

 ************************* DESCRIPTION OF STUDY *************************
* City of Yuciapa EIR Hydrology Support                                 *
* Existing Condition - 100 Year Model                                   *
* JN 144817 APRIL 2016 IE                                               *
 ************************************************************************

  FILE NAME: Y_EX_100.DAT
  TIME/DATE OF STUDY: 10:48 04/25/2016
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.3200

  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
```



```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   600.00
  ELEVATION DATA: UPSTREAM(FEET) =    667.00  DOWNSTREAM(FEET) =    617.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.993
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.033
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               A        7.74      0.55     1.000    66   14.99
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.55
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     17.32
  TOTAL AREA(ACRES) =      7.74   PEAK FLOW RATE(CFS) =     17.32

************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  52
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    617.00  DOWNSTREAM(FEET) =    586.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   954.00   CHANNEL SLOPE =  0.0325
  CHANNEL FLOW THRU SUBAREA(CFS) =      17.32
  FLOW VELOCITY(FEET/SEC) =   5.20 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.06   Tc(MIN.) =   18.05
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =    1554.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   18.05
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.714
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.02      0.31     1.000    84
  NATURAL FAIR COVER
  "OPEN BRUSH"               A       11.43      0.55     1.000    66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.55
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   11.45      SUBAREA RUNOFF(CFS) =   22.33
  EFFECTIVE AREA(ACRES) =     19.19   AREA-AVERAGED Fm(INCH/HR) =  0.55
  AREA-AVERAGED Fp(INCH/HR) =  0.55  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       19.2       PEAK FLOW RATE(CFS) =      37.42

************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    111.00 IS CODE =  52
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    586.00  DOWNSTREAM(FEET) =    567.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   946.00   CHANNEL SLOPE =  0.0201
```

```
  CHANNEL FLOW THRU SUBAREA(CFS) =      37.42
  FLOW VELOCITY(FEET/SEC) =   5.05 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.12   Tc(MIN.) =   21.18
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    111.00 =    2500.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.18
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.466
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.03      0.31     1.000    84
  NATURAL FAIR COVER
  "OPEN BRUSH"               A       12.97      0.55     1.000    66
  COMMERCIAL                 B        3.63      0.42     0.100    76
  COMMERCIAL                 A        2.25      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.55
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.720
  SUBAREA AREA(ACRES) =   18.88      SUBAREA RUNOFF(CFS) =   35.22
  EFFECTIVE AREA(ACRES) =     38.07   AREA-AVERAGED Fm(INCH/HR) =  0.47
  AREA-AVERAGED Fp(INCH/HR) =  0.55  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =       38.1       PEAK FLOW RATE(CFS) =      68.36

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   648.00
  ELEVATION DATA: UPSTREAM(FEET) =    674.00  DOWNSTREAM(FEET) =    642.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.168
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.797
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        7.51      0.31     1.000    84   17.17
  NATURAL FAIR COVER
  "OPEN BRUSH"               A        2.23      0.55     1.000    66   17.17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.36
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     21.34
  TOTAL AREA(ACRES) =      9.74   PEAK FLOW RATE(CFS) =     21.34
```



```
****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    642.00  DOWNSTREAM(FEET) =    611.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   702.00   CHANNEL SLOPE =  0.0442
  CHANNEL FLOW THRU SUBAREA(CFS) =      21.34
  FLOW VELOCITY(FEET/SEC) =   6.41 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.83   Tc(MIN.) =   18.99
  LONGEST FLOWPATH FROM NODE    103.00 TO NODE    105.00 =    1350.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.99
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.632
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        8.05      0.31     1.000    84
  NATURAL FAIR COVER
  "OPEN BRUSH"               A        5.93      0.55     1.000    66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.41
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   13.98      SUBAREA RUNOFF(CFS) =   27.97
  EFFECTIVE AREA(ACRES) =     23.72   AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.39  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       23.7       PEAK FLOW RATE(CFS) =      47.86

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    111.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    611.00  DOWNSTREAM(FEET) =    567.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1336.00   CHANNEL SLOPE =  0.0329
  CHANNEL FLOW THRU SUBAREA(CFS) =      47.86
  FLOW VELOCITY(FEET/SEC) =   6.94 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.21   Tc(MIN.) =   22.20
  LONGEST FLOWPATH FROM NODE    103.00 TO NODE    111.00 =    2686.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   22.20
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.397
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
```

```
  "OPEN BRUSH"                B       10.72      0.31     1.000    84
  NATURAL FAIR COVER
  "OPEN BRUSH"                A        5.51      0.55     1.000    66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.39
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   16.23      SUBAREA RUNOFF(CFS) =   29.32
  EFFECTIVE AREA(ACRES) =     39.95   AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.39  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       39.9       PEAK FLOW RATE(CFS) =      72.16

****************************************************************************
  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.) =   22.20
  RAINFALL INTENSITY(INCH/HR) =   2.40
  AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.39
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      39.95
  TOTAL STREAM AREA(ACRES) =      39.95
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      72.16

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    107.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   515.00
  ELEVATION DATA: UPSTREAM(FEET) =    692.00  DOWNSTREAM(FEET) =    682.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   18.875
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.642
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                A        0.15      0.55     1.000    66   18.88
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        0.38      0.31     1.000    84   18.88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.38
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.08
  TOTAL AREA(ACRES) =      0.53   PEAK FLOW RATE(CFS) =      1.08

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    108.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    682.00  DOWNSTREAM(FEET) =    672.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   911.00   CHANNEL SLOPE =  0.0110
```



```
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.08
  FLOW VELOCITY(FEET/SEC) =   1.59 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   9.52   Tc(MIN.) =   28.40
  LONGEST FLOWPATH FROM NODE    106.00 TO NODE    108.00 =    1426.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   28.40
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.068
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        3.66      0.31     1.000    84
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.31
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.66      SUBAREA RUNOFF(CFS) =    5.80
  EFFECTIVE AREA(ACRES) =      4.19   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.32  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        4.2       PEAK FLOW RATE(CFS) =       6.60

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    109.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    672.00  DOWNSTREAM(FEET) =    647.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   486.00   CHANNEL SLOPE =  0.0514
  CHANNEL FLOW THRU SUBAREA(CFS) =       6.60
  FLOW VELOCITY(FEET/SEC) =   5.11 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.58   Tc(MIN.) =   29.98
  LONGEST FLOWPATH FROM NODE    106.00 TO NODE    109.00 =    1912.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    109.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   29.98
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.002
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        3.44      0.31     1.000    84
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.31
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.44      SUBAREA RUNOFF(CFS) =    5.24
  EFFECTIVE AREA(ACRES) =      7.63   AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.31  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        7.6       PEAK FLOW RATE(CFS) =      11.60

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    110.00 IS CODE =  52
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    647.00  DOWNSTREAM(FEET) =    622.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   679.00   CHANNEL SLOPE =  0.0368
  CHANNEL FLOW THRU SUBAREA(CFS) =      11.60
  FLOW VELOCITY(FEET/SEC) =   4.98 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.27   Tc(MIN.) =   32.25
  LONGEST FLOWPATH FROM NODE    106.00 TO NODE    110.00 =    2591.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    110.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   32.25
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.916
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        5.33      0.31     1.000    84
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.31
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.33      SUBAREA RUNOFF(CFS) =    7.71
  EFFECTIVE AREA(ACRES) =     12.96   AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.31  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       13.0       PEAK FLOW RATE(CFS) =      18.72

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    111.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    622.00  DOWNSTREAM(FEET) =    567.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   885.00   CHANNEL SLOPE =  0.0621
  CHANNEL FLOW THRU SUBAREA(CFS) =      18.72
  FLOW VELOCITY(FEET/SEC) =   7.34 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.01   Tc(MIN.) =   34.26
  LONGEST FLOWPATH FROM NODE    106.00 TO NODE    111.00 =    3476.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   34.26
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.847
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        5.28      0.31     1.000    84
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.31
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.28      SUBAREA RUNOFF(CFS) =    7.32
```



```
  EFFECTIVE AREA(ACRES) =     18.24   AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.31  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       18.2       PEAK FLOW RATE(CFS) =      25.24

****************************************************************************
  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.) =   34.26
  RAINFALL INTENSITY(INCH/HR) =   1.85
  AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.31
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      18.24
  TOTAL STREAM AREA(ACRES) =      18.24
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      25.24

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       72.16   22.20    2.397  0.39( 0.39) 1.00      39.9     103.00
      2       25.24   34.26    1.847  0.31( 0.31) 1.00      18.2     106.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       94.36   22.20    2.397  0.37( 0.37) 1.00      51.8     103.00
      2       77.65   34.26    1.847  0.36( 0.36) 1.00      58.2     106.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      94.36    Tc(MIN.) =    22.20
  EFFECTIVE AREA(ACRES) =      51.77   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       58.2
  LONGEST FLOWPATH FROM NODE    106.00 TO NODE    111.00 =    3476.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       94.36   22.20    2.397  0.37( 0.37) 1.00      51.8     103.00
      2       77.65   34.26    1.847  0.36( 0.36) 1.00      58.2     106.00
  LONGEST FLOWPATH FROM NODE    106.00 TO NODE    111.00 =    3476.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
```

```
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1       68.36   21.18    2.466  0.55( 0.47) 0.86      38.1     100.00
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    111.00 =    2500.00 FEET.

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1      161.42   21.18    2.466  0.44( 0.41) 0.94      87.4     100.00
    2      160.35   22.20    2.397  0.44( 0.41) 0.94      89.8     103.00
    3      124.83   34.26    1.847  0.43( 0.41) 0.95      96.3     106.00
  TOTAL AREA(ACRES) =        96.3

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      161.42  Tc(MIN.) =   21.175
EFFECTIVE AREA(ACRES) =     87.44  AREA-AVERAGED Fm(INCH/HR) =  0.41
AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  0.95
TOTAL AREA(ACRES) =       96.3
LONGEST FLOWPATH FROM NODE    106.00 TO NODE    111.00 =    3476.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =  12
----------------------------------------------------------------------------
>>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
FLOW PROCESS FROM NODE    111.00 TO NODE    112.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   731.00
ELEVATION DATA: UPSTREAM(FEET) =    567.00  DOWNSTREAM(FEET) =    533.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   18.233
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.697
SUBAREA Tc AND LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
NATURAL FAIR COVER
"OPEN BRUSH"               A        2.98      0.55     1.000    66   18.23
NATURAL FAIR COVER
"OPEN BRUSH"               B        0.59      0.31     1.000    84   18.23
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.51
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA RUNOFF(CFS) =      7.04
TOTAL AREA(ACRES) =      3.57   PEAK FLOW RATE(CFS) =      7.04

****************************************************************************
FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   18.23
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.697
SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```



```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"OPEN BRUSH"               A        9.54      0.55     1.000    66
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.55
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =    9.54      SUBAREA RUNOFF(CFS) =   18.46
EFFECTIVE AREA(ACRES) =     13.11   AREA-AVERAGED Fm(INCH/HR) =  0.54
AREA-AVERAGED Fp(INCH/HR) =  0.54  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =       13.1       PEAK FLOW RATE(CFS) =      25.50
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =       13.1  TC(MIN.) =     18.23
EFFECTIVE AREA(ACRES) =     13.11  AREA-AVERAGED Fm(INCH/HR)=  0.54
AREA-AVERAGED Fp(INCH/HR) =  0.54  AREA-AVERAGED Ap = 1.000
PEAK FLOW RATE(CFS)   =      25.50
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
```

Appendix B: Proposed Condition Hydrology

2-Year, 10-Year, & 100-Year

```
************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
         (c) Copyright 1983-2013 Advanced Engineering Software (aes)
            Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                        Analysis prepared by:

                            RBF Consulting
                          14257 Alton Parkway
                               Irvine, CA
                                 92618

 ************************* DESCRIPTION OF STUDY *************************
* City of Yuciapa EIR Hydrology Support                                 *
* Proposed Condition - 2 Year Model                                     *
* JN 144187 MAY 2016 IE                                                *
 ************************************************************************

  FILE NAME: Y_PR_2.DAT
  TIME/DATE OF STUDY: 07:33 05/13/2016
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.5500

  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150
  2   18.0     13.0    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0130

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

************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
```



```
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   787.00
  ELEVATION DATA: UPSTREAM(FEET) =   2710.00  DOWNSTREAM(FEET) =   2684.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.229
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.691
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        6.73      1.33     0.200    17    9.23
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      8.63
  TOTAL AREA(ACRES) =      6.73   PEAK FLOW RATE(CFS) =      8.63

************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) = 2684.00  DOWNSTREAM ELEVATION(FEET) = 2677.00
  STREET LENGTH(FEET) =   438.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0130
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0130

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.61
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.39
    HALFSTREET FLOOD WIDTH(FEET) =   13.35
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.84
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.51
  STREET FLOW TRAVEL TIME(MIN.) =   1.90   Tc(MIN.) =   11.13
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.511
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A       10.20      1.33     0.200    17
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.40      0.94     0.200    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.31
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =   10.60      SUBAREA RUNOFF(CFS) =   11.91
  EFFECTIVE AREA(ACRES) =     17.33    AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  1.32  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =       17.3        PEAK FLOW RATE(CFS) =      19.46
```

```
  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  14.98
  FLOW VELOCITY(FEET/SEC.) =  4.12   DEPTH*VELOCITY(FT*FT/SEC.) =   1.75
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    103.00 =    1225.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    113.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 2677.00  DOWNSTREAM ELEVATION(FEET) = 2635.00
  STREET LENGTH(FEET) =   594.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0130
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0130

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      28.55
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.39
    HALFSTREET FLOOD WIDTH(FEET) =   12.95
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.95
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.06
  STREET FLOW TRAVEL TIME(MIN.) =   1.24   Tc(MIN.) =   12.37
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.418
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A       11.81      1.33     0.200    17
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        5.35      0.94     0.200    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =   17.16      SUBAREA RUNOFF(CFS) =   18.17
  EFFECTIVE AREA(ACRES) =     34.49    AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  1.26  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =       34.5        PEAK FLOW RATE(CFS) =      36.18

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  14.22
  FLOW VELOCITY(FEET/SEC.) =  8.46   DEPTH*VELOCITY(FT*FT/SEC.) =   3.47
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    113.00 =    1819.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

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



```
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   700.00
  ELEVATION DATA: UPSTREAM(FEET) =   2710.00  DOWNSTREAM(FEET) =   2675.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.662
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.146
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               A        2.36      1.00     1.000    28   17.66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.00
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.32
  TOTAL AREA(ACRES) =      2.36   PEAK FLOW RATE(CFS) =      0.32

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    108.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2675.00  DOWNSTREAM(FEET) =   2671.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   646.00   CHANNEL SLOPE =  0.0062
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.32
  FLOW VELOCITY(FEET/SEC) =   1.18 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   9.12   Tc(MIN.) =   26.78
  LONGEST FLOWPATH FROM NODE    104.00 TO NODE    108.00 =    1346.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   26.78
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.892
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               A        4.65      1.00     1.000    28
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.96      0.85     1.000    46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  SUBAREA AREA(ACRES) =    5.61      SUBAREA RUNOFF(CFS) =    0.00
  EFFECTIVE AREA(ACRES) =      7.97   AREA-AVERAGED Fm(INCH/HR) =  0.98
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  1.00
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
```

```
  TOTAL AREA(ACRES) =        8.0       PEAK FLOW RATE(CFS) =       0.32
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 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.) =   26.78
  RAINFALL INTENSITY(INCH/HR) =   0.89
  AREA-AVERAGED Fm(INCH/HR) =  0.98
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       7.97
  TOTAL STREAM AREA(ACRES) =       7.97
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.32

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    107.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   454.00
  ELEVATION DATA: UPSTREAM(FEET) =   2700.00  DOWNSTREAM(FEET) =   2690.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.500
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.152
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                A        1.66      1.00     1.000    28   17.50
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        2.51      0.85     1.000    46   17.50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.91
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.92
  TOTAL AREA(ACRES) =      4.17   PEAK FLOW RATE(CFS) =      0.92

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    108.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2690.00  DOWNSTREAM(FEET) =   2671.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   678.00   CHANNEL SLOPE =  0.0280
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.92
  FLOW VELOCITY(FEET/SEC) =   2.51 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.50   Tc(MIN.) =   22.00
  LONGEST FLOWPATH FROM NODE    106.00 TO NODE    108.00 =    1132.00 FEET.

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



```
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   22.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.004
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                A        2.28      1.00     1.000    28
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        2.86      0.85     1.000    46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.91
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.14      SUBAREA RUNOFF(CFS) =    0.42
  EFFECTIVE AREA(ACRES) =      9.31   AREA-AVERAGED Fm(INCH/HR) =  0.91
  AREA-AVERAGED Fp(INCH/HR) =  0.91  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        9.3       PEAK FLOW RATE(CFS) =       0.92
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   22.00
  RAINFALL INTENSITY(INCH/HR) =   1.00
  AREA-AVERAGED Fm(INCH/HR) =  0.91
  AREA-AVERAGED Fp(INCH/HR) =  0.91
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       9.31
  TOTAL STREAM AREA(ACRES) =       9.31
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.92

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        0.32   26.78    0.892  0.98( 0.98) 1.00       8.0     104.00
      2        0.92   22.00    1.004  0.91( 0.91) 1.00       9.3     106.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        1.21   22.00    1.004  0.94( 0.94) 1.00      15.9     106.00
      2        0.32   26.78    0.892  0.94( 0.94) 1.00      17.3     104.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       1.21    Tc(MIN.) =    22.00
  EFFECTIVE AREA(ACRES) =      15.86   AREA-AVERAGED Fm(INCH/HR) =  0.94
  AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       17.3
```

```
 LONGEST FLOWPATH FROM NODE    104.00 TO NODE    108.00 =    1346.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    108.00 TO NODE    109.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  2671.00  DOWNSTREAM(FEET) =  2635.00
 FLOW LENGTH(FEET) =   196.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.84
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.21
 PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   22.30
 LONGEST FLOWPATH FROM NODE    104.00 TO NODE    109.00 =    1542.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    109.00 TO NODE    119.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   2635.00  DOWNSTREAM(FEET) =   2605.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1365.00   CHANNEL SLOPE =  0.0220
 CHANNEL FLOW THRU SUBAREA(CFS) =       1.21
 FLOW VELOCITY(FEET/SEC) =   2.31 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   9.86   Tc(MIN.) =   32.16
 LONGEST FLOWPATH FROM NODE    104.00 TO NODE    119.00 =    2907.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    119.00 TO NODE    119.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   32.16
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.800
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               A        2.62      1.00     1.000    28
 NATURAL FAIR COVER
 "OPEN BRUSH"               B       22.08      0.85     1.000    46
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.86
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
 * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
 SUBAREA AREA(ACRES) =   24.70      SUBAREA RUNOFF(CFS) =    0.00
 EFFECTIVE AREA(ACRES) =     40.56   AREA-AVERAGED Fm(INCH/HR) =  0.89
 AREA-AVERAGED Fp(INCH/HR) =  0.89  AREA-AVERAGED Ap =  1.00
 * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
 * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
 TOTAL AREA(ACRES) =       42.0       PEAK FLOW RATE(CFS) =       1.21
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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



```
 FLOW PROCESS FROM NODE    119.00 TO NODE    119.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   32.16
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.800
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               B        9.64      0.85     1.000    46
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.85
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
 * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
 SUBAREA AREA(ACRES) =    9.64      SUBAREA RUNOFF(CFS) =    0.00
 EFFECTIVE AREA(ACRES) =     50.20   AREA-AVERAGED Fm(INCH/HR) =  0.88
 AREA-AVERAGED Fp(INCH/HR) =  0.88  AREA-AVERAGED Ap =  1.00
 * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
 * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
 TOTAL AREA(ACRES) =       51.6       PEAK FLOW RATE(CFS) =       1.21
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE    119.00 TO NODE    119.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    110.00 TO NODE    111.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   670.00
 ELEVATION DATA: UPSTREAM(FEET) =   2720.00  DOWNSTREAM(FEET) =   2683.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.014
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.172
 SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"               B        0.85      0.85     1.000    46   17.01
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.85
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      0.25
 TOTAL AREA(ACRES) =      0.85   PEAK FLOW RATE(CFS) =      0.25

****************************************************************************
 FLOW PROCESS FROM NODE    111.00 TO NODE    113.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 2683.00  DOWNSTREAM ELEVATION(FEET) = 2635.00
```

```
  STREET LENGTH(FEET) =  1520.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0130
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0130

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.30
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.16
    HALFSTREET FLOOD WIDTH(FEET) =    1.50
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.87
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.60
  STREET FLOW TRAVEL TIME(MIN.) =   6.55   Tc(MIN.) =   23.57
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.964
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                A        2.67      1.00     1.000    28
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        1.84      0.85     1.000    46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.51      SUBAREA RUNOFF(CFS) =    0.11
  EFFECTIVE AREA(ACRES) =      5.36    AREA-AVERAGED Fm(INCH/HR) =  0.92
  AREA-AVERAGED Fp(INCH/HR) =  0.92  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        5.4        PEAK FLOW RATE(CFS) =       0.25
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.16   HALFSTREET FLOOD WIDTH(FEET) =   1.50
  FLOW VELOCITY(FEET/SEC.) =  3.87   DEPTH*VELOCITY(FT*FT/SEC.) =   0.60
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    113.00 =    2190.00 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.) =   23.57
  RAINFALL INTENSITY(INCH/HR) =   0.96
  AREA-AVERAGED Fm(INCH/HR) =  0.92
  AREA-AVERAGED Fp(INCH/HR) =  0.92
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       5.36
  TOTAL STREAM AREA(ACRES) =       5.36
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.25

