MERRIAM MOUNTAINS SPECIFIC PLAN

APPENDIX P – PART 1

HYDROLOGY/HYDRAULIC REPORT

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for the

DRAFT ENVIRONMENTAL IMPACT REPORT

August 2007

MERRIAM MOUNTAINS SPECIFIC PLAN

HYDROLOGY/HYDRAULIC REPORT

March 2007

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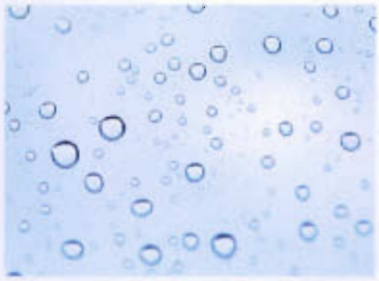

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Prepared For: Stonegate Merriam LLC

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ENGINEERING

PRELIMINARY DRAINAGE STUDY FOR

MERRIAM MOUNTAINS

TM 5381
MARCH 2007

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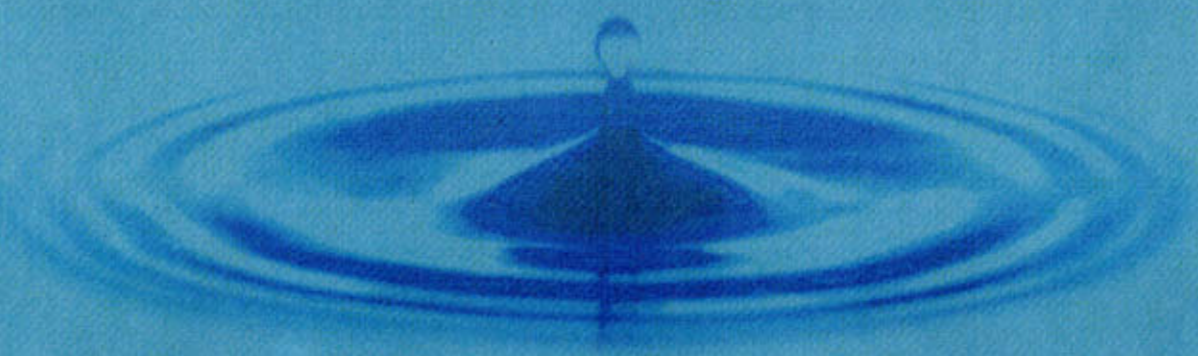

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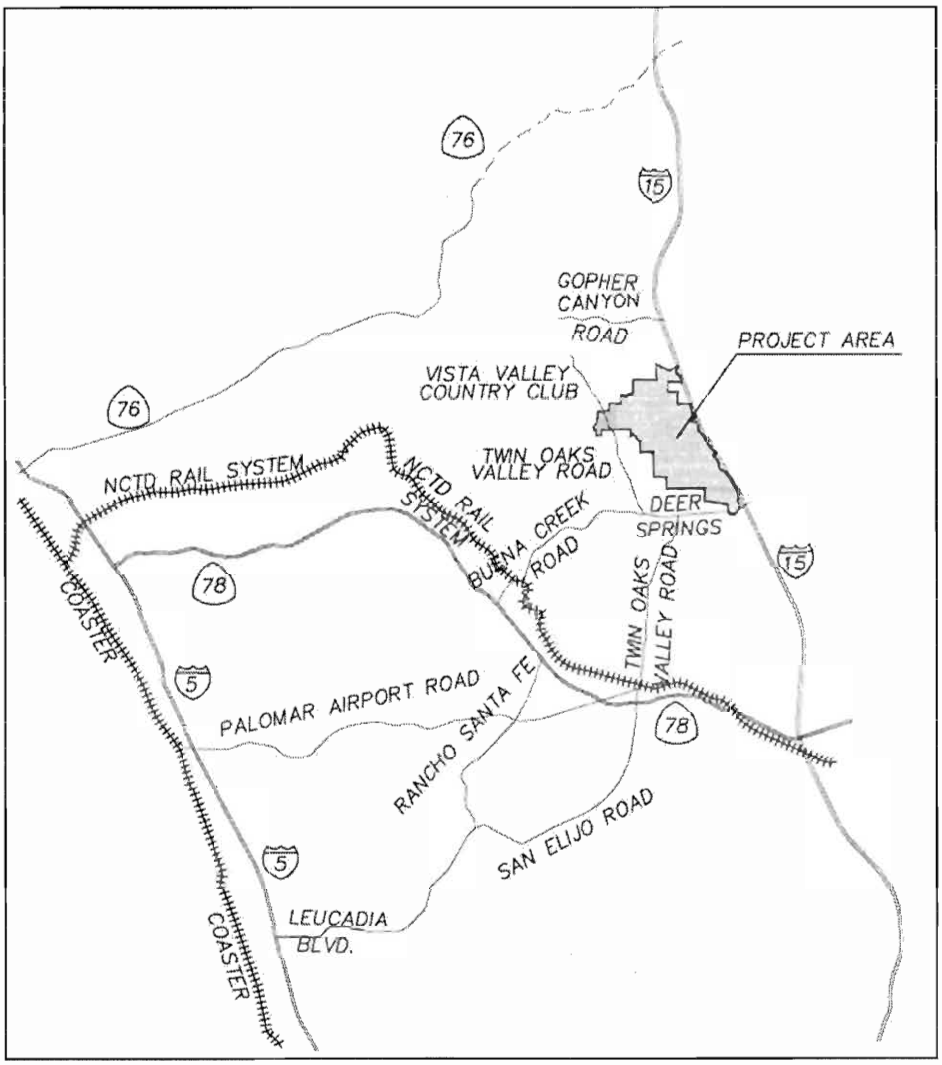
1. PROJECT DESCRIPTION

The proposed project is for The Merriam Mountains in the county of San Diego, California. The project site is located near the intersection of Highway I-15 and Highway 78. It is bordered on the north near Gopher Canyon Road, to the west near Twin Oaks Valley Road, to the south near Deer Springs Road and to the east by Highway I-15. Refer to Figure 1: Vicinity Map for project location.

The proposed development will include multiple neighborhoods, access roads, circulation roads, parking areas, utilities for a master planned community, and a significant amount of natural open space.

FIGURE 1. VICINITY MAP



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1.1 SIGNIFICANCE THRESHOLDS

A significant impact to Hydrology/Water Quality would occur if the Merriam Mountains project would result in:

1. Violations of any water quality standards or waste discharge requirements or conflict(s) with the goals and requirements of applicable federal, state and local regulations including the Clean Water Act, Porter-Cologne Water Quality Act, County of San Diego Revised Grading Ordinance, County of San Diego Watershed Protection, Stormwater Management and Discharge Control Ordinance;

2. Substantial alteration of the existing drainage pattern of the site or vicinity in a manner that would result in substantial erosion or siltation onsite or offsite or would substantially increase the