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    113.00 IS CODE =  21
```



```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   769.00
  ELEVATION DATA: UPSTREAM(FEET) =   2645.00  DOWNSTREAM(FEET) =   2635.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   24.008
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.953
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                A        1.40      1.00     1.000    28   24.01
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        0.66      0.85     1.000    46   24.01
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.95
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.01
  TOTAL AREA(ACRES) =      2.06   PEAK FLOW RATE(CFS) =      0.01

****************************************************************************
  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.) =   24.01
  RAINFALL INTENSITY(INCH/HR) =   0.95
  AREA-AVERAGED Fm(INCH/HR) =  0.95
  AREA-AVERAGED Fp(INCH/HR) =  0.95
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       2.06
  TOTAL STREAM AREA(ACRES) =       2.06
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.01

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        0.25   23.57    0.964  0.92( 0.92) 1.00       5.4     110.00
      2        0.01   24.01    0.953  0.95( 0.95) 1.00       2.1     112.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        0.26   23.57    0.964  0.93( 0.93) 1.00       7.4     110.00
      2        0.19   24.01    0.953  0.93( 0.93) 1.00       7.4     112.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       0.26    Tc(MIN.) =    23.57
  EFFECTIVE AREA(ACRES) =       7.38   AREA-AVERAGED Fm(INCH/HR) =  0.93
  AREA-AVERAGED Fp(INCH/HR) =  0.93  AREA-AVERAGED Ap =  1.00
```

```
  TOTAL AREA(ACRES) =        7.4
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    113.00 =    2190.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        0.26   23.57    0.964  0.93( 0.93) 1.00       7.4     110.00
      2        0.19   24.01    0.953  0.93( 0.93) 1.00       7.4     112.00
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    113.00 =    2190.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       36.18   12.37    1.418  1.26( 0.25) 0.20      34.5     101.00
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    113.00 =    1819.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       36.43   12.37    1.418  1.14( 0.32) 0.28      38.4     101.00
      2       24.18   23.57    0.964  1.09( 0.37) 0.34      41.9     110.00
      3       23.85   24.01    0.953  1.09( 0.37) 0.34      41.9     112.00
    TOTAL AREA(ACRES) =        41.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       36.43  Tc(MIN.) =   12.374
  EFFECTIVE AREA(ACRES) =     38.37  AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  1.09  AREA-AVERAGED Ap =  0.34
  TOTAL AREA(ACRES) =       41.9
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    113.00 =    2190.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    114.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2635.00  DOWNSTREAM(FEET) =  2630.00
  FLOW LENGTH(FEET) =   179.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.37
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      36.43
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   12.60
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    114.00 =    2369.00 FEET.
```



```
****************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    118.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2630.00  DOWNSTREAM(FEET) =   2608.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   282.00   CHANNEL SLOPE =  0.0780
  CHANNEL FLOW THRU SUBAREA(CFS) =      36.43
  FLOW VELOCITY(FEET/SEC) =   9.88 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.48   Tc(MIN.) =   13.07
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    118.00 =    2651.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    118.00 TO NODE    118.00 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.) =   13.07
  RAINFALL INTENSITY(INCH/HR) =   1.37
  AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  1.14
  AREA-AVERAGED Ap =  0.28
  EFFECTIVE STREAM AREA(ACRES) =      38.37
  TOTAL STREAM AREA(ACRES) =      41.91
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      36.43

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    116.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   560.00
  ELEVATION DATA: UPSTREAM(FEET) =   2620.00  DOWNSTREAM(FEET) =   2612.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.524
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.659
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        5.60      1.33     0.200    17    9.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      7.02
  TOTAL AREA(ACRES) =      5.60   PEAK FLOW RATE(CFS) =      7.02

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    117.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 2612.00  DOWNSTREAM ELEVATION(FEET) = 2610.00
```

```
  STREET LENGTH(FEET) =   480.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0130
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0130

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.26
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.42
    HALFSTREET FLOOD WIDTH(FEET) =   14.52
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.08
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.87
  STREET FLOW TRAVEL TIME(MIN.) =   3.85   Tc(MIN.) =   13.37
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.354
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        4.55      1.33     0.200    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    4.55      SUBAREA RUNOFF(CFS) =    4.46
  EFFECTIVE AREA(ACRES) =     10.15    AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =       10.1        PEAK FLOW RATE(CFS) =       9.94

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  14.98
  FLOW VELOCITY(FEET/SEC.) =  2.10   DEPTH*VELOCITY(FT*FT/SEC.) =   0.90
  LONGEST FLOWPATH FROM NODE    115.00 TO NODE    117.00 =    1040.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    118.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2610.00  DOWNSTREAM(FEET) =  2608.00
  FLOW LENGTH(FEET) =   317.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.68
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.94
  PIPE TRAVEL TIME(MIN.) =   0.93    Tc(MIN.) =   14.30
  LONGEST FLOWPATH FROM NODE    115.00 TO NODE    118.00 =    1357.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    118.00 TO NODE    118.00 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.) =   14.30
  RAINFALL INTENSITY(INCH/HR) =   1.30
  AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =      10.15
  TOTAL STREAM AREA(ACRES) =      10.15
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.94

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       36.43   13.07    1.372  1.14( 0.32) 0.28      38.4     101.00
      1       24.18   24.34    0.945  1.09( 0.37) 0.34      41.9     110.00
      1       23.85   24.79    0.935  1.09( 0.37) 0.34      41.9     112.00
      2        9.94   14.30    1.300  1.33( 0.27) 0.20      10.1     115.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       46.10   13.07    1.372  1.17( 0.31) 0.27      47.6     101.00
      2       45.04   14.30    1.300  1.17( 0.31) 0.27      48.9     115.00
      3       31.41   24.34    0.945  1.12( 0.35) 0.31      52.0     110.00
      4       31.00   24.79    0.935  1.12( 0.35) 0.31      52.1     112.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      46.10    Tc(MIN.) =    13.07
  EFFECTIVE AREA(ACRES) =      47.64   AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  1.17  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =       52.1
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    118.00 =    2651.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    118.00 TO NODE    119.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2608.00  DOWNSTREAM(FEET) =   2605.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   138.00   CHANNEL SLOPE =  0.0217
  CHANNEL FLOW THRU SUBAREA(CFS) =      46.10
  FLOW VELOCITY(FEET/SEC) =   5.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.41   Tc(MIN.) =   13.49
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    119.00 =    2789.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    119.00 TO NODE    119.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
```

```
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1       46.10   13.49    1.347  1.17( 0.31) 0.27      47.6     101.00
    2       45.04   14.72    1.278  1.17( 0.31) 0.27      48.9     115.00
    3       31.41   24.80    0.934  1.12( 0.35) 0.31      52.0     110.00
    4       31.00   25.25    0.924  1.12( 0.35) 0.31      52.1     112.00
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    119.00 =    2789.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1        1.21   32.16    0.800  0.88( 0.88) 1.00      50.2     106.00
    2        0.32   37.47    0.730  0.89( 0.89) 1.00      51.6     104.00
  LONGEST FLOWPATH FROM NODE    104.00 TO NODE    119.00 =    2907.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1       46.96   13.49    1.347  0.99( 0.49) 0.49      68.7     101.00
    2       45.92   14.72    1.278  0.99( 0.50) 0.50      71.9     115.00
    3       32.50   24.80    0.934  0.95( 0.58) 0.61      90.7     110.00
    4       32.10   25.25    0.924  0.95( 0.58) 0.61      91.5     112.00
    5       28.03   32.16    0.800  0.94( 0.61) 0.65     102.3     106.00
    6       24.78   37.47    0.730  0.94( 0.62) 0.66     103.7     104.00
   TOTAL AREA(ACRES) =       103.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       46.96  Tc(MIN.) =   13.485
  EFFECTIVE AREA(ACRES) =     68.69  AREA-AVERAGED Fm(INCH/HR) =  0.49
  AREA-AVERAGED Fp(INCH/HR) =  0.99  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =      103.7
  LONGEST FLOWPATH FROM NODE    104.00 TO NODE    119.00 =    2907.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    119.00 TO NODE    119.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    119.00 TO NODE    120.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2605.00  DOWNSTREAM(FEET) =  2603.00
  FLOW LENGTH(FEET) =   148.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.17
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      46.96
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   13.71
  LONGEST FLOWPATH FROM NODE    104.00 TO NODE    120.00 =    3055.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    121.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
```



```
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   829.00
  ELEVATION DATA: UPSTREAM(FEET) =   2603.00  DOWNSTREAM(FEET) =   2586.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   22.586
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.988
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               A        3.24      1.00     1.000    28   22.59
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        2.46      0.85     1.000    46   22.59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.93
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.29
  TOTAL AREA(ACRES) =      5.70   PEAK FLOW RATE(CFS) =      0.29
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        5.7  TC(MIN.) =     22.59
  EFFECTIVE AREA(ACRES) =      5.70  AREA-AVERAGED Fm(INCH/HR)=  0.93
  AREA-AVERAGED Fp(INCH/HR) =  0.93  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =       0.29
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
         (c) Copyright 1983-2013 Advanced Engineering Software (aes)
             Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                        Analysis prepared by:

                            RBF Consulting
                          14257 Alton Parkway
                               Irvine, CA
                                 92618

 ************************* DESCRIPTION OF STUDY *************************
* City of Yuciapa EIR Hydrology Support                                 *
* Proposed Condition - 10 Year Model                                    *
* JN 144187 MAY 2016 IE                                                *
 ************************************************************************

  FILE NAME: Y_PR_10.DAT
  TIME/DATE OF STUDY: 07:33 05/13/2016
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.8900

  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150
  2   18.0     13.0    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0130

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

************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
```



```
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   787.00
  ELEVATION DATA: UPSTREAM(FEET) =   2710.00  DOWNSTREAM(FEET) =   2684.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.229
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.737
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        6.73      0.98     0.200    32    9.23
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =     15.39
  TOTAL AREA(ACRES) =      6.73   PEAK FLOW RATE(CFS) =     15.39

************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) = 2684.00  DOWNSTREAM ELEVATION(FEET) = 2677.00
  STREET LENGTH(FEET) =   438.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0130
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0130

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      26.31
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.46
    HALFSTREET FLOOD WIDTH(FEET) =   16.86
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.45
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.06
  STREET FLOW TRAVEL TIME(MIN.) =   1.64   Tc(MIN.) =   10.87
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.480
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A       10.20      0.98     0.200    32
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.40      0.75     0.200    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =   10.60      SUBAREA RUNOFF(CFS) =   21.82
  EFFECTIVE AREA(ACRES) =     17.33    AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =       17.3        PEAK FLOW RATE(CFS) =      35.66
```

```
  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.50   HALFSTREET FLOOD WIDTH(FEET) =  18.14
  FLOW VELOCITY(FEET/SEC.) =  4.88   DEPTH*VELOCITY(FT*FT/SEC.) =   2.45
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    103.00 =    1225.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    113.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 2677.00  DOWNSTREAM ELEVATION(FEET) = 2635.00
  STREET LENGTH(FEET) =   594.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0130
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0130

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      52.37
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.46
    HALFSTREET FLOOD WIDTH(FEET) =   16.50
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    9.22
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    4.21
  STREET FLOW TRAVEL TIME(MIN.) =   1.07   Tc(MIN.) =   11.94
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.344
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A       11.81      0.98     0.200    32
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        5.35      0.75     0.200    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.90
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =   17.16      SUBAREA RUNOFF(CFS) =   33.41
  EFFECTIVE AREA(ACRES) =     34.49    AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =       34.5        PEAK FLOW RATE(CFS) =      66.94

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  9.81   DEPTH*VELOCITY(FT*FT/SEC.) =   4.80
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    113.00 =    1819.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

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



```
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   700.00
  ELEVATION DATA: UPSTREAM(FEET) =   2710.00  DOWNSTREAM(FEET) =   2675.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.662
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.854
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               A        2.36      0.86     1.000    46   17.66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.86
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.11
  TOTAL AREA(ACRES) =      2.36   PEAK FLOW RATE(CFS) =      2.11

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    108.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2675.00  DOWNSTREAM(FEET) =   2671.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   646.00   CHANNEL SLOPE =  0.0062
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.11
  FLOW VELOCITY(FEET/SEC) =   1.37 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.86   Tc(MIN.) =   25.52
  LONGEST FLOWPATH FROM NODE    104.00 TO NODE    108.00 =    1346.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   25.52
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.486
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               A        4.65      0.86     1.000    46
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.96      0.61     1.000    66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.82
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.61      SUBAREA RUNOFF(CFS) =    3.37
  EFFECTIVE AREA(ACRES) =      7.97   AREA-AVERAGED Fm(INCH/HR) =  0.83
  AREA-AVERAGED Fp(INCH/HR) =  0.83  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        8.0       PEAK FLOW RATE(CFS) =       4.71

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 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.) =   25.52
  RAINFALL INTENSITY(INCH/HR) =   1.49
  AREA-AVERAGED Fm(INCH/HR) =  0.83
  AREA-AVERAGED Fp(INCH/HR) =  0.83
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       7.97
  TOTAL STREAM AREA(ACRES) =       7.97
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.71

******************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    107.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   454.00
  ELEVATION DATA: UPSTREAM(FEET) =   2700.00  DOWNSTREAM(FEET) =   2690.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.500
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.864
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               A        1.66      0.86     1.000    46   17.50
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        2.51      0.61     1.000    66   17.50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.71
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      4.32
  TOTAL AREA(ACRES) =      4.17   PEAK FLOW RATE(CFS) =      4.32

******************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    108.00 IS CODE =  52
------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2690.00  DOWNSTREAM(FEET) =   2671.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   678.00   CHANNEL SLOPE =  0.0280
  CHANNEL FLOW THRU SUBAREA(CFS) =       4.32
  FLOW VELOCITY(FEET/SEC) =   3.41 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.31   Tc(MIN.) =   20.81
  LONGEST FLOWPATH FROM NODE    106.00 TO NODE    108.00 =    1132.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   20.81
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.680
  SUBAREA LOSS RATE DATA(AMC  II):
```



```
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               A        2.28      0.86     1.000    46
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        2.86      0.61     1.000    66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.72
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     5.14      SUBAREA RUNOFF(CFS) =     4.43
  EFFECTIVE AREA(ACRES) =      9.31   AREA-AVERAGED Fm(INCH/HR) =  0.72
  AREA-AVERAGED Fp(INCH/HR) =  0.72  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        9.3       PEAK FLOW RATE(CFS) =       8.06

******************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =   1
------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   20.81
  RAINFALL INTENSITY(INCH/HR) =   1.68
  AREA-AVERAGED Fm(INCH/HR) =  0.72
  AREA-AVERAGED Fp(INCH/HR) =  0.72
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       9.31
  TOTAL STREAM AREA(ACRES) =       9.31
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.06

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        4.71   25.52    1.486  0.83( 0.83) 1.00       8.0     104.00
      2        8.06   20.81    1.680  0.72( 0.72) 1.00       9.3     106.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       12.77   20.81    1.680  0.76( 0.76) 1.00      15.8     106.00
      2       11.14   25.52    1.486  0.77( 0.77) 1.00      17.3     104.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      12.77    Tc(MIN.) =    20.81
  EFFECTIVE AREA(ACRES) =      15.81   AREA-AVERAGED Fm(INCH/HR) =  0.76
  AREA-AVERAGED Fp(INCH/HR) =  0.76  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       17.3
  LONGEST FLOWPATH FROM NODE    104.00 TO NODE    108.00 =    1346.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    109.00 IS CODE =  31
------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =  2671.00  DOWNSTREAM(FEET) =  2635.00
  FLOW LENGTH(FEET) =   196.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.52
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.77
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   20.96
  LONGEST FLOWPATH FROM NODE    104.00 TO NODE    109.00 =    1542.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    119.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2635.00  DOWNSTREAM(FEET) =   2605.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1365.00   CHANNEL SLOPE =  0.0220
  CHANNEL FLOW THRU SUBAREA(CFS) =      12.77
  FLOW VELOCITY(FEET/SEC) =   3.94 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.77   Tc(MIN.) =   26.73
  LONGEST FLOWPATH FROM NODE    104.00 TO NODE    119.00 =    2907.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    119.00 TO NODE    119.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   26.73
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.446
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               A        2.62      0.86     1.000    46
  NATURAL FAIR COVER
  "OPEN BRUSH"               B       22.08      0.61     1.000    66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.64
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   24.70      SUBAREA RUNOFF(CFS) =   17.91
  EFFECTIVE AREA(ACRES) =     40.51   AREA-AVERAGED Fm(INCH/HR) =  0.69
  AREA-AVERAGED Fp(INCH/HR) =  0.69  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       42.0       PEAK FLOW RATE(CFS) =      27.61

****************************************************************************
  FLOW PROCESS FROM NODE    119.00 TO NODE    119.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   26.73
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.446
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        9.64      0.61     1.000    66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.61
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
```



```
  SUBAREA AREA(ACRES) =    9.64      SUBAREA RUNOFF(CFS) =    7.22
  EFFECTIVE AREA(ACRES) =     50.15   AREA-AVERAGED Fm(INCH/HR) =  0.67
  AREA-AVERAGED Fp(INCH/HR) =  0.67  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       51.6       PEAK FLOW RATE(CFS) =      34.82

****************************************************************************
  FLOW PROCESS FROM NODE    119.00 TO NODE    119.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    111.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   670.00
  ELEVATION DATA: UPSTREAM(FEET) =   2720.00  DOWNSTREAM(FEET) =   2683.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.014
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.896
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.85      0.61     1.000    66   17.01
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.61
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.98
  TOTAL AREA(ACRES) =      0.85   PEAK FLOW RATE(CFS) =      0.98

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    113.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 2683.00  DOWNSTREAM ELEVATION(FEET) = 2635.00
  STREET LENGTH(FEET) =  1520.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0130
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0130

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.57
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.23
    HALFSTREET FLOOD WIDTH(FEET) =    5.03
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.47
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.79
```

```
  STREET FLOW TRAVEL TIME(MIN.) =   7.30   Tc(MIN.) =   24.31
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.530
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               A        2.67      0.86     1.000    46
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        1.84      0.61     1.000    66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.76
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.51      SUBAREA RUNOFF(CFS) =    3.13
  EFFECTIVE AREA(ACRES) =      5.36    AREA-AVERAGED Fm(INCH/HR) =  0.74
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        5.4        PEAK FLOW RATE(CFS) =       3.83

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   6.29
  FLOW VELOCITY(FEET/SEC.) =  3.72   DEPTH*VELOCITY(FT*FT/SEC.) =   0.94
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    113.00 =    2190.00 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.) =   24.31
  RAINFALL INTENSITY(INCH/HR) =   1.53
  AREA-AVERAGED Fm(INCH/HR) =  0.74
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       5.36
  TOTAL STREAM AREA(ACRES) =       5.36
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.83

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    113.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   769.00
  ELEVATION DATA: UPSTREAM(FEET) =   2645.00  DOWNSTREAM(FEET) =   2635.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   24.008
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.542
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               A        1.40      0.86     1.000    46   24.01
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.66      0.61     1.000    66   24.01
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.78
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
```



```
  SUBAREA RUNOFF(CFS) =      1.41
  TOTAL AREA(ACRES) =      2.06   PEAK FLOW RATE(CFS) =      1.41

****************************************************************************
  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.) =   24.01
  RAINFALL INTENSITY(INCH/HR) =   1.54
  AREA-AVERAGED Fm(INCH/HR) =  0.78
  AREA-AVERAGED Fp(INCH/HR) =  0.78
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       2.06
  TOTAL STREAM AREA(ACRES) =       2.06
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.41

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        3.83   24.31    1.530  0.74( 0.74) 1.00       5.4     110.00
      2        1.41   24.01    1.542  0.78( 0.78) 1.00       2.1     112.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        5.24   24.01    1.542  0.75( 0.75) 1.00       7.4     112.00
      2        5.22   24.31    1.530  0.75( 0.75) 1.00       7.4     110.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.24    Tc(MIN.) =    24.01
  EFFECTIVE AREA(ACRES) =       7.35   AREA-AVERAGED Fm(INCH/HR) =  0.75
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        7.4
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    113.00 =    2190.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        5.24   24.01    1.542  0.75( 0.75) 1.00       7.4     112.00
      2        5.22   24.31    1.530  0.75( 0.75) 1.00       7.4     110.00
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    113.00 =    2190.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
```

```
     1       66.94   11.94    2.344  0.94( 0.19) 0.20      34.5     101.00
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    113.00 =    1819.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       72.18   11.94    2.344  0.87( 0.24) 0.28      38.1     101.00
     2       47.29   24.01    1.542  0.84( 0.29) 0.34      41.8     112.00
     3       46.91   24.31    1.530  0.84( 0.29) 0.34      41.9     110.00
    TOTAL AREA(ACRES) =        41.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       72.18  Tc(MIN.) =   11.945
  EFFECTIVE AREA(ACRES) =     38.15  AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.84  AREA-AVERAGED Ap =  0.34
  TOTAL AREA(ACRES) =       41.9
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    113.00 =    2190.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    114.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2635.00  DOWNSTREAM(FEET) =  2630.00
  FLOW LENGTH(FEET) =   179.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.24
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      72.18
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   12.13
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    114.00 =    2369.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    118.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2630.00  DOWNSTREAM(FEET) =   2608.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   282.00   CHANNEL SLOPE =  0.0780
  CHANNEL FLOW THRU SUBAREA(CFS) =      72.18
  FLOW VELOCITY(FEET/SEC) =  12.03 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.39   Tc(MIN.) =   12.52
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    118.00 =    2651.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    118.00 TO NODE    118.00 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.) =   12.52
  RAINFALL INTENSITY(INCH/HR) =   2.28
  AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.87
  AREA-AVERAGED Ap =  0.28
  EFFECTIVE STREAM AREA(ACRES) =      38.15
  TOTAL STREAM AREA(ACRES) =      41.91
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      72.18

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    116.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   560.00
  ELEVATION DATA: UPSTREAM(FEET) =   2620.00  DOWNSTREAM(FEET) =   2612.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.524
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.685
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        A        5.60      0.98     0.200    32    9.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =     12.55
  TOTAL AREA(ACRES) =      5.60   PEAK FLOW RATE(CFS) =     12.55

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    117.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 2612.00  DOWNSTREAM ELEVATION(FEET) = 2610.00
  STREET LENGTH(FEET) =   480.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0130
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0130

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      16.76
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.49
    HALFSTREET FLOOD WIDTH(FEET) =   18.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.41
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.19
```

```
  STREET FLOW TRAVEL TIME(MIN.) =   3.32   Tc(MIN.) =   12.85
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.244
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        4.55      0.98     0.200    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    4.55      SUBAREA RUNOFF(CFS) =    8.39
  EFFECTIVE AREA(ACRES) =     10.15    AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =       10.1        PEAK FLOW RATE(CFS) =      18.72

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.51   HALFSTREET FLOOD WIDTH(FEET) =  18.26
  FLOW VELOCITY(FEET/SEC.) =  2.53   DEPTH*VELOCITY(FT*FT/SEC.) =   1.28
  LONGEST FLOWPATH FROM NODE    115.00 TO NODE    117.00 =    1040.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    118.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2610.00  DOWNSTREAM(FEET) =  2608.00
  FLOW LENGTH(FEET) =   317.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.67
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.72
  PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =   13.64
  LONGEST FLOWPATH FROM NODE    115.00 TO NODE    118.00 =    1357.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    118.00 TO NODE    118.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.64
  RAINFALL INTENSITY(INCH/HR) =   2.16
  AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =      10.15
  TOTAL STREAM AREA(ACRES) =      10.15
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      18.72

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       72.18   12.52    2.279  0.87( 0.24) 0.28      38.1     101.00
      1       47.29   24.66    1.517  0.84( 0.29) 0.34      41.8     112.00
      1       46.91   24.96    1.506  0.84( 0.29) 0.34      41.9     110.00
      2       18.72   13.64    2.165  0.98( 0.20) 0.20      10.1     115.00
```



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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       90.36   12.52    2.279  0.89( 0.23) 0.26      47.5     101.00
      2       88.61   13.64    2.165  0.89( 0.24) 0.27      48.6     115.00
      3       59.85   24.66    1.517  0.86( 0.27) 0.31      52.0     112.00
      4       59.37   24.96    1.506  0.86( 0.27) 0.31      52.1     110.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      90.36    Tc(MIN.) =    12.52
  EFFECTIVE AREA(ACRES) =      47.47   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.89  AREA-AVERAGED Ap =  0.26
  TOTAL AREA(ACRES) =       52.1
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    118.00 =    2651.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    118.00 TO NODE    119.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2608.00  DOWNSTREAM(FEET) =   2605.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   138.00   CHANNEL SLOPE =  0.0217
  CHANNEL FLOW THRU SUBAREA(CFS) =      90.36
  FLOW VELOCITY(FEET/SEC) =   6.79 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.34   Tc(MIN.) =   12.86
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    119.00 =    2789.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    119.00 TO NODE    119.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       90.36   12.86    2.243  0.89( 0.23) 0.26      47.5     101.00
      2       88.61   13.98    2.133  0.89( 0.24) 0.27      48.6     115.00
      3       59.85   25.04    1.504  0.86( 0.27) 0.31      52.0     112.00
      4       59.37   25.34    1.493  0.86( 0.27) 0.31      52.1     110.00
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    119.00 =    2789.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       34.82   26.73    1.446  0.67( 0.67) 1.00      50.1     106.00
      2       29.16   31.65    1.306  0.68( 0.68) 1.00      51.6     104.00
  LONGEST FLOWPATH FROM NODE    104.00 TO NODE    119.00 =    2907.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      124.42   12.86    2.243  0.75( 0.38) 0.51      71.6     101.00
```

```
     2      123.04   13.98    2.133  0.74( 0.39) 0.52      74.9     115.00
     3       94.67   25.04    1.504  0.72( 0.46) 0.64      99.0     112.00
     4       94.19   25.34    1.493  0.72( 0.46) 0.64      99.6     110.00
     5       91.91   26.73    1.446  0.72( 0.47) 0.65     102.2     106.00
     6       79.48   31.65    1.306  0.72( 0.47) 0.66     103.7     104.00
   TOTAL AREA(ACRES) =       103.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      124.42  Tc(MIN.) =   12.858
  EFFECTIVE AREA(ACRES) =     71.59  AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =      103.7
  LONGEST FLOWPATH FROM NODE    104.00 TO NODE    119.00 =    2907.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    119.00 TO NODE    119.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    119.00 TO NODE    120.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2605.00  DOWNSTREAM(FEET) =  2603.00
  FLOW LENGTH(FEET) =   148.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  33.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.05
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     124.42
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   13.03
  LONGEST FLOWPATH FROM NODE    104.00 TO NODE    120.00 =    3055.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    121.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   829.00
  ELEVATION DATA: UPSTREAM(FEET) =   2603.00  DOWNSTREAM(FEET) =   2586.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   22.586
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.599
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               A        3.24      0.86     1.000    46   22.59
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        2.46      0.61     1.000    66   22.59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      4.34
  TOTAL AREA(ACRES) =      5.70   PEAK FLOW RATE(CFS) =      4.34
```



```
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        5.7  TC(MIN.) =     22.59
  EFFECTIVE AREA(ACRES) =      5.70  AREA-AVERAGED Fm(INCH/HR)=  0.75
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =       4.34
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

                            RBF Consulting
                          14257 Alton Parkway
                               Irvine, CA
                                 92618

 ************************* DESCRIPTION OF STUDY *************************
* City of Yuciapa EIR Hydrology Support                                 *
* Proposed Condition - 100 Year Model                                   *
* JN 144187 MAY 2016 IE                                                *
 ************************************************************************

  FILE NAME: Y_PR_100.DAT
  TIME/DATE OF STUDY: 07:35 05/13/2016
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.3200

  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150
  2   18.0     13.0    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0130

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

************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
```



```
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   787.00
  ELEVATION DATA: UPSTREAM(FEET) =   2710.00  DOWNSTREAM(FEET) =   2684.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.229
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.059
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        6.73      0.74     0.200    52    9.23
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =     23.68
  TOTAL AREA(ACRES) =      6.73   PEAK FLOW RATE(CFS) =     23.68

************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) = 2684.00  DOWNSTREAM ELEVATION(FEET) = 2677.00
  STREET LENGTH(FEET) =   438.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0130
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0130

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      40.77
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.52
    HALFSTREET FLOOD WIDTH(FEET) =   18.99
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.13
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.67
  STREET FLOW TRAVEL TIME(MIN.) =   1.42   Tc(MIN.) =   10.65
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.724
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A       10.20      0.74     0.200    52
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        0.40      0.42     0.200    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.73
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =   10.60      SUBAREA RUNOFF(CFS) =   34.14
  EFFECTIVE AREA(ACRES) =     17.33    AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.73  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =       17.3        PEAK FLOW RATE(CFS) =      55.79
```

```
  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.56   HALFSTREET FLOOD WIDTH(FEET) =  21.19
  FLOW VELOCITY(FEET/SEC.) =  5.75   DEPTH*VELOCITY(FT*FT/SEC.) =   3.24
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  438.0 FT WITH ELEVATION-DROP =   7.0 FT, IS   39.5 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    103.00
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    103.00 =    1225.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    113.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 2677.00  DOWNSTREAM ELEVATION(FEET) = 2635.00
  STREET LENGTH(FEET) =   594.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0130
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0130

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      82.16
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.51
    HALFSTREET FLOOD WIDTH(FEET) =   18.69
    AVERAGE FLOW VELOCITY(FEET/SEC.) =   10.65
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    5.47
  STREET FLOW TRAVEL TIME(MIN.) =   0.93   Tc(MIN.) =   11.58
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.542
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A       11.81      0.74     0.200    52
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        5.35      0.42     0.200    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.64
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =   17.16      SUBAREA RUNOFF(CFS) =   52.72
  EFFECTIVE AREA(ACRES) =     34.49    AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.69  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =       34.5        PEAK FLOW RATE(CFS) =     105.67

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.55   HALFSTREET FLOOD WIDTH(FEET) =  20.39
  FLOW VELOCITY(FEET/SEC.) = 11.68   DEPTH*VELOCITY(FT*FT/SEC.) =   6.40
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    113.00 =    1819.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  10
```



```
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   700.00
  ELEVATION DATA: UPSTREAM(FEET) =   2710.00  DOWNSTREAM(FEET) =   2675.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.662
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.749
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               A        2.36      0.55     1.000    66   17.66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.55
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      4.68
  TOTAL AREA(ACRES) =      2.36   PEAK FLOW RATE(CFS) =      4.68

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    108.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2675.00  DOWNSTREAM(FEET) =   2671.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   646.00   CHANNEL SLOPE =  0.0062
  CHANNEL FLOW THRU SUBAREA(CFS) =       4.68
  FLOW VELOCITY(FEET/SEC) =   1.63 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.59   Tc(MIN.) =   24.25
  LONGEST FLOWPATH FROM NODE    104.00 TO NODE    108.00 =    1346.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   24.25
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.273
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               A        4.65      0.55     1.000    66
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.96      0.31     1.000    84
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.51
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.61      SUBAREA RUNOFF(CFS) =    8.92
  EFFECTIVE AREA(ACRES) =      7.97   AREA-AVERAGED Fm(INCH/HR) =  0.52
  AREA-AVERAGED Fp(INCH/HR) =  0.52  AREA-AVERAGED Ap =  1.00
```

```
  TOTAL AREA(ACRES) =        8.0       PEAK FLOW RATE(CFS) =      12.59

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   24.25
  RAINFALL INTENSITY(INCH/HR) =   2.27
  AREA-AVERAGED Fm(INCH/HR) =  0.52
  AREA-AVERAGED Fp(INCH/HR) =  0.52
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       7.97
  TOTAL STREAM AREA(ACRES) =       7.97
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      12.59

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    107.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   454.00
  ELEVATION DATA: UPSTREAM(FEET) =   2700.00  DOWNSTREAM(FEET) =   2690.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.500
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.765
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                A        1.66      0.55     1.000    66   17.50
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        2.51      0.31     1.000    84   17.50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      8.86
  TOTAL AREA(ACRES) =      4.17   PEAK FLOW RATE(CFS) =      8.86

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    108.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2690.00  DOWNSTREAM(FEET) =   2671.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   678.00   CHANNEL SLOPE =  0.0280
  CHANNEL FLOW THRU SUBAREA(CFS) =       8.86
  FLOW VELOCITY(FEET/SEC) =   4.06 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.78   Tc(MIN.) =   20.28
  LONGEST FLOWPATH FROM NODE    106.00 TO NODE    108.00 =    1132.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =  81
----------------------------------------------------------------------------
```



```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.28
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.530
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                A        2.28      0.55     1.000    66
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        2.86      0.31     1.000    84
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.41
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =     5.14      SUBAREA RUNOFF(CFS) =     9.79
  EFFECTIVE AREA(ACRES) =      9.31   AREA-AVERAGED Fm(INCH/HR) =  0.41
  AREA-AVERAGED Fp(INCH/HR) =  0.41  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        9.3       PEAK FLOW RATE(CFS) =      17.77

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   20.28
  RAINFALL INTENSITY(INCH/HR) =   2.53
  AREA-AVERAGED Fm(INCH/HR) =  0.41
  AREA-AVERAGED Fp(INCH/HR) =  0.41
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       9.31
  TOTAL STREAM AREA(ACRES) =       9.31
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      17.77

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       12.59   24.25    2.273  0.52( 0.52) 1.00       8.0     104.00
      2       17.77   20.28    2.530  0.41( 0.41) 1.00       9.3     106.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       29.85   20.28    2.530  0.45( 0.45) 1.00      16.0     106.00
      2       28.21   24.25    2.273  0.46( 0.46) 1.00      17.3     104.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      29.85    Tc(MIN.) =    20.28
  EFFECTIVE AREA(ACRES) =      15.98   AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       17.3
  LONGEST FLOWPATH FROM NODE    104.00 TO NODE    108.00 =    1346.00 FEET.

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

```
 FLOW PROCESS FROM NODE    108.00 TO NODE    109.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  2671.00  DOWNSTREAM(FEET) =  2635.00
 FLOW LENGTH(FEET) =   196.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  26.70
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      29.85
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   20.41
 LONGEST FLOWPATH FROM NODE    104.00 TO NODE    109.00 =    1542.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    109.00 TO NODE    119.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   2635.00  DOWNSTREAM(FEET) =   2605.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1365.00   CHANNEL SLOPE =  0.0220
 CHANNEL FLOW THRU SUBAREA(CFS) =      29.85
 FLOW VELOCITY(FEET/SEC) =   4.96 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   4.59   Tc(MIN.) =   25.00
 LONGEST FLOWPATH FROM NODE    104.00 TO NODE    119.00 =    2907.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    119.00 TO NODE    119.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   25.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.232
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "OPEN BRUSH"               A        2.62      0.55     1.000    66
 NATURAL FAIR COVER
 "OPEN BRUSH"               B       22.08      0.31     1.000    84
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.33
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   24.70      SUBAREA RUNOFF(CFS) =   42.21
 EFFECTIVE AREA(ACRES) =     40.68   AREA-AVERAGED Fm(INCH/HR) =  0.38
 AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       42.0       PEAK FLOW RATE(CFS) =      67.77

****************************************************************************
 FLOW PROCESS FROM NODE    119.00 TO NODE    119.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   25.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.232
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```



```
 NATURAL FAIR COVER
 "OPEN BRUSH"               B        9.64      0.31     1.000    84
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.31
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    9.64      SUBAREA RUNOFF(CFS) =   16.69
 EFFECTIVE AREA(ACRES) =     50.32   AREA-AVERAGED Fm(INCH/HR) =  0.37
 AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       51.6       PEAK FLOW RATE(CFS) =      84.47

****************************************************************************
 FLOW PROCESS FROM NODE    119.00 TO NODE    119.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    110.00 TO NODE    111.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   670.00
 ELEVATION DATA: UPSTREAM(FEET) =   2720.00  DOWNSTREAM(FEET) =   2683.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.014
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.812
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"               B        0.85      0.31     1.000    84   17.01
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.31
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.92
 TOTAL AREA(ACRES) =      0.85   PEAK FLOW RATE(CFS) =      1.92

****************************************************************************
 FLOW PROCESS FROM NODE    111.00 TO NODE    113.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 2683.00  DOWNSTREAM ELEVATION(FEET) = 2635.00
 STREET LENGTH(FEET) =  1520.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0130
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0130

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.76
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
```

```
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    7.72
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.04
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.13
  STREET FLOW TRAVEL TIME(MIN.) =   6.27   Tc(MIN.) =   23.29
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.329
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                A        2.67      0.55     1.000    66
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        1.84      0.31     1.000    84
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.51      SUBAREA RUNOFF(CFS) =    7.63
  EFFECTIVE AREA(ACRES) =      5.36    AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        5.4        PEAK FLOW RATE(CFS) =       9.18

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   9.49
  FLOW VELOCITY(FEET/SEC.) =  4.50   DEPTH*VELOCITY(FT*FT/SEC.) =   1.42
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    113.00 =    2190.00 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.) =   23.29
  RAINFALL INTENSITY(INCH/HR) =   2.33
  AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       5.36
  TOTAL STREAM AREA(ACRES) =       5.36
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.18

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    113.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   769.00
  ELEVATION DATA: UPSTREAM(FEET) =   2645.00  DOWNSTREAM(FEET) =   2635.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   24.008
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.287
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"                A        1.40      0.55     1.000    66   24.01
```



```
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        0.66      0.31     1.000    84   24.01
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.47
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      3.37
  TOTAL AREA(ACRES) =      2.06   PEAK FLOW RATE(CFS) =      3.37

****************************************************************************
  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.) =   24.01
  RAINFALL INTENSITY(INCH/HR) =   2.29
  AREA-AVERAGED Fm(INCH/HR) =  0.47
  AREA-AVERAGED Fp(INCH/HR) =  0.47
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       2.06
  TOTAL STREAM AREA(ACRES) =       2.06
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.37

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1        9.18   23.29    2.329  0.43( 0.43) 1.00       5.4     110.00
      2        3.37   24.01    2.287  0.47( 0.47) 1.00       2.1     112.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       12.52   23.29    2.329  0.44( 0.44) 1.00       7.4     110.00
      2       12.34   24.01    2.287  0.44( 0.44) 1.00       7.4     112.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      12.52    Tc(MIN.) =    23.29
  EFFECTIVE AREA(ACRES) =       7.36   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        7.4
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    113.00 =    2190.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       12.52   23.29    2.329  0.44( 0.44) 1.00       7.4     110.00
      2       12.34   24.01    2.287  0.44( 0.44) 1.00       7.4     112.00
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    113.00 =    2190.00 FEET.
```

```
  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      105.67   11.58    3.542  0.69( 0.14) 0.20      34.5     101.00
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    113.00 =    1819.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      115.88   11.58    3.542  0.60( 0.17) 0.28      38.1     101.00
      2       80.54   23.29    2.329  0.56( 0.19) 0.34      41.8     110.00
      3       79.05   24.01    2.287  0.56( 0.19) 0.34      41.9     112.00
    TOTAL AREA(ACRES) =        41.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      115.88  Tc(MIN.) =   11.581
  EFFECTIVE AREA(ACRES) =     38.15  AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.56  AREA-AVERAGED Ap =  0.34
  TOTAL AREA(ACRES) =       41.9
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    113.00 =    2190.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    114.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2635.00  DOWNSTREAM(FEET) =  2630.00
  FLOW LENGTH(FEET) =   179.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.24
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     115.88
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   11.74
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    114.00 =    2369.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    118.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2630.00  DOWNSTREAM(FEET) =   2608.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   282.00   CHANNEL SLOPE =  0.0780
  CHANNEL FLOW THRU SUBAREA(CFS) =     115.88
  FLOW VELOCITY(FEET/SEC) =  13.86 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.34   Tc(MIN.) =   12.08
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    118.00 =    2651.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    118.00 TO NODE    118.00 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.) =   12.08
  RAINFALL INTENSITY(INCH/HR) =   3.45
  AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.60
  AREA-AVERAGED Ap =  0.28
  EFFECTIVE STREAM AREA(ACRES) =      38.15
  TOTAL STREAM AREA(ACRES) =      41.91
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     115.88

****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    116.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   560.00
  ELEVATION DATA: UPSTREAM(FEET) =   2620.00  DOWNSTREAM(FEET) =   2612.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.524
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.983
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        5.60      0.74     0.200    52    9.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =     19.32
  TOTAL AREA(ACRES) =      5.60   PEAK FLOW RATE(CFS) =     19.32

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    117.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 2612.00  DOWNSTREAM ELEVATION(FEET) = 2610.00
  STREET LENGTH(FEET) =   480.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0130
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0130

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      26.02
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
```

```
    STREET FLOW DEPTH(FEET) =  0.55
    HALFSTREET FLOOD WIDTH(FEET) =   20.52
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.84
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.56
  STREET FLOW TRAVEL TIME(MIN.) =   2.81   Tc(MIN.) =   12.34
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.410
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        4.55      0.74     0.200    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    4.55      SUBAREA RUNOFF(CFS) =   13.36
  EFFECTIVE AREA(ACRES) =     10.15    AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =       10.1        PEAK FLOW RATE(CFS) =      29.79

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.57   HALFSTREET FLOOD WIDTH(FEET) =  21.55
  FLOW VELOCITY(FEET/SEC.) =  2.97   DEPTH*VELOCITY(FT*FT/SEC.) =   1.70
  LONGEST FLOWPATH FROM NODE    115.00 TO NODE    117.00 =    1040.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    118.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2610.00  DOWNSTREAM(FEET) =  2608.00
  FLOW LENGTH(FEET) =   317.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.35
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      29.79
  PIPE TRAVEL TIME(MIN.) =   0.72    Tc(MIN.) =   13.06
  LONGEST FLOWPATH FROM NODE    115.00 TO NODE    118.00 =    1357.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    118.00 TO NODE    118.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.06
  RAINFALL INTENSITY(INCH/HR) =   3.30
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =      10.15
  TOTAL STREAM AREA(ACRES) =      10.15
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      29.79

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      115.88   12.08    3.453  0.60( 0.17) 0.28      38.1     101.00
      1       80.54   23.85    2.296  0.56( 0.19) 0.34      41.8     110.00
      1       79.05   24.57    2.255  0.56( 0.19) 0.34      41.9     112.00
      2       29.79   13.06    3.296  0.74( 0.15) 0.20      10.1     115.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      144.83   12.08    3.453  0.62( 0.16) 0.26      47.5     101.00
      2      142.75   13.06    3.296  0.62( 0.16) 0.26      48.6     115.00
      3      100.87   23.85    2.296  0.58( 0.18) 0.31      52.0     110.00
      4       98.99   24.57    2.255  0.58( 0.18) 0.31      52.1     112.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     144.83    Tc(MIN.) =    12.08
  EFFECTIVE AREA(ACRES) =      47.54   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.62  AREA-AVERAGED Ap =  0.26
  TOTAL AREA(ACRES) =       52.1
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    118.00 =    2651.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    118.00 TO NODE    119.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2608.00  DOWNSTREAM(FEET) =   2605.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   138.00   CHANNEL SLOPE =  0.0217
  CHANNEL FLOW THRU SUBAREA(CFS) =     144.83
  FLOW VELOCITY(FEET/SEC) =   7.83 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.29   Tc(MIN.) =   12.38
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    119.00 =    2789.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    119.00 TO NODE    119.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      144.83   12.38    3.403  0.62( 0.16) 0.26      47.5     101.00
      2      142.75   13.35    3.252  0.62( 0.16) 0.26      48.6     115.00
      3      100.87   24.17    2.277  0.58( 0.18) 0.31      52.0     110.00
      4       98.99   24.90    2.237  0.58( 0.18) 0.31      52.1     112.00
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    119.00 =    2789.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       84.47   25.00    2.232  0.37( 0.37) 1.00      50.3     106.00
      2       77.56   29.04    2.040  0.37( 0.37) 1.00      51.6     104.00
  LONGEST FLOWPATH FROM NODE    104.00 TO NODE    119.00 =    2907.00 FEET.
```

```
 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      212.91   12.38    3.403  0.45( 0.23) 0.52      72.5     101.00
     2      212.54   13.35    3.252  0.45( 0.24) 0.53      75.5     115.00
     3      184.54   24.17    2.277  0.42( 0.27) 0.65     100.7     110.00
     4      183.37   24.90    2.237  0.42( 0.27) 0.65     102.2     112.00
     5      183.21   25.00    2.232  0.42( 0.27) 0.65     102.4     106.00
     6      167.06   29.04    2.040  0.42( 0.28) 0.66     103.7     104.00
   TOTAL AREA(ACRES) =       103.7

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      212.91  Tc(MIN.) =   12.377
 EFFECTIVE AREA(ACRES) =     72.46  AREA-AVERAGED Fm(INCH/HR) =  0.23
 AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.52
 TOTAL AREA(ACRES) =      103.7
 LONGEST FLOWPATH FROM NODE    104.00 TO NODE    119.00 =    2907.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    119.00 TO NODE    119.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    119.00 TO NODE    120.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  2605.00  DOWNSTREAM(FEET) =  2603.00
 FLOW LENGTH(FEET) =   148.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  42.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.95
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     212.91
 PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   12.53
 LONGEST FLOWPATH FROM NODE    104.00 TO NODE    120.00 =    3055.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    120.00 TO NODE    121.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   829.00
 ELEVATION DATA: UPSTREAM(FEET) =   2603.00  DOWNSTREAM(FEET) =   2586.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   22.586
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.372
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "OPEN BRUSH"               A        3.24      0.55     1.000    66   22.59
 NATURAL FAIR COVER
 "OPEN BRUSH"               B        2.46      0.31     1.000    84   22.59
```



```
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      9.89
 TOTAL AREA(ACRES) =      5.70   PEAK FLOW RATE(CFS) =      9.89
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        5.7  TC(MIN.) =     22.59
 EFFECTIVE AREA(ACRES) =      5.70  AREA-AVERAGED Fm(INCH/HR)=  0.44
 AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)   =       9.89
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

Appendix C: Storm Water Quality Calculations

Design Capture Volume

Hydrologic Conditions of Concern (Unit Hydrographs)

Wilson Basin
City of Yucaipa, CA
County of San Bernardino

Drainage Area	TDA (ac)	TDA (ft^2)	Impervious Area (ft^2)	% Impervious	Runoff Coefficient, C	2yr, 1hr Rainfall depth, $P_{2yr,1hr}$ (in)	Climatic Region	Climate Coefficient, a_1	Mean Storm Rainfall Depth, P_6 (in)	Regression Constant (for drawdown time), a_2	Design Capture Volume, DCV (ft^3)
Total	109	**4,748,040**	1970204	**41%**	**0.28**	**0.576**	**Valley**	**1.4807**	**0.8528832**	**1.963**	**182,648**

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

            F L O O D    R O U T I N G    A N A L Y S I S
         USING COUNTY HYDROLOGY MANUAL OF SAN BERNARDINO(1986)
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                          Analysis prepared by:

                             RBF Consulting
                           14257 Alton Parkway
                                Irvine, CA
                                  92618

--------------------------------------------------------------------------
  FILE NAME: Y_EX_2UH.DAT
  TIME/DATE OF STUDY: 16:27 04/26/2016


**************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    111.00 IS CODE =   1
--------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
==========================================================================

      (UNIT-HYDROGRAPH ADDED TO STREAM #1)

         WATERSHED AREA =      96.300 ACRES
         BASEFLOW =   0.000 CFS/SQUARE-MILE
         *USER ENTERED "LAG" TIME =    0.360 HOURS
          CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
          THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
          MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
         VALLEY(UNDEVELOPED)/DESERT S-GRAPH SELECTED
         MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) =  0.880
         LOW LOSS FRACTION = 0.920
         *HYDROGRAPH MODEL #1 SPECIFIED*

         SPECIFIED PEAK  5-MINUTES RAINFALL(INCH)=  0.16
         SPECIFIED PEAK 30-MINUTES RAINFALL(INCH)=  0.40
         SPECIFIED PEAK  1-HOUR RAINFALL(INCH) =  0.58
         SPECIFIED PEAK  3-HOUR RAINFALL(INCH) =  1.03
         SPECIFIED PEAK  6-HOUR RAINFALL(INCH) =  1.50
         SPECIFIED PEAK 24-HOUR RAINFALL(INCH) =  2.88

         *USER SPECIFIED PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
           5-MINUTE FACTOR = 0.996
          30-MINUTE FACTOR = 0.996
           1-HOUR FACTOR = 0.996
           3-HOUR FACTOR = 0.999
           6-HOUR FACTOR = 1.000
          24-HOUR FACTOR = 1.000

         UNIT HYDROGRAPH TIME UNIT =   5.000 MINUTES
         UNIT INTERVAL PERCENTAGE OF LAG-TIME =  23.148
```

UNIT HYDROGRAPH DETERMINATION

INTERVAL NUMBER	"S" GRAPH MEAN VALUES	UNIT HYDROGRAPH ORDINATES(CFS)
1	2.068	24.084
2	8.498	74.882
3	20.149	135.701
4	36.189	186.797
5	52.178	186.215
6	62.456	119.707
7	69.182	78.323
8	73.953	55.568
9	77.523	41.573
10	80.481	34.460
11	82.902	28.191
12	84.987	24.281
13	86.739	20.405
14	88.210	17.137
15	89.563	15.749
16	90.735	13.648
17	91.800	12.405
18	92.707	10.567
19	93.564	9.984
20	94.335	8.974
21	95.016	7.930
22	95.696	7.923
23	96.249	6.442
24	96.698	5.232
25	97.148	5.238
26	97.597	5.232
27	97.995	4.632
28	98.183	2.193
29	98.350	1.934
30	98.516	1.934
31	98.682	1.936
32	98.848	1.936
33	99.014	1.936
34	99.180	1.936
35	99.347	1.936
36	99.513	1.936
37	99.679	1.936
38	99.845	1.936
39	100.000	1.801

UNIT PERIOD (NUMBER)	UNIT RAINFALL (INCHES)	UNIT SOIL-LOSS (INCHES)	EFFECTIVE RAINFALL (INCHES)
1	0.0047	0.0043	0.0004
2	0.0047	0.0043	0.0004
3	0.0047	0.0044	0.0004
4	0.0047	0.0044	0.0004
5	0.0048	0.0044	0.0004
6	0.0048	0.0044	0.0004
7	0.0048	0.0044	0.0004
8	0.0048	0.0044	0.0004
9	0.0048	0.0044	0.0004
10	0.0048	0.0044	0.0004
11	0.0048	0.0045	0.0004
12	0.0049	0.0045	0.0004
13	0.0049	0.0045	0.0004
14	0.0049	0.0045	0.0004
15	0.0049	0.0045	0.0004
16	0.0049	0.0045	0.0004
17	0.0049	0.0045	0.0004
18	0.0049	0.0045	0.0004
19	0.0050	0.0046	0.0004
20	0.0050	0.0046	0.0004
21	0.0050	0.0046	0.0004
22	0.0050	0.0046	0.0004
23	0.0050	0.0046	0.0004
24	0.0050	0.0046	0.0004
25	0.0051	0.0047	0.0004
26	0.0051	0.0047	0.0004
27	0.0051	0.0047	0.0004
28	0.0051	0.0047	0.0004
29	0.0051	0.0047	0.0004
30	0.0051	0.0047	0.0004
31	0.0052	0.0047	0.0004
32	0.0052	0.0048	0.0004
33	0.0052	0.0048	0.0004
34	0.0052	0.0048	0.0004
35	0.0052	0.0048	0.0004
36	0.0052	0.0048	0.0004
37	0.0053	0.0048	0.0004
38	0.0053	0.0048	0.0004
39	0.0053	0.0049	0.0004
40	0.0053	0.0049	0.0004
41	0.0053	0.0049	0.0004
42	0.0053	0.0049	0.0004
43	0.0054	0.0049	0.0004
44	0.0054	0.0050	0.0004
45	0.0054	0.0050	0.0004
46	0.0054	0.0050	0.0004
47	0.0054	0.0050	0.0004
48	0.0055	0.0050	0.0004
49	0.0055	0.0050	0.0004
50	0.0055	0.0051	0.0004
51	0.0055	0.0051	0.0004
52	0.0055	0.0051	0.0004
53	0.0056	0.0051	0.0004

54	0.0056	0.0051	0.0004
55	0.0056	0.0052	0.0004
56	0.0056	0.0052	0.0005
57	0.0057	0.0052	0.0005
58	0.0057	0.0052	0.0005
59	0.0057	0.0052	0.0005
60	0.0057	0.0053	0.0005
61	0.0057	0.0053	0.0005
62	0.0058	0.0053	0.0005
63	0.0058	0.0053	0.0005
64	0.0058	0.0053	0.0005
65	0.0058	0.0054	0.0005
66	0.0059	0.0054	0.0005
67	0.0059	0.0054	0.0005
68	0.0059	0.0054	0.0005
69	0.0059	0.0055	0.0005
70	0.0060	0.0055	0.0005
71	0.0060	0.0055	0.0005
72	0.0060	0.0055	0.0005
73	0.0060	0.0056	0.0005
74	0.0061	0.0056	0.0005
75	0.0061	0.0056	0.0005
76	0.0061	0.0056	0.0005
77	0.0062	0.0057	0.0005
78	0.0062	0.0057	0.0005
79	0.0062	0.0057	0.0005
80	0.0062	0.0057	0.0005
81	0.0063	0.0058	0.0005
82	0.0063	0.0058	0.0005
83	0.0063	0.0058	0.0005
84	0.0064	0.0058	0.0005
85	0.0064	0.0059	0.0005
86	0.0064	0.0059	0.0005
87	0.0065	0.0059	0.0005
88	0.0065	0.0060	0.0005
89	0.0065	0.0060	0.0005
90	0.0065	0.0060	0.0005
91	0.0066	0.0061	0.0005
92	0.0066	0.0061	0.0005
93	0.0067	0.0061	0.0005
94	0.0067	0.0061	0.0005
95	0.0067	0.0062	0.0005
96	0.0068	0.0062	0.0005
97	0.0068	0.0063	0.0005
98	0.0068	0.0063	0.0005
99	0.0069	0.0063	0.0006
100	0.0069	0.0064	0.0006
101	0.0070	0.0064	0.0006
102	0.0070	0.0064	0.0006
103	0.0070	0.0065	0.0006
104	0.0071	0.0065	0.0006
105	0.0071	0.0066	0.0006
106	0.0072	0.0066	0.0006
107	0.0072	0.0066	0.0006
108	0.0072	0.0067	0.0006
109	0.0073	0.0067	0.0006
110	0.0073	0.0067	0.0006
111	0.0074	0.0068	0.0006

112	0.0074	0.0068	0.0006
113	0.0075	0.0069	0.0006
114	0.0075	0.0069	0.0006
115	0.0076	0.0070	0.0006
116	0.0076	0.0070	0.0006
117	0.0077	0.0071	0.0006
118	0.0077	0.0071	0.0006
119	0.0078	0.0072	0.0006
120	0.0079	0.0072	0.0006
121	0.0079	0.0073	0.0006
122	0.0080	0.0073	0.0006
123	0.0080	0.0074	0.0006
124	0.0081	0.0074	0.0006
125	0.0082	0.0075	0.0007
126	0.0082	0.0076	0.0007
127	0.0083	0.0076	0.0007
128	0.0083	0.0077	0.0007
129	0.0084	0.0078	0.0007
130	0.0085	0.0078	0.0007
131	0.0086	0.0079	0.0007
132	0.0086	0.0079	0.0007
133	0.0087	0.0080	0.0007
134	0.0088	0.0081	0.0007
135	0.0089	0.0082	0.0007
136	0.0090	0.0082	0.0007
137	0.0091	0.0083	0.0007
138	0.0091	0.0084	0.0007
139	0.0092	0.0085	0.0007
140	0.0093	0.0086	0.0007
141	0.0094	0.0087	0.0008
142	0.0095	0.0087	0.0008
143	0.0096	0.0089	0.0008
144	0.0097	0.0089	0.0008
145	0.0114	0.0105	0.0009
146	0.0114	0.0105	0.0009
147	0.0116	0.0107	0.0009
148	0.0117	0.0107	0.0009
149	0.0118	0.0109	0.0009
150	0.0119	0.0110	0.0010
151	0.0121	0.0111	0.0010
152	0.0122	0.0112	0.0010
153	0.0124	0.0114	0.0010
154	0.0125	0.0115	0.0010
155	0.0127	0.0116	0.0010
156	0.0128	0.0117	0.0010
157	0.0130	0.0119	0.0010
158	0.0131	0.0120	0.0010
159	0.0133	0.0123	0.0011
160	0.0134	0.0124	0.0011
161	0.0137	0.0126	0.0011
162	0.0138	0.0127	0.0011
163	0.0141	0.0130	0.0011
164	0.0143	0.0131	0.0011
165	0.0146	0.0134	0.0012
166	0.0147	0.0136	0.0012
167	0.0151	0.0139	0.0012
168	0.0153	0.0140	0.0012
169	0.0151	0.0139	0.0012

170	0.0153	0.0141	0.0012
171	0.0158	0.0145	0.0013
172	0.0160	0.0147	0.0013
173	0.0165	0.0152	0.0013
174	0.0168	0.0154	0.0013
175	0.0174	0.0160	0.0014
176	0.0177	0.0163	0.0014
177	0.0184	0.0169	0.0015
178	0.0188	0.0173	0.0015
179	0.0196	0.0181	0.0016
180	0.0201	0.0185	0.0016
181	0.0212	0.0195	0.0017
182	0.0218	0.0200	0.0017
183	0.0231	0.0213	0.0019
184	0.0239	0.0220	0.0019
185	0.0263	0.0242	0.0021
186	0.0275	0.0253	0.0022
187	0.0303	0.0279	0.0024
188	0.0321	0.0296	0.0026
189	0.0355	0.0326	0.0028
190	0.0392	0.0360	0.0031
191	0.0523	0.0481	0.0042
192	0.0678	0.0624	0.0054
193	0.1594	0.0733	0.0860
194	0.0443	0.0407	0.0035
195	0.0343	0.0316	0.0027
196	0.0288	0.0265	0.0023
197	0.0248	0.0228	0.0020
198	0.0224	0.0206	0.0018
199	0.0206	0.0190	0.0016
200	0.0192	0.0176	0.0015
201	0.0180	0.0166	0.0014
202	0.0171	0.0157	0.0014
203	0.0162	0.0149	0.0013
204	0.0155	0.0143	0.0012
205	0.0154	0.0142	0.0012
206	0.0149	0.0137	0.0012
207	0.0144	0.0133	0.0012
208	0.0140	0.0128	0.0011
209	0.0136	0.0125	0.0011
210	0.0132	0.0121	0.0011
211	0.0129	0.0118	0.0010
212	0.0126	0.0115	0.0010
213	0.0123	0.0113	0.0010
214	0.0120	0.0110	0.0010
215	0.0117	0.0108	0.0009
216	0.0115	0.0106	0.0009
217	0.0098	0.0090	0.0008
218	0.0096	0.0088	0.0008
219	0.0094	0.0086	0.0007
220	0.0092	0.0084	0.0007
221	0.0090	0.0083	0.0007
222	0.0088	0.0081	0.0007
223	0.0087	0.0080	0.0007
224	0.0085	0.0079	0.0007
225	0.0084	0.0077	0.0007
226	0.0083	0.0076	0.0007
227	0.0081	0.0075	0.0007

228	0.0080	0.0074	0.0006
229	0.0079	0.0073	0.0006
230	0.0078	0.0072	0.0006
231	0.0077	0.0071	0.0006
232	0.0076	0.0070	0.0006
233	0.0075	0.0069	0.0006
234	0.0074	0.0068	0.0006
235	0.0073	0.0067	0.0006
236	0.0072	0.0066	0.0006
237	0.0071	0.0065	0.0006
238	0.0070	0.0065	0.0006
239	0.0069	0.0064	0.0006
240	0.0069	0.0063	0.0005
241	0.0068	0.0062	0.0005
242	0.0067	0.0062	0.0005
243	0.0066	0.0061	0.0005
244	0.0066	0.0060	0.0005
245	0.0065	0.0060	0.0005
246	0.0064	0.0059	0.0005
247	0.0064	0.0059	0.0005
248	0.0063	0.0058	0.0005
249	0.0062	0.0057	0.0005
250	0.0062	0.0057	0.0005
251	0.0061	0.0056	0.0005
252	0.0061	0.0056	0.0005
253	0.0060	0.0055	0.0005
254	0.0060	0.0055	0.0005
255	0.0059	0.0054	0.0005
256	0.0059	0.0054	0.0005
257	0.0058	0.0054	0.0005
258	0.0058	0.0053	0.0005
259	0.0057	0.0053	0.0005
260	0.0057	0.0052	0.0005
261	0.0056	0.0052	0.0005
262	0.0056	0.0051	0.0004
263	0.0056	0.0051	0.0004
264	0.0055	0.0051	0.0004
265	0.0055	0.0050	0.0004
266	0.0054	0.0050	0.0004
267	0.0054	0.0050	0.0004
268	0.0054	0.0049	0.0004
269	0.0053	0.0049	0.0004
270	0.0053	0.0049	0.0004
271	0.0052	0.0048	0.0004
272	0.0052	0.0048	0.0004
273	0.0052	0.0048	0.0004
274	0.0051	0.0047	0.0004
275	0.0051	0.0047	0.0004
276	0.0051	0.0047	0.0004
277	0.0050	0.0046	0.0004
278	0.0050	0.0046	0.0004
279	0.0050	0.0046	0.0004
280	0.0050	0.0046	0.0004
281	0.0049	0.0045	0.0004
282	0.0049	0.0045	0.0004
283	0.0049	0.0045	0.0004
284	0.0048	0.0044	0.0004
285	0.0048	0.0044	0.0004

286	0.0048	0.0044	0.0004
287	0.0048	0.0044	0.0004
288	0.0047	0.0043	0.0004

TOTAL STORM RAINFALL(INCHES) = 2.88
TOTAL SOIL-LOSS(INCHES) = 2.58
TOTAL EFFECTIVE RAINFALL(INCHES) = 0.30

TOTAL SOIL-LOSS VOLUME(ACRE-FEET) = 20.6750
TOTAL STORM RUNOFF VOLUME(ACRE-FEET) = 2.4358

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2 4 - H O U R S T O R M
R U N O F F H Y D R O G R A P H

HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
(Note: Time indicated is at END of Each Unit Intervals)

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	5.0	10.0	15.0	20.0
0.083	0.0001	0.01	Q	.	.	.	.
0.167	0.0003	0.04	Q	.	.	.	.
0.250	0.0009	0.09	Q	.	.	.	.
0.333	0.0020	0.16	Q	.	.	.	.
0.417	0.0036	0.23	Q	.	.	.	.
0.500	0.0055	0.28	Q	.	.	.	.
0.583	0.0076	0.31	Q	.	.	.	.
0.667	0.0099	0.33	Q	.	.	.	.
0.750	0.0122	0.34	Q	.	.	.	.
0.833	0.0147	0.36	Q	.	.	.	.
0.917	0.0172	0.37	Q	.	.	.	.
1.000	0.0199	0.38	Q	.	.	.	.
1.083	0.0225	0.39	Q	.	.	.	.
1.167	0.0253	0.40	Q	.	.	.	.
1.250	0.0280	0.40	Q	.	.	.	.
1.333	0.0309	0.41	Q	.	.	.	.
1.417	0.0337	0.42	Q	.	.	.	.
1.500	0.0366	0.42	Q	.	.	.	.
1.583	0.0396	0.43	Q	.	.	.	.
1.667	0.0425	0.43	Q	.	.	.	.
1.750	0.0455	0.43	Q	.	.	.	.
1.833	0.0485	0.44	Q	.	.	.	.
1.917	0.0516	0.44	Q	.	.	.	.
2.000	0.0547	0.45	Q	.	.	.	.
2.083	0.0577	0.45	Q	.	.	.	.
2.167	0.0609	0.45	Q	.	.	.	.
2.250	0.0640	0.46	QV	.	.	.	.
2.333	0.0672	0.46	QV	.	.	.	.
2.417	0.0703	0.46	QV	.	.	.	.
2.500	0.0735	0.46	QV	.	.	.	.
2.583	0.0767	0.46	QV	.	.	.	.
2.667	0.0799	0.47	QV	.	.	.	.
2.750	0.0832	0.47	QV	.	.	.	.
2.833	0.0864	0.47	QV	.	.	.	.
2.917	0.0897	0.47	QV	.	.	.	.
3.000	0.0929	0.48	QV	.	.	.	.
3.083	0.0962	0.48	QV	.	.	.	.
3.167	0.0995	0.48	QV	.	.	.	.
3.250	0.1029	0.48	QV	.	.	.	.
3.333	0.1062	0.48	QV	.	.	.	.
3.417	0.1095	0.49	QV	.	.	.	.
3.500	0.1129	0.49	QV	.	.	.	.
3.583	0.1163	0.49	QV	.	.	.	.
3.667	0.1196	0.49	QV	.	.	.	.
3.750	0.1230	0.49	Q V	.	.	.	.
3.833	0.1264	0.49	Q V	.	.	.	.
3.917	0.1298	0.50	Q V	.	.	.	.

4.000	0.1333	0.50	Q V	.	.	.	.
4.083	0.1367	0.50	Q V	.	.	.	.
4.167	0.1402	0.50	.QV	.	.	.	.
4.250	0.1436	0.50	.QV	.	.	.	.
4.333	0.1471	0.50	.QV	.	.	.	.
4.417	0.1506	0.51	.QV	.	.	.	.
4.500	0.1541	0.51	.QV	.	.	.	.
4.583	0.1576	0.51	.QV	.	.	.	.
4.667	0.1611	0.51	.QV	.	.	.	.
4.750	0.1647	0.51	.QV	.	.	.	.
4.833	0.1682	0.52	.QV	.	.	.	.
4.917	0.1718	0.52	.QV	.	.	.	.
5.000	0.1754	0.52	.QV	.	.	.	.
5.083	0.1790	0.52	.QV	.	.	.	.
5.167	0.1826	0.52	.QV	.	.	.	.
5.250	0.1862	0.53	.Q V	.	.	.	.
5.333	0.1898	0.53	.Q V	.	.	.	.
5.417	0.1935	0.53	.Q V	.	.	.	.
5.500	0.1971	0.53	.Q V	.	.	.	.
5.583	0.2008	0.53	.Q V	.	.	.	.
5.667	0.2045	0.54	.Q V	.	.	.	.
5.750	0.2082	0.54	.Q V	.	.	.	.
5.833	0.2119	0.54	.Q V	.	.	.	.
5.917	0.2157	0.54	.Q V	.	.	.	.
6.000	0.2194	0.55	.Q V	.	.	.	.
6.083	0.2232	0.55	.Q V	.	.	.	.
6.167	0.2270	0.55	.Q V	.	.	.	.
6.250	0.2308	0.55	.Q V	.	.	.	.
6.333	0.2346	0.55	.Q V	.	.	.	.
6.417	0.2385	0.56	.Q V	.	.	.	.
6.500	0.2423	0.56	.Q V	.	.	.	.
6.583	0.2462	0.56	.Q V	.	.	.	.
6.667	0.2501	0.56	.Q V	.	.	.	.
6.750	0.2540	0.57	.Q V	.	.	.	.
6.833	0.2579	0.57	.Q V	.	.	.	.
6.917	0.2618	0.57	.Q V	.	.	.	.
7.000	0.2658	0.57	.Q V	.	.	.	.
7.083	0.2698	0.58	.Q V	.	.	.	.
7.167	0.2738	0.58	.Q V	.	.	.	.
7.250	0.2778	0.58	.Q V	.	.	.	.
7.333	0.2818	0.59	.Q V	.	.	.	.
7.417	0.2859	0.59	.Q V	.	.	.	.
7.500	0.2899	0.59	.Q V	.	.	.	.
7.583	0.2940	0.59	.Q V	.	.	.	.
7.667	0.2981	0.60	.Q V	.	.	.	.
7.750	0.3023	0.60	.Q V	.	.	.	.
7.833	0.3064	0.60	.Q V	.	.	.	.
7.917	0.3106	0.61	.Q V	.	.	.	.
8.000	0.3148	0.61	.Q V	.	.	.	.
8.083	0.3190	0.61	.Q V	.	.	.	.
8.167	0.3233	0.62	.Q V	.	.	.	.
8.250	0.3275	0.62	.Q V	.	.	.	.
8.333	0.3318	0.62	.Q V	.	.	.	.
8.417	0.3361	0.63	.Q V	.	.	.	.
8.500	0.3404	0.63	.Q V	.	.	.	.
8.583	0.3448	0.63	.Q V	.	.	.	.
8.667	0.3492	0.64	.Q V	.	.	.	.
8.750	0.3536	0.64	.Q V	.	.	.	.

8.833	0.3580	0.64	.Q	V	.	.	.
8.917	0.3625	0.65	.Q	V	.	.	.
9.000	0.3669	0.65	.Q	V	.	.	.
9.083	0.3714	0.65	.Q	V	.	.	.
9.167	0.3760	0.66	.Q	V	.	.	.
9.250	0.3805	0.66	.Q	V	.	.	.
9.333	0.3851	0.67	.Q	V	.	.	.
9.417	0.3898	0.67	.Q	V	.	.	.
9.500	0.3944	0.67	.Q	V	.	.	.
9.583	0.3991	0.68	.Q	V	.	.	.
9.667	0.4038	0.68	.Q	V	.	.	.
9.750	0.4085	0.69	.Q	V	.	.	.
9.833	0.4133	0.69	.Q	V	.	.	.
9.917	0.4181	0.70	.Q	V	.	.	.
10.000	0.4229	0.70	.Q	V	.	.	.
10.083	0.4278	0.71	.Q	V	.	.	.
10.167	0.4327	0.71	.Q	V	.	.	.
10.250	0.4376	0.72	.Q	V	.	.	.
10.333	0.4426	0.72	.Q	V	.	.	.
10.417	0.4476	0.73	.Q	V	.	.	.
10.500	0.4526	0.73	.Q	V	.	.	.
10.583	0.4577	0.74	.Q	V	.	.	.
10.667	0.4628	0.74	.Q	V	.	.	.
10.750	0.4679	0.75	.Q	V	.	.	.
10.833	0.4731	0.75	.Q	V	.	.	.
10.917	0.4784	0.76	.Q	V	.	.	.
11.000	0.4836	0.77	.Q	V	.	.	.
11.083	0.4889	0.77	.Q	V	.	.	.
11.167	0.4943	0.78	.Q	V	.	.	.
11.250	0.4997	0.78	.Q	V	.	.	.
11.333	0.5052	0.79	.Q	V	.	.	.
11.417	0.5106	0.80	.Q	V	.	.	.
11.500	0.5162	0.80	.Q	V	.	.	.
11.583	0.5218	0.81	.Q	V	.	.	.
11.667	0.5274	0.82	.Q	V	.	.	.
11.750	0.5331	0.83	.Q	V	.	.	.
11.833	0.5389	0.83	.Q	V	.	.	.
11.917	0.5447	0.84	.Q	V	.	.	.
12.000	0.5505	0.85	.Q	V	.	.	.
12.083	0.5565	0.86	.Q	V	.	.	.
12.167	0.5625	0.88	.Q	V	.	.	.
12.250	0.5687	0.90	.Q	V	.	.	.
12.333	0.5752	0.94	.Q	V	.	.	.
12.417	0.5819	0.97	.Q	V	.	.	.
12.500	0.5887	0.99	.Q	V	.	.	.
12.583	0.5957	1.01	. Q	V	.	.	.
12.667	0.6028	1.03	. Q	V	.	.	.
12.750	0.6100	1.05	. Q	V	.	.	.
12.833	0.6173	1.06	. Q	V	.	.	.
12.917	0.6247	1.08	. Q	V	.	.	.
13.000	0.6322	1.09	. Q	V	.	.	.
13.083	0.6398	1.10	. Q	V	.	.	.
13.167	0.6475	1.12	. Q	V	.	.	.
13.250	0.6553	1.13	. Q	V	.	.	.
13.333	0.6632	1.15	. Q	V	.	.	.
13.417	0.6713	1.17	. Q	.V	.	.	.
13.500	0.6794	1.18	. Q	.V	.	.	.
13.583	0.6877	1.20	. Q	.V	.	.	.

13.667	0.6960	1.22	. Q .V . . .
13.750	0.7045	1.23	. Q .V . . .
13.833	0.7131	1.25	. Q .V . . .
13.917	0.7219	1.27	. Q .V . . .
14.000	0.7308	1.29	. Q . V . . .
14.083	0.7398	1.31	. Q . V . . .
14.167	0.7489	1.33	. Q . V . . .
14.250	0.7582	1.35	. Q . V . . .
14.333	0.7676	1.36	. Q . V . . .
14.417	0.7771	1.38	. Q . V . . .
14.500	0.7867	1.40	. Q . V . . .
14.583	0.7965	1.43	. Q . V . . .
14.667	0.8066	1.45	. Q . V . . .
14.750	0.8168	1.49	. Q . V . . .
14.833	0.8273	1.52	. Q . V . . .
14.917	0.8380	1.56	. Q . V . . .
15.000	0.8490	1.60	. Q . V . . .
15.083	0.8603	1.64	. Q . V . . .
15.167	0.8719	1.69	. Q . V . . .
15.250	0.8839	1.74	. Q . V . . .
15.333	0.8963	1.80	. Q . V . . .
15.417	0.9092	1.87	. Q . V . . .
15.500	0.9227	1.95	. Q . V . . .
15.583	0.9368	2.05	. Q . V . . .
15.667	0.9516	2.16	. Q . V . . .
15.750	0.9674	2.29	. Q . V . . .
15.833	0.9843	2.44	. Q . V . . .
15.917	1.0025	2.64	. Q . V . . .
16.000	1.0226	2.93	. Q . V . . .
16.083	1.0590	5.27	. Q V . . .
16.167	1.1266	9.82	. . VQ. . .
16.250	1.2304	15.08	. . V Q .
16.333	1.3634	19.30	. . . V . Q .
16.417	1.4944	19.03	. . . V . Q .
16.500	1.5859	13.28	. . . Q . .
16.583	1.6519	9.58	. . Q. V . .
16.667	1.7032	7.44	. . Q . V . .
16.750	1.7449	6.07	. . Q . V . .
16.833	1.7814	5.30	. Q . V. .
16.917	1.8133	4.62	. Q. . V. .
17.000	1.8420	4.17	. Q . . V .
17.083	1.8677	3.73	. Q . . V .
17.167	1.8908	3.36	. Q . . .V .
17.250	1.9126	3.16	. Q . . .V .
17.333	1.9327	2.92	. Q . . .V .
17.417	1.9517	2.75	. Q . . . V .
17.500	1.9691	2.54	. Q . . . V .
17.583	1.9858	2.43	. Q . . . V .
17.667	2.0016	2.29	. Q . . . V .
17.750	2.0165	2.15	. Q . . . V .
17.833	2.0309	2.10	. Q . . . V .
17.917	2.0443	1.94	. Q . . . V .
18.000	2.0566	1.79	. Q . . . V .
18.083	2.0687	1.75	. Q . . . V .
18.167	2.0804	1.70	. Q . . . V .
18.250	2.0915	1.60	. Q . . . V .
18.333	2.1007	1.34	. Q . . . V .
18.417	2.1094	1.27	. Q . . . V .

18.500	2.1179	1.23	. Q	.	.	.	V	.
18.583	2.1261	1.19	. Q	.	.	.	V	.
18.667	2.1341	1.16	. Q	.	.	.	V	.
18.750	2.1419	1.14	. Q	.	.	.	V	.
18.833	2.1495	1.11	. Q	.	.	.	V	.
18.917	2.1570	1.09	. Q	.	.	.	V	.
19.000	2.1643	1.06	. Q	.	.	.	V	.
19.083	2.1715	1.04	. Q	.	.	.	V	.
19.167	2.1786	1.02	. Q	.	.	.	V	.
19.250	2.1854	0.99	.Q	.	.	.	V	.
19.333	2.1910	0.82	.Q	.	.	.	V	.
19.417	2.1965	0.80	.Q	.	.	.	V	.
19.500	2.2019	0.78	.Q	.	.	.	V	.
19.583	2.2072	0.77	.Q	.	.	.	V	.
19.667	2.2124	0.75	.Q	.	.	.	V	.
19.750	2.2175	0.74	.Q	.	.	.	V	.
19.833	2.2225	0.73	.Q	.	.	.	V	.
19.917	2.2274	0.72	.Q	.	.	.	V	.
20.000	2.2323	0.71	.Q	.	.	.	V	.
20.083	2.2371	0.70	.Q	.	.	.	V	.
20.167	2.2418	0.69	.Q	.	.	.	V	.
20.250	2.2465	0.68	.Q	.	.	.	V	.
20.333	2.2511	0.67	.Q	.	.	.	V	.
20.417	2.2556	0.66	.Q	.	.	.	V	.
20.500	2.2601	0.65	.Q	.	.	.	V	.
20.583	2.2646	0.64	.Q	.	.	.	V	.
20.667	2.2690	0.64	.Q	.	.	.	V	.
20.750	2.2733	0.63	.Q	.	.	.	V	.
20.833	2.2776	0.62	.Q	.	.	.	V	.
20.917	2.2818	0.62	.Q	.	.	.	V	.
21.000	2.2860	0.61	.Q	.	.	.	V	.
21.083	2.2901	0.60	.Q	.	.	.	V	.
21.167	2.2942	0.60	.Q	.	.	.	V	.
21.250	2.2983	0.59	.Q	.	.	.	V	.
21.333	2.3023	0.58	.Q	.	.	.	V	.
21.417	2.3063	0.58	.Q	.	.	.	V	.
21.500	2.3103	0.57	.Q	.	.	.	V	.
21.583	2.3142	0.57	.Q	.	.	.	V	.
21.667	2.3180	0.56	.Q	.	.	.	V	.
21.750	2.3219	0.56	.Q	.	.	.	V	.
21.833	2.3257	0.55	.Q	.	.	.	V	.
21.917	2.3295	0.55	.Q	.	.	.	V	.
22.000	2.3332	0.54	.Q	.	.	.	V	.
22.083	2.3369	0.54	.Q	.	.	.	V	.
22.167	2.3406	0.53	.Q	.	.	.	V	.
22.250	2.3442	0.53	.Q	.	.	.	V	.
22.333	2.3479	0.53	.Q	.	.	.	V	.
22.417	2.3515	0.52	.Q	.	.	.	V	.
22.500	2.3550	0.52	.Q	.	.	.	V	.
22.583	2.3586	0.51	.Q	.	.	.	V	.
22.667	2.3621	0.51	.Q	.	.	.	V	.
22.750	2.3656	0.51	.Q	.	.	.	V	.
22.833	2.3690	0.50	.Q	.	.	.	V	.
22.917	2.3725	0.50	Q	.	.	.	V	.
23.000	2.3759	0.50	Q	.	.	.	V	.
23.083	2.3793	0.49	Q	.	.	.	V	.
23.167	2.3826	0.49	Q	.	.	.	V	.
23.250	2.3860	0.49	Q	.	.	.	V	.

23.333	2.3893	0.48	Q	.	.	.	V.
23.417	2.3926	0.48	Q	.	.	.	V.
23.500	2.3959	0.48	Q	.	.	.	V.
23.583	2.3991	0.47	Q	.	.	.	V.
23.667	2.4024	0.47	Q	.	.	.	V.
23.750	2.4056	0.47	Q	.	.	.	V.
23.833	2.4088	0.46	Q	.	.	.	V.
23.917	2.4120	0.46	Q	.	.	.	V.
24.000	2.4151	0.46	Q	.	.	.	V.
24.083	2.4182	0.45	Q	.	.	.	V.
24.167	2.4211	0.42	Q	.	.	.	V.
24.250	2.4236	0.36	Q	.	.	.	V.
24.333	2.4256	0.29	Q	.	.	.	V.
24.417	2.4271	0.22	Q	.	.	.	V.
24.500	2.4282	0.17	Q	.	.	.	V.
24.583	2.4292	0.14	Q	.	.	.	V.
24.667	2.4300	0.12	Q	.	.	.	V.
24.750	2.4308	0.10	Q	.	.	.	V.
24.833	2.4314	0.09	Q	.	.	.	V.
24.917	2.4319	0.08	Q	.	.	.	V.
25.000	2.4324	0.07	Q	.	.	.	V.
25.083	2.4328	0.06	Q	.	.	.	V.
25.167	2.4332	0.05	Q	.	.	.	V.
25.250	2.4335	0.05	Q	.	.	.	V.
25.333	2.4338	0.04	Q	.	.	.	V.
25.417	2.4341	0.04	Q	.	.	.	V.
25.500	2.4343	0.03	Q	.	.	.	V.
25.583	2.4345	0.03	Q	.	.	.	V.
25.667	2.4347	0.03	Q	.	.	.	V.
25.750	2.4348	0.02	Q	.	.	.	V.
25.833	2.4350	0.02	Q	.	.	.	V.
25.917	2.4351	0.02	Q	.	.	.	V.
26.000	2.4352	0.02	Q	.	.	.	V.
26.083	2.4353	0.01	Q	.	.	.	V.
26.167	2.4354	0.01	Q	.	.	.	V.
26.250	2.4354	0.01	Q	.	.	.	V.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1575.0
10%	150.0
20%	60.0
30%	40.0
40%	30.0
50%	25.0
60%	20.0
70%	15.0
80%	10.0
90%	10.0

****
FLOW PROCESS FROM NODE 111.00 TO NODE 111.00 IS CODE = 6

```
--------------------------------------------------------------------------------
  >>>>>STREAM NUMBER 1 CLEARED AND SET TO ZERO<<<<<
================================================================================


********************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
================================================================================

      (UNIT-HYDROGRAPH ADDED TO STREAM #1)

         WATERSHED AREA =      13.100 ACRES
         BASEFLOW =   0.000 CFS/SQUARE-MILE
         *USER ENTERED "LAG" TIME =    0.240 HOURS
          CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
          THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
          MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
         VALLEY(UNDEVELOPED)/DESERT S-GRAPH SELECTED
         MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) =  0.990
         LOW LOSS FRACTION = 0.990
         *HYDROGRAPH MODEL #1 SPECIFIED*

         SPECIFIED PEAK  5-MINUTES RAINFALL(INCH)=  0.16
         SPECIFIED PEAK 30-MINUTES RAINFALL(INCH)=  0.40
         SPECIFIED PEAK  1-HOUR RAINFALL(INCH) =  0.58
         SPECIFIED PEAK  3-HOUR RAINFALL(INCH) =  1.03
         SPECIFIED PEAK  6-HOUR RAINFALL(INCH) =  1.50
         SPECIFIED PEAK 24-HOUR RAINFALL(INCH) =  2.88

         *USER SPECIFIED PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
           5-MINUTE FACTOR = 0.996
          30-MINUTE FACTOR = 0.996
           1-HOUR FACTOR = 0.996
           3-HOUR FACTOR = 0.999
           6-HOUR FACTOR = 1.000
          24-HOUR FACTOR = 1.000

         UNIT HYDROGRAPH TIME UNIT =   5.000 MINUTES
         UNIT INTERVAL PERCENTAGE OF LAG-TIME =  34.722



================================================================================
                      UNIT HYDROGRAPH DETERMINATION

--------------------------------------------------------------------------------
    INTERVAL          "S" GRAPH          UNIT HYDROGRAPH
     NUMBER          MEAN VALUES          ORDINATES(CFS)
--------------------------------------------------------------------------------
         1                3.489                5.527
         2               16.988               21.387
         3               40.420               37.122
         4               60.129               31.225
         5               70.434               16.325
         6               76.671                9.882
         7               81.112                7.035
```

8	84.468	5.318
9	87.118	4.197
10	89.224	3.337
11	91.004	2.820
12	92.491	2.355
13	93.765	2.018
14	94.846	1.713
15	95.843	1.580
16	96.586	1.178
17	97.261	1.068
18	97.900	1.014
19	98.225	0.514
20	98.474	0.395
21	98.723	0.395
22	98.973	0.395
23	99.222	0.395
24	99.471	0.395
25	99.720	0.395
26	99.970	0.395
27	100.000	0.048

UNIT PERIOD (NUMBER)	UNIT RAINFALL (INCHES)	UNIT SOIL-LOSS (INCHES)	EFFECTIVE RAINFALL (INCHES)
1	0.0047	0.0047	0.0000
2	0.0047	0.0047	0.0000
3	0.0047	0.0047	0.0000
4	0.0047	0.0047	0.0000
5	0.0048	0.0047	0.0000
6	0.0048	0.0047	0.0000
7	0.0048	0.0047	0.0000
8	0.0048	0.0048	0.0000
9	0.0048	0.0048	0.0000
10	0.0048	0.0048	0.0000
11	0.0048	0.0048	0.0000
12	0.0049	0.0048	0.0000
13	0.0049	0.0048	0.0000
14	0.0049	0.0048	0.0000
15	0.0049	0.0049	0.0000
16	0.0049	0.0049	0.0000
17	0.0049	0.0049	0.0000
18	0.0049	0.0049	0.0000
19	0.0050	0.0049	0.0000
20	0.0050	0.0049	0.0000
21	0.0050	0.0049	0.0000
22	0.0050	0.0050	0.0001
23	0.0050	0.0050	0.0001
24	0.0050	0.0050	0.0001
25	0.0051	0.0050	0.0001
26	0.0051	0.0050	0.0001
27	0.0051	0.0050	0.0001
28	0.0051	0.0050	0.0001
29	0.0051	0.0051	0.0001
30	0.0051	0.0051	0.0001
31	0.0052	0.0051	0.0001
32	0.0052	0.0051	0.0001
33	0.0052	0.0051	0.0001
34	0.0052	0.0051	0.0001
35	0.0052	0.0052	0.0001
36	0.0052	0.0052	0.0001
37	0.0053	0.0052	0.0001
38	0.0053	0.0052	0.0001
39	0.0053	0.0052	0.0001
40	0.0053	0.0053	0.0001
41	0.0053	0.0053	0.0001
42	0.0053	0.0053	0.0001
43	0.0054	0.0053	0.0001
44	0.0054	0.0053	0.0001
45	0.0054	0.0054	0.0001
46	0.0054	0.0054	0.0001
47	0.0054	0.0054	0.0001
48	0.0055	0.0054	0.0001
49	0.0055	0.0054	0.0001
50	0.0055	0.0054	0.0001
51	0.0055	0.0055	0.0001
52	0.0055	0.0055	0.0001
53	0.0056	0.0055	0.0001

54	0.0056	0.0055	0.0001
55	0.0056	0.0056	0.0001
56	0.0056	0.0056	0.0001
57	0.0057	0.0056	0.0001
58	0.0057	0.0056	0.0001
59	0.0057	0.0056	0.0001
60	0.0057	0.0057	0.0001
61	0.0057	0.0057	0.0001
62	0.0058	0.0057	0.0001
63	0.0058	0.0057	0.0001
64	0.0058	0.0058	0.0001
65	0.0058	0.0058	0.0001
66	0.0059	0.0058	0.0001
67	0.0059	0.0058	0.0001
68	0.0059	0.0058	0.0001
69	0.0059	0.0059	0.0001
70	0.0060	0.0059	0.0001
71	0.0060	0.0059	0.0001
72	0.0060	0.0059	0.0001
73	0.0060	0.0060	0.0001
74	0.0061	0.0060	0.0001
75	0.0061	0.0060	0.0001
76	0.0061	0.0061	0.0001
77	0.0062	0.0061	0.0001
78	0.0062	0.0061	0.0001
79	0.0062	0.0061	0.0001
80	0.0062	0.0062	0.0001
81	0.0063	0.0062	0.0001
82	0.0063	0.0062	0.0001
83	0.0063	0.0063	0.0001
84	0.0064	0.0063	0.0001
85	0.0064	0.0063	0.0001
86	0.0064	0.0063	0.0001
87	0.0065	0.0064	0.0001
88	0.0065	0.0064	0.0001
89	0.0065	0.0065	0.0001
90	0.0065	0.0065	0.0001
91	0.0066	0.0065	0.0001
92	0.0066	0.0065	0.0001
93	0.0067	0.0066	0.0001
94	0.0067	0.0066	0.0001
95	0.0067	0.0067	0.0001
96	0.0068	0.0067	0.0001
97	0.0068	0.0067	0.0001
98	0.0068	0.0068	0.0001
99	0.0069	0.0068	0.0001
100	0.0069	0.0068	0.0001
101	0.0070	0.0069	0.0001
102	0.0070	0.0069	0.0001
103	0.0070	0.0070	0.0001
104	0.0071	0.0070	0.0001
105	0.0071	0.0071	0.0001
106	0.0072	0.0071	0.0001
107	0.0072	0.0071	0.0001
108	0.0072	0.0072	0.0001
109	0.0073	0.0072	0.0001
110	0.0073	0.0073	0.0001
111	0.0074	0.0073	0.0001

112	0.0074	0.0074	0.0001
113	0.0075	0.0074	0.0001
114	0.0075	0.0075	0.0001
115	0.0076	0.0075	0.0001
116	0.0076	0.0076	0.0001
117	0.0077	0.0076	0.0001
118	0.0077	0.0077	0.0001
119	0.0078	0.0077	0.0001
120	0.0079	0.0078	0.0001
121	0.0079	0.0078	0.0001
122	0.0080	0.0079	0.0001
123	0.0080	0.0080	0.0001
124	0.0081	0.0080	0.0001
125	0.0082	0.0081	0.0001
126	0.0082	0.0081	0.0001
127	0.0083	0.0082	0.0001
128	0.0083	0.0083	0.0001
129	0.0084	0.0084	0.0001
130	0.0085	0.0084	0.0001
131	0.0086	0.0085	0.0001
132	0.0086	0.0085	0.0001
133	0.0087	0.0086	0.0001
134	0.0088	0.0087	0.0001
135	0.0089	0.0088	0.0001
136	0.0090	0.0089	0.0001
137	0.0091	0.0090	0.0001
138	0.0091	0.0090	0.0001
139	0.0092	0.0091	0.0001
140	0.0093	0.0092	0.0001
141	0.0094	0.0093	0.0001
142	0.0095	0.0094	0.0001
143	0.0096	0.0095	0.0001
144	0.0097	0.0096	0.0001
145	0.0114	0.0113	0.0001
146	0.0114	0.0113	0.0001
147	0.0116	0.0115	0.0001
148	0.0117	0.0116	0.0001
149	0.0118	0.0117	0.0001
150	0.0119	0.0118	0.0001
151	0.0121	0.0120	0.0001
152	0.0122	0.0121	0.0001
153	0.0124	0.0122	0.0001
154	0.0125	0.0123	0.0001
155	0.0127	0.0125	0.0001
156	0.0128	0.0126	0.0001
157	0.0130	0.0128	0.0001
158	0.0131	0.0130	0.0001
159	0.0133	0.0132	0.0001
160	0.0134	0.0133	0.0001
161	0.0137	0.0136	0.0001
162	0.0138	0.0137	0.0001
163	0.0141	0.0140	0.0001
164	0.0143	0.0141	0.0001
165	0.0146	0.0144	0.0001
166	0.0147	0.0146	0.0001
167	0.0151	0.0149	0.0002
168	0.0153	0.0151	0.0002
169	0.0151	0.0150	0.0002

170	0.0153	0.0152	0.0002
171	0.0158	0.0156	0.0002
172	0.0160	0.0158	0.0002
173	0.0165	0.0163	0.0002
174	0.0168	0.0166	0.0002
175	0.0174	0.0172	0.0002
176	0.0177	0.0175	0.0002
177	0.0184	0.0182	0.0002
178	0.0188	0.0186	0.0002
179	0.0196	0.0194	0.0002
180	0.0201	0.0199	0.0002
181	0.0212	0.0209	0.0002
182	0.0218	0.0215	0.0002
183	0.0231	0.0229	0.0002
184	0.0239	0.0237	0.0002
185	0.0263	0.0261	0.0003
186	0.0275	0.0272	0.0003
187	0.0303	0.0300	0.0003
188	0.0321	0.0318	0.0003
189	0.0355	0.0351	0.0004
190	0.0392	0.0388	0.0004
191	0.0523	0.0518	0.0005
192	0.0678	0.0672	0.0007
193	0.1594	0.0825	0.0769
194	0.0443	0.0438	0.0004
195	0.0343	0.0340	0.0003
196	0.0288	0.0285	0.0003
197	0.0248	0.0246	0.0002
198	0.0224	0.0222	0.0002
199	0.0206	0.0204	0.0002
200	0.0192	0.0190	0.0002
201	0.0180	0.0178	0.0002
202	0.0171	0.0169	0.0002
203	0.0162	0.0161	0.0002
204	0.0155	0.0154	0.0002
205	0.0154	0.0153	0.0002
206	0.0149	0.0147	0.0001
207	0.0144	0.0143	0.0001
208	0.0140	0.0138	0.0001
209	0.0136	0.0134	0.0001
210	0.0132	0.0131	0.0001
211	0.0129	0.0127	0.0001
212	0.0126	0.0124	0.0001
213	0.0123	0.0121	0.0001
214	0.0120	0.0119	0.0001
215	0.0117	0.0116	0.0001
216	0.0115	0.0114	0.0001
217	0.0098	0.0097	0.0001
218	0.0096	0.0095	0.0001
219	0.0094	0.0093	0.0001
220	0.0092	0.0091	0.0001
221	0.0090	0.0089	0.0001
222	0.0088	0.0088	0.0001
223	0.0087	0.0086	0.0001
224	0.0085	0.0085	0.0001
225	0.0084	0.0083	0.0001
226	0.0083	0.0082	0.0001
227	0.0081	0.0080	0.0001

228	0.0080	0.0079	0.0001
229	0.0079	0.0078	0.0001
230	0.0078	0.0077	0.0001
231	0.0077	0.0076	0.0001
232	0.0076	0.0075	0.0001
233	0.0075	0.0074	0.0001
234	0.0074	0.0073	0.0001
235	0.0073	0.0072	0.0001
236	0.0072	0.0071	0.0001
237	0.0071	0.0070	0.0001
238	0.0070	0.0069	0.0001
239	0.0069	0.0069	0.0001
240	0.0069	0.0068	0.0001
241	0.0068	0.0067	0.0001
242	0.0067	0.0066	0.0001
243	0.0066	0.0066	0.0001
244	0.0066	0.0065	0.0001
245	0.0065	0.0064	0.0001
246	0.0064	0.0064	0.0001
247	0.0064	0.0063	0.0001
248	0.0063	0.0062	0.0001
249	0.0062	0.0062	0.0001
250	0.0062	0.0061	0.0001
251	0.0061	0.0061	0.0001
252	0.0061	0.0060	0.0001
253	0.0060	0.0060	0.0001
254	0.0060	0.0059	0.0001
255	0.0059	0.0059	0.0001
256	0.0059	0.0058	0.0001
257	0.0058	0.0058	0.0001
258	0.0058	0.0057	0.0001
259	0.0057	0.0057	0.0001
260	0.0057	0.0056	0.0001
261	0.0056	0.0056	0.0001
262	0.0056	0.0055	0.0001
263	0.0056	0.0055	0.0001
264	0.0055	0.0055	0.0001
265	0.0055	0.0054	0.0001
266	0.0054	0.0054	0.0001
267	0.0054	0.0053	0.0001
268	0.0054	0.0053	0.0001
269	0.0053	0.0053	0.0001
270	0.0053	0.0052	0.0001
271	0.0052	0.0052	0.0001
272	0.0052	0.0052	0.0001
273	0.0052	0.0051	0.0001
274	0.0051	0.0051	0.0001
275	0.0051	0.0051	0.0001
276	0.0051	0.0050	0.0001
277	0.0050	0.0050	0.0001
278	0.0050	0.0050	0.0001
279	0.0050	0.0049	0.0000
280	0.0050	0.0049	0.0000
281	0.0049	0.0049	0.0000
282	0.0049	0.0048	0.0000
283	0.0049	0.0048	0.0000
284	0.0048	0.0048	0.0000
285	0.0048	0.0048	0.0000

286	0.0048	0.0047	0.0000
287	0.0048	0.0047	0.0000
288	0.0047	0.0047	0.0000

TOTAL STORM RAINFALL(INCHES) = 2.88
TOTAL SOIL-LOSS(INCHES) = 2.78
TOTAL EFFECTIVE RAINFALL(INCHES) = 0.10

TOTAL SOIL-LOSS VOLUME(ACRE-FEET) = 3.0304
TOTAL STORM RUNOFF VOLUME(ACRE-FEET) = 0.1135

---

2 4 - H O U R S T O R M
R U N O F F H Y D R O G R A P H

HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
(Note: Time indicated is at END of Each Unit Intervals)

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	2.5	5.0	7.5	10.0
0.083	0.0000	0.00	Q	.	.	.	.
0.167	0.0000	0.00	Q	.	.	.	.
0.250	0.0000	0.00	Q	.	.	.	.
0.333	0.0001	0.00	Q	.	.	.	.
0.417	0.0001	0.01	Q	.	.	.	.
0.500	0.0001	0.01	Q	.	.	.	.
0.583	0.0002	0.01	Q	.	.	.	.
0.667	0.0002	0.01	Q	.	.	.	.
0.750	0.0003	0.01	Q	.	.	.	.
0.833	0.0003	0.01	Q	.	.	.	.
0.917	0.0004	0.01	Q	.	.	.	.
1.000	0.0004	0.01	Q	.	.	.	.
1.083	0.0005	0.01	Q	.	.	.	.
1.167	0.0005	0.01	Q	.	.	.	.
1.250	0.0006	0.01	Q	.	.	.	.
1.333	0.0006	0.01	Q	.	.	.	.
1.417	0.0007	0.01	Q	.	.	.	.
1.500	0.0007	0.01	Q	.	.	.	.
1.583	0.0008	0.01	Q	.	.	.	.
1.667	0.0008	0.01	Q	.	.	.	.
1.750	0.0009	0.01	Q	.	.	.	.
1.833	0.0009	0.01	Q	.	.	.	.
1.917	0.0010	0.01	Q	.	.	.	.
2.000	0.0010	0.01	Q	.	.	.	.
2.083	0.0011	0.01	Q	.	.	.	.
2.167	0.0011	0.01	Q	.	.	.	.
2.250	0.0012	0.01	Q	.	.	.	.
2.333	0.0013	0.01	Q	.	.	.	.
2.417	0.0013	0.01	Q	.	.	.	.
2.500	0.0014	0.01	Q	.	.	.	.
2.583	0.0014	0.01	Q	.	.	.	.
2.667	0.0015	0.01	Q	.	.	.	.
2.750	0.0015	0.01	Q	.	.	.	.
2.833	0.0016	0.01	Q	.	.	.	.
2.917	0.0016	0.01	Q	.	.	.	.
3.000	0.0017	0.01	Q	.	.	.	.
3.083	0.0018	0.01	Q	.	.	.	.
3.167	0.0018	0.01	Q	.	.	.	.
3.250	0.0019	0.01	Q	.	.	.	.
3.333	0.0019	0.01	Q	.	.	.	.
3.417	0.0020	0.01	Q	.	.	.	.
3.500	0.0020	0.01	Q	.	.	.	.
3.583	0.0021	0.01	Q	.	.	.	.
3.667	0.0022	0.01	Q	.	.	.	.
3.750	0.0022	0.01	Q	.	.	.	.
3.833	0.0023	0.01	Q	.	.	.	.
3.917	0.0023	0.01	Q	.	.	.	.

4.000	0.0024	0.01	Q	.	.	.	.
4.083	0.0025	0.01	Q	.	.	.	.
4.167	0.0025	0.01	Q	.	.	.	.
4.250	0.0026	0.01	Q	.	.	.	.
4.333	0.0026	0.01	Q	.	.	.	.
4.417	0.0027	0.01	Q	.	.	.	.
4.500	0.0027	0.01	Q	.	.	.	.
4.583	0.0028	0.01	Q	.	.	.	.
4.667	0.0029	0.01	QV	.	.	.	.
4.750	0.0029	0.01	QV	.	.	.	.
4.833	0.0030	0.01	QV	.	.	.	.
4.917	0.0031	0.01	QV	.	.	.	.
5.000	0.0031	0.01	QV	.	.	.	.
5.083	0.0032	0.01	QV	.	.	.	.
5.167	0.0032	0.01	QV	.	.	.	.
5.250	0.0033	0.01	QV	.	.	.	.
5.333	0.0034	0.01	QV	.	.	.	.
5.417	0.0034	0.01	QV	.	.	.	.
5.500	0.0035	0.01	QV	.	.	.	.
5.583	0.0035	0.01	QV	.	.	.	.
5.667	0.0036	0.01	QV	.	.	.	.
5.750	0.0037	0.01	QV	.	.	.	.
5.833	0.0037	0.01	QV	.	.	.	.
5.917	0.0038	0.01	QV	.	.	.	.
6.000	0.0039	0.01	QV	.	.	.	.
6.083	0.0039	0.01	QV	.	.	.	.
6.167	0.0040	0.01	QV	.	.	.	.
6.250	0.0041	0.01	QV	.	.	.	.
6.333	0.0041	0.01	QV	.	.	.	.
6.417	0.0042	0.01	QV	.	.	.	.
6.500	0.0043	0.01	QV	.	.	.	.
6.583	0.0043	0.01	QV	.	.	.	.
6.667	0.0044	0.01	QV	.	.	.	.
6.750	0.0045	0.01	QV	.	.	.	.
6.833	0.0045	0.01	QV	.	.	.	.
6.917	0.0046	0.01	QV	.	.	.	.
7.000	0.0047	0.01	QV	.	.	.	.
7.083	0.0047	0.01	QV	.	.	.	.
7.167	0.0048	0.01	QV	.	.	.	.
7.250	0.0049	0.01	QV	.	.	.	.
7.333	0.0049	0.01	QV	.	.	.	.
7.417	0.0050	0.01	QV	.	.	.	.
7.500	0.0051	0.01	QV	.	.	.	.
7.583	0.0051	0.01	QV	.	.	.	.
7.667	0.0052	0.01	QV	.	.	.	.
7.750	0.0053	0.01	QV	.	.	.	.
7.833	0.0054	0.01	QV	.	.	.	.
7.917	0.0054	0.01	QV	.	.	.	.
8.000	0.0055	0.01	QV	.	.	.	.
8.083	0.0056	0.01	QV	.	.	.	.
8.167	0.0057	0.01	QV	.	.	.	.
8.250	0.0057	0.01	Q V	.	.	.	.
8.333	0.0058	0.01	Q V	.	.	.	.
8.417	0.0059	0.01	Q V	.	.	.	.
8.500	0.0059	0.01	Q V	.	.	.	.
8.583	0.0060	0.01	Q V	.	.	.	.
8.667	0.0061	0.01	Q V	.	.	.	.
8.750	0.0062	0.01	Q V	.	.	.	.

8.833	0.0062	0.01	Q	V	.	.	.	.
8.917	0.0063	0.01	Q	V	.	.	.	.
9.000	0.0064	0.01	Q	V	.	.	.	.
9.083	0.0065	0.01	Q	V	.	.	.	.
9.167	0.0066	0.01	Q	V	.	.	.	.
9.250	0.0066	0.01	Q	V	.	.	.	.
9.333	0.0067	0.01	Q	V	.	.	.	.
9.417	0.0068	0.01	Q	V	.	.	.	.
9.500	0.0069	0.01	Q	V	.	.	.	.
9.583	0.0070	0.01	Q	V	.	.	.	.
9.667	0.0070	0.01	Q	V	.	.	.	.
9.750	0.0071	0.01	Q	V	.	.	.	.
9.833	0.0072	0.01	Q	V	.	.	.	.
9.917	0.0073	0.01	Q	V	.	.	.	.
10.000	0.0074	0.01	Q	V	.	.	.	.
10.083	0.0075	0.01	Q	V	.	.	.	.
10.167	0.0075	0.01	Q	V	.	.	.	.
10.250	0.0076	0.01	Q	V	.	.	.	.
10.333	0.0077	0.01	Q	V	.	.	.	.
10.417	0.0078	0.01	Q	V	.	.	.	.
10.500	0.0079	0.01	Q	V	.	.	.	.
10.583	0.0080	0.01	Q	V	.	.	.	.
10.667	0.0081	0.01	Q	V	.	.	.	.
10.750	0.0081	0.01	Q	V	.	.	.	.
10.833	0.0082	0.01	Q	V	.	.	.	.
10.917	0.0083	0.01	Q	V	.	.	.	.
11.000	0.0084	0.01	Q	V	.	.	.	.
11.083	0.0085	0.01	Q	V	.	.	.	.
11.167	0.0086	0.01	Q	V	.	.	.	.
11.250	0.0087	0.01	Q	V	.	.	.	.
11.333	0.0088	0.01	Q	V	.	.	.	.
11.417	0.0089	0.01	Q	V	.	.	.	.
11.500	0.0090	0.01	Q	V	.	.	.	.
11.583	0.0091	0.01	Q	V	.	.	.	.
11.667	0.0092	0.01	Q	V	.	.	.	.
11.750	0.0093	0.01	Q	V	.	.	.	.
11.833	0.0094	0.01	Q	V	.	.	.	.
11.917	0.0095	0.01	Q	V	.	.	.	.
12.000	0.0096	0.01	Q	V	.	.	.	.
12.083	0.0097	0.01	Q	V	.	.	.	.
12.167	0.0098	0.02	Q	V	.	.	.	.
12.250	0.0099	0.02	Q	V	.	.	.	.
12.333	0.0100	0.02	Q	V	.	.	.	.
12.417	0.0101	0.02	Q	V	.	.	.	.
12.500	0.0102	0.02	Q	V	.	.	.	.
12.583	0.0104	0.02	Q	V	.	.	.	.
12.667	0.0105	0.02	Q	V	.	.	.	.
12.750	0.0106	0.02	Q	V	.	.	.	.
12.833	0.0108	0.02	Q	V	.	.	.	.
12.917	0.0109	0.02	Q	V	.	.	.	.
13.000	0.0110	0.02	Q	V	.	.	.	.
13.083	0.0111	0.02	Q	V	.	.	.	.
13.167	0.0113	0.02	Q	V	.	.	.	.
13.250	0.0114	0.02	Q	V	.	.	.	.
13.333	0.0116	0.02	Q	V	.	.	.	.
13.417	0.0117	0.02	Q	V	.	.	.	.
13.500	0.0118	0.02	Q	V	.	.	.	.
13.583	0.0120	0.02	Q	V	.	.	.	.

```
13.667      0.0121      0.02  Q   V     .          .          .          .
13.750      0.0123      0.02  Q   V     .          .          .          .
13.833      0.0124      0.02  Q   V     .          .          .          .
13.917      0.0126      0.02  Q   V     .          .          .          .
14.000      0.0127      0.02  Q   V     .          .          .          .
14.083      0.0129      0.02  Q   V     .          .          .          .
14.167      0.0131      0.02  Q   V     .          .          .          .
14.250      0.0132      0.02  Q   V     .          .          .          .
14.333      0.0134      0.02  Q   V     .          .          .          .
14.417      0.0136      0.02  Q   V     .          .          .          .
14.500      0.0137      0.02  Q   V     .          .          .          .
14.583      0.0139      0.03  Q   V     .          .          .          .
14.667      0.0141      0.03  Q   V     .          .          .          .
14.750      0.0143      0.03  Q    V    .          .          .          .
14.833      0.0144      0.03  Q    V    .          .          .          .
14.917      0.0146      0.03  Q    V    .          .          .          .
15.000      0.0148      0.03  Q    V    .          .          .          .
15.083      0.0150      0.03  Q    V    .          .          .          .
15.167      0.0152      0.03  Q    V    .          .          .          .
15.250      0.0154      0.03  Q    V    .          .          .          .
15.333      0.0157      0.03  Q    V    .          .          .          .
15.417      0.0159      0.03  Q    V    .          .          .          .
15.500      0.0161      0.04  Q    V    .          .          .          .
15.583      0.0164      0.04  Q    V    .          .          .          .
15.667      0.0167      0.04  Q    V    .          .          .          .
15.750      0.0170      0.04  Q    V    .          .          .          .
15.833      0.0173      0.05  Q     V   .          .          .          .
15.917      0.0176      0.05  Q     V   .          .          .          .
16.000      0.0180      0.06  Q     V   .          .          .          .
16.083      0.0214      0.49  .Q     V  .          .          .          .
16.167      0.0332      1.71  .     Q   .V         .          .          .
16.250      0.0532      2.91  .         .Q      V  .          .          .
16.333      0.0701      2.45  .        Q.         .   V      .          .
16.417      0.0791      1.31  .    Q    .         .      V   .          .
16.500      0.0847      0.81  .  Q      .         .        V.          .
16.583      0.0887      0.59  . Q       .         .         .V         .
16.667      0.0918      0.45  .Q        .         .          . V       .
16.750      0.0943      0.36  .Q        .         .          .  V      .
16.833      0.0963      0.29  .Q        .         .          .  V      .
16.917      0.0980      0.25  .Q        .         .          .   V     .
17.000      0.0995      0.21  Q         .         .          .    V    .
17.083      0.1008      0.19  Q         .         .          .    V    .
17.167      0.1019      0.16  Q         .         .          .    V    .
17.250      0.1029      0.15  Q         .         .          .     V   .
17.333      0.1037      0.12  Q         .         .          .     V   .
17.417      0.1045      0.11  Q         .         .          .     V   .
17.500      0.1052      0.10  Q         .         .          .      V  .
17.583      0.1056      0.06  Q         .         .          .      V  .
17.667      0.1060      0.05  Q         .         .          .      V  .
17.750      0.1064      0.05  Q         .         .          .      V  .
17.833      0.1067      0.05  Q         .         .          .      V  .
17.917      0.1071      0.05  Q         .         .          .      V  .
18.000      0.1075      0.05  Q         .         .          .      V  .
18.083      0.1078      0.05  Q         .         .          .      V  .
18.167      0.1081      0.05  Q         .         .          .       V .
18.250      0.1083      0.02  Q         .         .          .       V .
18.333      0.1084      0.02  Q         .         .          .       V .
18.417      0.1085      0.02  Q         .         .          .       V .
```

18.500	0.1086	0.02	Q	.	.	.	V .
18.583	0.1087	0.02	Q	.	.	.	V .
18.667	0.1089	0.02	Q	.	.	.	V .
18.750	0.1090	0.01	Q	.	.	.	V .
18.833	0.1091	0.01	Q	.	.	.	V .
18.917	0.1092	0.01	Q	.	.	.	V .
19.000	0.1092	0.01	Q	.	.	.	V .
19.083	0.1093	0.01	Q	.	.	.	V .
19.167	0.1094	0.01	Q	.	.	.	V .
19.250	0.1095	0.01	Q	.	.	.	V .
19.333	0.1096	0.01	Q	.	.	.	V .
19.417	0.1097	0.01	Q	.	.	.	V .
19.500	0.1098	0.01	Q	.	.	.	V .
19.583	0.1099	0.01	Q	.	.	.	V .
19.667	0.1100	0.01	Q	.	.	.	V .
19.750	0.1100	0.01	Q	.	.	.	V .
19.833	0.1101	0.01	Q	.	.	.	V .
19.917	0.1102	0.01	Q	.	.	.	V .
20.000	0.1103	0.01	Q	.	.	.	V .
20.083	0.1104	0.01	Q	.	.	.	V .
20.167	0.1104	0.01	Q	.	.	.	V .
20.250	0.1105	0.01	Q	.	.	.	V .
20.333	0.1106	0.01	Q	.	.	.	V .
20.417	0.1107	0.01	Q	.	.	.	V .
20.500	0.1107	0.01	Q	.	.	.	V.
20.583	0.1108	0.01	Q	.	.	.	V.
20.667	0.1109	0.01	Q	.	.	.	V.
20.750	0.1110	0.01	Q	.	.	.	V.
20.833	0.1110	0.01	Q	.	.	.	V.
20.917	0.1111	0.01	Q	.	.	.	V.
21.000	0.1112	0.01	Q	.	.	.	V.
21.083	0.1112	0.01	Q	.	.	.	V.
21.167	0.1113	0.01	Q	.	.	.	V.
21.250	0.1114	0.01	Q	.	.	.	V.
21.333	0.1114	0.01	Q	.	.	.	V.
21.417	0.1115	0.01	Q	.	.	.	V.
21.500	0.1116	0.01	Q	.	.	.	V.
21.583	0.1116	0.01	Q	.	.	.	V.
21.667	0.1117	0.01	Q	.	.	.	V.
21.750	0.1118	0.01	Q	.	.	.	V.
21.833	0.1118	0.01	Q	.	.	.	V.
21.917	0.1119	0.01	Q	.	.	.	V.
22.000	0.1119	0.01	Q	.	.	.	V.
22.083	0.1120	0.01	Q	.	.	.	V.
22.167	0.1121	0.01	Q	.	.	.	V.
22.250	0.1121	0.01	Q	.	.	.	V.
22.333	0.1122	0.01	Q	.	.	.	V.
22.417	0.1123	0.01	Q	.	.	.	V.
22.500	0.1123	0.01	Q	.	.	.	V.
22.583	0.1124	0.01	Q	.	.	.	V.
22.667	0.1124	0.01	Q	.	.	.	V.
22.750	0.1125	0.01	Q	.	.	.	V.
22.833	0.1125	0.01	Q	.	.	.	V.
22.917	0.1126	0.01	Q	.	.	.	V.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1375.0
10%	50.0
20%	30.0
30%	20.0
40%	20.0
50%	15.0
60%	10.0
70%	10.0
80%	10.0
90%	5.0

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

            F L O O D    R O U T I N G    A N A L Y S I S
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          (c) Copyright 1989-2013 Advanced Engineering Software (aes)
              Ver. 20.0  Release Date: 06/01/2013  License ID 1264

                          Analysis prepared by:

                              RBF Consulting
                            14257 Alton Parkway
                                 Irvine, CA
                                   92618

--------------------------------------------------------------------------
  FILE NAME: Y_PR_2UH.DAT
  TIME/DATE OF STUDY: 16:26 04/26/2016


**************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    120.00 IS CODE =   1
--------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
==========================================================================

      (UNIT-HYDROGRAPH ADDED TO STREAM #1)

         WATERSHED AREA =     109.400 ACRES
         BASEFLOW =   0.000 CFS/SQUARE-MILE
         *USER ENTERED "LAG" TIME =    0.220 HOURS
          CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
          THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
          MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
         VALLEY(DEVELOPED) S-GRAPH SELECTED
         MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) =  0.670
         LOW LOSS FRACTION = 0.940
         *HYDROGRAPH MODEL #1 SPECIFIED*

         SPECIFIED PEAK  5-MINUTES RAINFALL(INCH)=  0.16
         SPECIFIED PEAK 30-MINUTES RAINFALL(INCH)=  0.40
         SPECIFIED PEAK  1-HOUR RAINFALL(INCH) =  0.58
         SPECIFIED PEAK  3-HOUR RAINFALL(INCH) =  1.03
         SPECIFIED PEAK  6-HOUR RAINFALL(INCH) =  1.50
         SPECIFIED PEAK 24-HOUR RAINFALL(INCH) =  2.88

         *USER SPECIFIED PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
           5-MINUTE FACTOR = 0.996
          30-MINUTE FACTOR = 0.996
           1-HOUR FACTOR = 0.996
           3-HOUR FACTOR = 0.999
           6-HOUR FACTOR = 1.000
          24-HOUR FACTOR = 1.000

         UNIT HYDROGRAPH TIME UNIT =   5.000 MINUTES
         UNIT INTERVAL PERCENTAGE OF LAG-TIME =  37.879
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UNIT HYDROGRAPH DETERMINATION

INTERVAL NUMBER	"S" GRAPH MEAN VALUES	UNIT HYDROGRAPH ORDINATES(CFS)
1	2.653	35.095
2	17.527	196.794
3	44.644	358.778
4	73.375	380.128
5	88.902	205.423
6	95.634	89.067
7	98.163	33.469
8	98.920	10.019
9	99.471	7.284
10	99.788	4.200
11	99.947	2.100
12	100.000	0.700

UNIT PERIOD (NUMBER)	UNIT RAINFALL (INCHES)	UNIT SOIL-LOSS (INCHES)	EFFECTIVE RAINFALL (INCHES)
1	0.0047	0.0044	0.0003
2	0.0047	0.0044	0.0003
3	0.0047	0.0045	0.0003
4	0.0047	0.0045	0.0003
5	0.0048	0.0045	0.0003
6	0.0048	0.0045	0.0003
7	0.0048	0.0045	0.0003
8	0.0048	0.0045	0.0003
9	0.0048	0.0045	0.0003
10	0.0048	0.0045	0.0003
11	0.0048	0.0046	0.0003
12	0.0049	0.0046	0.0003
13	0.0049	0.0046	0.0003
14	0.0049	0.0046	0.0003
15	0.0049	0.0046	0.0003
16	0.0049	0.0046	0.0003
17	0.0049	0.0046	0.0003
18	0.0049	0.0046	0.0003
19	0.0050	0.0047	0.0003
20	0.0050	0.0047	0.0003
21	0.0050	0.0047	0.0003
22	0.0050	0.0047	0.0003
23	0.0050	0.0047	0.0003
24	0.0050	0.0047	0.0003
25	0.0051	0.0048	0.0003
26	0.0051	0.0048	0.0003
27	0.0051	0.0048	0.0003
28	0.0051	0.0048	0.0003
29	0.0051	0.0048	0.0003
30	0.0051	0.0048	0.0003
31	0.0052	0.0048	0.0003
32	0.0052	0.0049	0.0003
33	0.0052	0.0049	0.0003
34	0.0052	0.0049	0.0003
35	0.0052	0.0049	0.0003
36	0.0052	0.0049	0.0003
37	0.0053	0.0049	0.0003
38	0.0053	0.0050	0.0003
39	0.0053	0.0050	0.0003
40	0.0053	0.0050	0.0003
41	0.0053	0.0050	0.0003
42	0.0053	0.0050	0.0003
43	0.0054	0.0050	0.0003
44	0.0054	0.0051	0.0003
45	0.0054	0.0051	0.0003
46	0.0054	0.0051	0.0003
47	0.0054	0.0051	0.0003
48	0.0055	0.0051	0.0003
49	0.0055	0.0052	0.0003
50	0.0055	0.0052	0.0003
51	0.0055	0.0052	0.0003
52	0.0055	0.0052	0.0003
53	0.0056	0.0052	0.0003

54	0.0056	0.0052	0.0003
55	0.0056	0.0053	0.0003
56	0.0056	0.0053	0.0003
57	0.0057	0.0053	0.0003
58	0.0057	0.0053	0.0003
59	0.0057	0.0054	0.0003
60	0.0057	0.0054	0.0003
61	0.0057	0.0054	0.0003
62	0.0058	0.0054	0.0003
63	0.0058	0.0054	0.0003
64	0.0058	0.0055	0.0003
65	0.0058	0.0055	0.0004
66	0.0059	0.0055	0.0004
67	0.0059	0.0055	0.0004
68	0.0059	0.0056	0.0004
69	0.0059	0.0056	0.0004
70	0.0060	0.0056	0.0004
71	0.0060	0.0056	0.0004
72	0.0060	0.0056	0.0004
73	0.0060	0.0057	0.0004
74	0.0061	0.0057	0.0004
75	0.0061	0.0057	0.0004
76	0.0061	0.0057	0.0004
77	0.0062	0.0058	0.0004
78	0.0062	0.0058	0.0004
79	0.0062	0.0058	0.0004
80	0.0062	0.0059	0.0004
81	0.0063	0.0059	0.0004
82	0.0063	0.0059	0.0004
83	0.0063	0.0059	0.0004
84	0.0064	0.0060	0.0004
85	0.0064	0.0060	0.0004
86	0.0064	0.0060	0.0004
87	0.0065	0.0061	0.0004
88	0.0065	0.0061	0.0004
89	0.0065	0.0061	0.0004
90	0.0065	0.0062	0.0004
91	0.0066	0.0062	0.0004
92	0.0066	0.0062	0.0004
93	0.0067	0.0063	0.0004
94	0.0067	0.0063	0.0004
95	0.0067	0.0063	0.0004
96	0.0068	0.0063	0.0004
97	0.0068	0.0064	0.0004
98	0.0068	0.0064	0.0004
99	0.0069	0.0065	0.0004
100	0.0069	0.0065	0.0004
101	0.0070	0.0065	0.0004
102	0.0070	0.0066	0.0004
103	0.0070	0.0066	0.0004
104	0.0071	0.0066	0.0004
105	0.0071	0.0067	0.0004
106	0.0072	0.0067	0.0004
107	0.0072	0.0068	0.0004
108	0.0072	0.0068	0.0004
109	0.0073	0.0069	0.0004
110	0.0073	0.0069	0.0004
111	0.0074	0.0070	0.0004

112	0.0074	0.0070	0.0004
113	0.0075	0.0070	0.0004
114	0.0075	0.0071	0.0005
115	0.0076	0.0071	0.0005
116	0.0076	0.0072	0.0005
117	0.0077	0.0072	0.0005
118	0.0077	0.0073	0.0005
119	0.0078	0.0073	0.0005
120	0.0079	0.0074	0.0005
121	0.0079	0.0075	0.0005
122	0.0080	0.0075	0.0005
123	0.0080	0.0076	0.0005
124	0.0081	0.0076	0.0005
125	0.0082	0.0077	0.0005
126	0.0082	0.0077	0.0005
127	0.0083	0.0078	0.0005
128	0.0083	0.0078	0.0005
129	0.0084	0.0079	0.0005
130	0.0085	0.0080	0.0005
131	0.0086	0.0081	0.0005
132	0.0086	0.0081	0.0005
133	0.0087	0.0082	0.0005
134	0.0088	0.0083	0.0005
135	0.0089	0.0084	0.0005
136	0.0090	0.0084	0.0005
137	0.0091	0.0085	0.0005
138	0.0091	0.0086	0.0005
139	0.0092	0.0087	0.0006
140	0.0093	0.0087	0.0006
141	0.0094	0.0089	0.0006
142	0.0095	0.0089	0.0006
143	0.0096	0.0091	0.0006
144	0.0097	0.0091	0.0006
145	0.0114	0.0107	0.0007
146	0.0114	0.0108	0.0007
147	0.0116	0.0109	0.0007
148	0.0117	0.0110	0.0007
149	0.0118	0.0111	0.0007
150	0.0119	0.0112	0.0007
151	0.0121	0.0114	0.0007
152	0.0122	0.0114	0.0007
153	0.0124	0.0116	0.0007
154	0.0125	0.0117	0.0007
155	0.0127	0.0119	0.0008
156	0.0128	0.0120	0.0008
157	0.0130	0.0122	0.0008
158	0.0131	0.0123	0.0008
159	0.0133	0.0125	0.0008
160	0.0134	0.0126	0.0008
161	0.0137	0.0129	0.0008
162	0.0138	0.0130	0.0008
163	0.0141	0.0133	0.0008
164	0.0143	0.0134	0.0009
165	0.0146	0.0137	0.0009
166	0.0147	0.0138	0.0009
167	0.0151	0.0142	0.0009
168	0.0153	0.0143	0.0009
169	0.0151	0.0142	0.0009

170	0.0153	0.0144	0.0009
171	0.0158	0.0148	0.0009
172	0.0160	0.0150	0.0010
173	0.0165	0.0155	0.0010
174	0.0168	0.0158	0.0010
175	0.0174	0.0163	0.0010
176	0.0177	0.0166	0.0011
177	0.0184	0.0173	0.0011
178	0.0188	0.0176	0.0011
179	0.0196	0.0184	0.0012
180	0.0201	0.0189	0.0012
181	0.0212	0.0199	0.0013
182	0.0218	0.0204	0.0013
183	0.0231	0.0217	0.0014
184	0.0239	0.0225	0.0014
185	0.0263	0.0247	0.0016
186	0.0275	0.0258	0.0016
187	0.0303	0.0285	0.0018
188	0.0321	0.0302	0.0019
189	0.0355	0.0333	0.0021
190	0.0392	0.0368	0.0023
191	0.0523	0.0492	0.0031
192	0.0678	0.0558	0.0120
193	0.1594	0.0558	0.1035
194	0.0443	0.0416	0.0027
195	0.0343	0.0322	0.0021
196	0.0288	0.0270	0.0017
197	0.0248	0.0233	0.0015
198	0.0224	0.0211	0.0013
199	0.0206	0.0194	0.0012
200	0.0192	0.0180	0.0012
201	0.0180	0.0169	0.0011
202	0.0171	0.0160	0.0010
203	0.0162	0.0153	0.0010
204	0.0155	0.0146	0.0009
205	0.0154	0.0145	0.0009
206	0.0149	0.0140	0.0009
207	0.0144	0.0135	0.0009
208	0.0140	0.0131	0.0008
209	0.0136	0.0128	0.0008
210	0.0132	0.0124	0.0008
211	0.0129	0.0121	0.0008
212	0.0126	0.0118	0.0008
213	0.0123	0.0115	0.0007
214	0.0120	0.0113	0.0007
215	0.0117	0.0110	0.0007
216	0.0115	0.0108	0.0007
217	0.0098	0.0092	0.0006
218	0.0096	0.0090	0.0006
219	0.0094	0.0088	0.0006
220	0.0092	0.0086	0.0006
221	0.0090	0.0085	0.0005
222	0.0088	0.0083	0.0005
223	0.0087	0.0082	0.0005
224	0.0085	0.0080	0.0005
225	0.0084	0.0079	0.0005
226	0.0083	0.0078	0.0005
227	0.0081	0.0076	0.0005

228	0.0080	0.0075	0.0005
229	0.0079	0.0074	0.0005
230	0.0078	0.0073	0.0005
231	0.0077	0.0072	0.0005
232	0.0076	0.0071	0.0005
233	0.0075	0.0070	0.0004
234	0.0074	0.0069	0.0004
235	0.0073	0.0068	0.0004
236	0.0072	0.0068	0.0004
237	0.0071	0.0067	0.0004
238	0.0070	0.0066	0.0004
239	0.0069	0.0065	0.0004
240	0.0069	0.0064	0.0004
241	0.0068	0.0064	0.0004
242	0.0067	0.0063	0.0004
243	0.0066	0.0062	0.0004
244	0.0066	0.0062	0.0004
245	0.0065	0.0061	0.0004
246	0.0064	0.0060	0.0004
247	0.0064	0.0060	0.0004
248	0.0063	0.0059	0.0004
249	0.0062	0.0059	0.0004
250	0.0062	0.0058	0.0004
251	0.0061	0.0058	0.0004
252	0.0061	0.0057	0.0004
253	0.0060	0.0057	0.0004
254	0.0060	0.0056	0.0004
255	0.0059	0.0056	0.0004
256	0.0059	0.0055	0.0004
257	0.0058	0.0055	0.0003
258	0.0058	0.0054	0.0003
259	0.0057	0.0054	0.0003
260	0.0057	0.0053	0.0003
261	0.0056	0.0053	0.0003
262	0.0056	0.0053	0.0003
263	0.0056	0.0052	0.0003
264	0.0055	0.0052	0.0003
265	0.0055	0.0051	0.0003
266	0.0054	0.0051	0.0003
267	0.0054	0.0051	0.0003
268	0.0054	0.0050	0.0003
269	0.0053	0.0050	0.0003
270	0.0053	0.0050	0.0003
271	0.0052	0.0049	0.0003
272	0.0052	0.0049	0.0003
273	0.0052	0.0049	0.0003
274	0.0051	0.0048	0.0003
275	0.0051	0.0048	0.0003
276	0.0051	0.0048	0.0003
277	0.0050	0.0047	0.0003
278	0.0050	0.0047	0.0003
279	0.0050	0.0047	0.0003
280	0.0050	0.0047	0.0003
281	0.0049	0.0046	0.0003
282	0.0049	0.0046	0.0003
283	0.0049	0.0046	0.0003
284	0.0048	0.0045	0.0003
285	0.0048	0.0045	0.0003

286	0.0048	0.0045	0.0003
287	0.0048	0.0045	0.0003
288	0.0047	0.0044	0.0003

TOTAL STORM RAINFALL(INCHES) = 2.88
TOTAL SOIL-LOSS(INCHES) = 2.61
TOTAL EFFECTIVE RAINFALL(INCHES) = 0.27

TOTAL SOIL-LOSS VOLUME(ACRE-FEET) = 23.7516
TOTAL STORM RUNOFF VOLUME(ACRE-FEET) = 2.5031

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2 4 - H O U R S T O R M
R U N O F F H Y D R O G R A P H

HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
(Note: Time indicated is at END of Each Unit Intervals)

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	12.5	25.0	37.5	50.0
0.083	0.0001	0.01	Q	.	.	.	.
0.167	0.0005	0.07	Q	.	.	.	.
0.250	0.0017	0.17	Q	.	.	.	.
0.333	0.0036	0.27	Q	.	.	.	.
0.417	0.0059	0.33	Q	.	.	.	.
0.500	0.0083	0.36	Q	.	.	.	.
0.583	0.0109	0.37	Q	.	.	.	.
0.667	0.0135	0.37	Q	.	.	.	.
0.750	0.0161	0.38	Q	.	.	.	.
0.833	0.0187	0.38	Q	.	.	.	.
0.917	0.0213	0.38	Q	.	.	.	.
1.000	0.0239	0.38	Q	.	.	.	.
1.083	0.0266	0.38	Q	.	.	.	.
1.167	0.0292	0.38	Q	.	.	.	.
1.250	0.0319	0.39	Q	.	.	.	.
1.333	0.0345	0.39	Q	.	.	.	.
1.417	0.0372	0.39	Q	.	.	.	.
1.500	0.0399	0.39	Q	.	.	.	.
1.583	0.0426	0.39	Q	.	.	.	.
1.667	0.0453	0.39	Q	.	.	.	.
1.750	0.0480	0.39	Q	.	.	.	.
1.833	0.0507	0.39	Q	.	.	.	.
1.917	0.0534	0.40	Q	.	.	.	.
2.000	0.0562	0.40	Q	.	.	.	.
2.083	0.0589	0.40	Q	.	.	.	.
2.167	0.0616	0.40	Q	.	.	.	.
2.250	0.0644	0.40	QV	.	.	.	.
2.333	0.0672	0.40	QV	.	.	.	.
2.417	0.0699	0.40	QV	.	.	.	.
2.500	0.0727	0.40	QV	.	.	.	.
2.583	0.0755	0.41	QV	.	.	.	.
2.667	0.0783	0.41	QV	.	.	.	.
2.750	0.0811	0.41	QV	.	.	.	.
2.833	0.0839	0.41	QV	.	.	.	.
2.917	0.0868	0.41	QV	.	.	.	.
3.000	0.0896	0.41	QV	.	.	.	.
3.083	0.0924	0.41	QV	.	.	.	.
3.167	0.0953	0.41	QV	.	.	.	.
3.250	0.0982	0.42	QV	.	.	.	.
3.333	0.1010	0.42	QV	.	.	.	.
3.417	0.1039	0.42	QV	.	.	.	.
3.500	0.1068	0.42	QV	.	.	.	.
3.583	0.1097	0.42	QV	.	.	.	.
3.667	0.1126	0.42	QV	.	.	.	.
3.750	0.1156	0.42	QV	.	.	.	.
3.833	0.1185	0.43	QV	.	.	.	.
3.917	0.1215	0.43	QV	.	.	.	.

4.000	0.1244	0.43	QV	.	.	.	.
4.083	0.1274	0.43	Q V	.	.	.	.
4.167	0.1304	0.43	Q V	.	.	.	.
4.250	0.1333	0.43	Q V	.	.	.	.
4.333	0.1363	0.44	Q V	.	.	.	.
4.417	0.1394	0.44	Q V	.	.	.	.
4.500	0.1424	0.44	Q V	.	.	.	.
4.583	0.1454	0.44	Q V	.	.	.	.
4.667	0.1485	0.44	Q V	.	.	.	.
4.750	0.1515	0.44	Q V	.	.	.	.
4.833	0.1546	0.45	Q V	.	.	.	.
4.917	0.1577	0.45	Q V	.	.	.	.
5.000	0.1608	0.45	Q V	.	.	.	.
5.083	0.1639	0.45	Q V	.	.	.	.
5.167	0.1670	0.45	Q V	.	.	.	.
5.250	0.1701	0.45	Q V	.	.	.	.
5.333	0.1732	0.46	Q V	.	.	.	.
5.417	0.1764	0.46	Q V	.	.	.	.
5.500	0.1796	0.46	Q V	.	.	.	.
5.583	0.1827	0.46	Q V	.	.	.	.
5.667	0.1859	0.46	Q V	.	.	.	.
5.750	0.1891	0.47	Q V	.	.	.	.
5.833	0.1924	0.47	Q V	.	.	.	.
5.917	0.1956	0.47	Q V	.	.	.	.
6.000	0.1988	0.47	Q V	.	.	.	.
6.083	0.2021	0.47	Q V	.	.	.	.
6.167	0.2054	0.48	Q V	.	.	.	.
6.250	0.2087	0.48	Q V	.	.	.	.
6.333	0.2120	0.48	Q V	.	.	.	.
6.417	0.2153	0.48	Q V	.	.	.	.
6.500	0.2186	0.48	Q V	.	.	.	.
6.583	0.2220	0.49	Q V	.	.	.	.
6.667	0.2254	0.49	Q V	.	.	.	.
6.750	0.2287	0.49	Q V	.	.	.	.
6.833	0.2321	0.49	Q V	.	.	.	.
6.917	0.2355	0.50	Q V	.	.	.	.
7.000	0.2390	0.50	Q V	.	.	.	.
7.083	0.2424	0.50	Q V	.	.	.	.
7.167	0.2459	0.50	Q V	.	.	.	.
7.250	0.2494	0.51	Q V	.	.	.	.
7.333	0.2528	0.51	Q V	.	.	.	.
7.417	0.2564	0.51	Q V	.	.	.	.
7.500	0.2599	0.51	Q V	.	.	.	.
7.583	0.2634	0.52	Q V	.	.	.	.
7.667	0.2670	0.52	Q V	.	.	.	.
7.750	0.2706	0.52	Q V	.	.	.	.
7.833	0.2742	0.52	Q V	.	.	.	.
7.917	0.2778	0.53	Q V	.	.	.	.
8.000	0.2815	0.53	Q V	.	.	.	.
8.083	0.2851	0.53	Q V	.	.	.	.
8.167	0.2888	0.53	Q V	.	.	.	.
8.250	0.2925	0.54	Q V	.	.	.	.
8.333	0.2962	0.54	Q V	.	.	.	.
8.417	0.3000	0.54	Q V	.	.	.	.
8.500	0.3037	0.55	Q V	.	.	.	.
8.583	0.3075	0.55	Q V	.	.	.	.
8.667	0.3113	0.55	Q V	.	.	.	.
8.750	0.3151	0.56	Q V	.	.	.	.

8.833	0.3190	0.56	Q	V	.	.	.	.
8.917	0.3229	0.56	Q	V	.	.	.	.
9.000	0.3268	0.57	Q	V	.	.	.	.
9.083	0.3307	0.57	Q	V	.	.	.	.
9.167	0.3346	0.57	Q	V	.	.	.	.
9.250	0.3386	0.58	Q	V	.	.	.	.
9.333	0.3426	0.58	Q	V	.	.	.	.
9.417	0.3466	0.58	Q	V	.	.	.	.
9.500	0.3507	0.59	Q	V	.	.	.	.
9.583	0.3547	0.59	Q	V	.	.	.	.
9.667	0.3588	0.60	Q	V	.	.	.	.
9.750	0.3630	0.60	Q	V	.	.	.	.
9.833	0.3671	0.60	Q	V	.	.	.	.
9.917	0.3713	0.61	Q	V	.	.	.	.
10.000	0.3755	0.61	Q	V	.	.	.	.
10.083	0.3798	0.62	Q	V	.	.	.	.
10.167	0.3840	0.62	Q	V	.	.	.	.
10.250	0.3883	0.63	Q	V	.	.	.	.
10.333	0.3927	0.63	Q	V	.	.	.	.
10.417	0.3970	0.63	Q	V	.	.	.	.
10.500	0.4014	0.64	Q	V	.	.	.	.
10.583	0.4059	0.64	Q	V	.	.	.	.
10.667	0.4103	0.65	Q	V	.	.	.	.
10.750	0.4148	0.65	Q	V	.	.	.	.
10.833	0.4194	0.66	Q	V	.	.	.	.
10.917	0.4240	0.66	Q	V	.	.	.	.
11.000	0.4286	0.67	Q	V	.	.	.	.
11.083	0.4332	0.68	Q	V	.	.	.	.
11.167	0.4379	0.68	Q	V	.	.	.	.
11.250	0.4427	0.69	Q	V	.	.	.	.
11.333	0.4475	0.69	Q	V	.	.	.	.
11.417	0.4523	0.70	Q	V	.	.	.	.
11.500	0.4571	0.71	Q	V	.	.	.	.
11.583	0.4621	0.71	Q	V	.	.	.	.
11.667	0.4670	0.72	Q	V	.	.	.	.
11.750	0.4720	0.73	Q	V	.	.	.	.
11.833	0.4771	0.73	Q	V	.	.	.	.
11.917	0.4822	0.74	Q	V	.	.	.	.
12.000	0.4873	0.75	Q	V	.	.	.	.
12.083	0.4926	0.76	Q	V	.	.	.	.
12.167	0.4980	0.79	Q	V	.	.	.	.
12.250	0.5037	0.83	Q	V	.	.	.	.
12.333	0.5097	0.87	Q	V	.	.	.	.
12.417	0.5159	0.90	Q	V	.	.	.	.
12.500	0.5222	0.92	Q	V	.	.	.	.
12.583	0.5285	0.93	Q	V	.	.	.	.
12.667	0.5350	0.94	Q	V	.	.	.	.
12.750	0.5415	0.95	Q	V	.	.	.	.
12.833	0.5482	0.96	Q	V	.	.	.	.
12.917	0.5548	0.97	Q	V	.	.	.	.
13.000	0.5616	0.98	Q	V	.	.	.	.
13.083	0.5684	0.99	Q	V	.	.	.	.
13.167	0.5754	1.01	Q	V	.	.	.	.
13.250	0.5824	1.02	Q	V	.	.	.	.
13.333	0.5895	1.03	Q	V	.	.	.	.
13.417	0.5967	1.04	Q	V	.	.	.	.
13.500	0.6040	1.06	Q	V	.	.	.	.
13.583	0.6113	1.07	Q	V	.	.	.	.

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13.667      0.6188       1.09  Q        V.         .         .         .
13.750      0.6264       1.10  Q         V         .         .         .
13.833      0.6342       1.12  Q         V         .         .         .
13.917      0.6420       1.14  Q         V         .         .         .
14.000      0.6500       1.16  Q         V         .         .         .
14.083      0.6581       1.18  Q         V         .         .         .
14.167      0.6663       1.19  Q         V         .         .         .
14.250      0.6746       1.20  Q         V         .         .         .
14.333      0.6829       1.21  Q         V         .         .         .
14.417      0.6914       1.23  Q         .V        .         .         .
14.500      0.7001       1.26  .Q        .V        .         .         .
14.583      0.7089       1.28  .Q        .V        .         .         .
14.667      0.7180       1.31  .Q        .V        .         .         .
14.750      0.7272       1.35  .Q        .V        .         .         .
14.833      0.7368       1.38  .Q        .V        .         .         .
14.917      0.7466       1.42  .Q        .V        .         .         .
15.000      0.7566       1.47  .Q        . V       .         .         .
15.083      0.7671       1.51  .Q        . V       .         .         .
15.167      0.7778       1.57  .Q        . V       .         .         .
15.250      0.7890       1.62  .Q        . V       .         .         .
15.333      0.8007       1.69  .Q        . V       .         .         .
15.417      0.8128       1.77  .Q        . V       .         .         .
15.500      0.8256       1.86  .Q        .  V      .         .         .
15.583      0.8392       1.97  .Q        .  V      .         .         .
15.667      0.8538       2.11  .Q        .  V      .         .         .
15.750      0.8693       2.26  .Q        .  V      .         .         .
15.833      0.8862       2.44  .Q        .   V     .         .         .
15.917      0.9046       2.68  . Q       .   V     .         .         .
16.000      0.9276       3.34  . Q       .   V     .         .         .
16.083      0.9877       8.72  .     Q   .    V    .         .         .
16.167      1.1719      26.75  .         .       V .Q        .         .
16.250      1.4699      43.27  .         .         .  V      .   Q     .
16.333      1.7705      43.65  .         .         .       V .   Q     .
16.417      1.9401      24.63  .         .        Q.         .V        .
16.500      2.0226      11.97  .        Q.         .         . V       .
16.583      2.0624       5.78  .   Q     .         .         . V       .
16.667      2.0838       3.10  . Q       .         .         .  V      .
16.750      2.1016       2.59  . Q       .         .         .  V      .
16.833      2.1161       2.10  .Q        .         .         .  V      .
16.917      2.1282       1.75  .Q        .         .         .   V     .
17.000      2.1385       1.51  .Q        .         .         .   V     .
17.083      2.1479       1.36  .Q        .         .         .   V     .
17.167      2.1568       1.30  .Q        .         .         .   V     .
17.250      2.1655       1.25  .Q        .         .         .   V     .
17.333      2.1738       1.21  Q         .         .         .   V     .
17.417      2.1819       1.18  Q         .         .         .   V     .
17.500      2.1898       1.14  Q         .         .         .   V     .
17.583      2.1974       1.11  Q         .         .         .    V    .
17.667      2.2048       1.07  Q         .         .         .    V    .
17.750      2.2120       1.05  Q         .         .         .    V    .
17.833      2.2190       1.02  Q         .         .         .    V    .
17.917      2.2258       0.99  Q         .         .         .    V    .
18.000      2.2325       0.97  Q         .         .         .    V    .
18.083      2.2391       0.95  Q         .         .         .    V    .
18.167      2.2453       0.91  Q         .         .         .    V    .
18.250      2.2512       0.86  Q         .         .         .    V    .
18.333      2.2568       0.81  Q         .         .         .     V   .
18.417      2.2621       0.77  Q         .         .         .     V   .
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18.500	2.2672	0.75	Q	.	.	.	V	.
18.583	2.2722	0.73	Q	.	.	.	V	.
18.667	2.2772	0.71	Q	.	.	.	V	.
18.750	2.2820	0.70	Q	.	.	.	V	.
18.833	2.2867	0.69	Q	.	.	.	V	.
18.917	2.2914	0.68	Q	.	.	.	V	.
19.000	2.2960	0.66	Q	.	.	.	V	.
19.083	2.3005	0.65	Q	.	.	.	V	.
19.167	2.3049	0.64	Q	.	.	.	V	.
19.250	2.3093	0.63	Q	.	.	.	V	.
19.333	2.3136	0.63	Q	.	.	.	V	.
19.417	2.3178	0.62	Q	.	.	.	V	.
19.500	2.3220	0.61	Q	.	.	.	V	.
19.583	2.3261	0.60	Q	.	.	.	V	.
19.667	2.3302	0.59	Q	.	.	.	V	.
19.750	2.3342	0.58	Q	.	.	.	V	.
19.833	2.3382	0.58	Q	.	.	.	V	.
19.917	2.3421	0.57	Q	.	.	.	V	.
20.000	2.3460	0.56	Q	.	.	.	V	.
20.083	2.3498	0.56	Q	.	.	.	V	.
20.167	2.3536	0.55	Q	.	.	.	V	.
20.250	2.3573	0.54	Q	.	.	.	V	.
20.333	2.3610	0.54	Q	.	.	.	V	.
20.417	2.3647	0.53	Q	.	.	.	V	.
20.500	2.3683	0.53	Q	.	.	.	V	.
20.583	2.3719	0.52	Q	.	.	.	V	.
20.667	2.3755	0.52	Q	.	.	.	V	.
20.750	2.3790	0.51	Q	.	.	.	V	.
20.833	2.3824	0.50	Q	.	.	.	V	.
20.917	2.3859	0.50	Q	.	.	.	V	.
21.000	2.3893	0.50	Q	.	.	.	V	.
21.083	2.3927	0.49	Q	.	.	.	V	.
21.167	2.3960	0.49	Q	.	.	.	V	.
21.250	2.3993	0.48	Q	.	.	.	V	.
21.333	2.4026	0.48	Q	.	.	.	V	.
21.417	2.4059	0.47	Q	.	.	.	V	.
21.500	2.4091	0.47	Q	.	.	.	V	.
21.583	2.4123	0.47	Q	.	.	.	V	.
21.667	2.4155	0.46	Q	.	.	.	V	.
21.750	2.4187	0.46	Q	.	.	.	V	.
21.833	2.4218	0.45	Q	.	.	.	V	.
21.917	2.4249	0.45	Q	.	.	.	V	.
22.000	2.4280	0.45	Q	.	.	.	V	.
22.083	2.4310	0.44	Q	.	.	.	V	.
22.167	2.4341	0.44	Q	.	.	.	V	.
22.250	2.4371	0.44	Q	.	.	.	V	.
22.333	2.4401	0.43	Q	.	.	.	V	.
22.417	2.4430	0.43	Q	.	.	.	V	.
22.500	2.4460	0.43	Q	.	.	.	V	.
22.583	2.4489	0.42	Q	.	.	.	V	.
22.667	2.4518	0.42	Q	.	.	.	V	.
22.750	2.4547	0.42	Q	.	.	.	V	.
22.833	2.4576	0.42	Q	.	.	.	V	.
22.917	2.4604	0.41	Q	.	.	.	V	.
23.000	2.4632	0.41	Q	.	.	.	V	.
23.083	2.4660	0.41	Q	.	.	.	V	.
23.167	2.4688	0.41	Q	.	.	.	V	.
23.250	2.4716	0.40	Q	.	.	.	V	.

23.333	2.4744	0.40	Q	.	.	.	V.
23.417	2.4771	0.40	Q	.	.	.	V.
23.500	2.4798	0.40	Q	.	.	.	V.
23.583	2.4825	0.39	Q	.	.	.	V.
23.667	2.4852	0.39	Q	.	.	.	V.
23.750	2.4879	0.39	Q	.	.	.	V.
23.833	2.4905	0.39	Q	.	.	.	V.
23.917	2.4932	0.38	Q	.	.	.	V.
24.000	2.4958	0.38	Q	.	.	.	V.
24.083	2.4984	0.37	Q	.	.	.	V.
24.167	2.5005	0.31	Q	.	.	.	V.
24.250	2.5019	0.21	Q	.	.	.	V.
24.333	2.5026	0.10	Q	.	.	.	V.
24.417	2.5029	0.04	Q	.	.	.	V.
24.500	2.5030	0.02	Q	.	.	.	V.
24.583	2.5031	0.01	Q	.	.	.	V.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1475.0
10%	35.0
20%	25.0
30%	20.0
40%	20.0
50%	20.0
60%	15.0
70%	10.0
80%	10.0
90%	10.0

END OF FLOODSCx ROUTING ANALYSIS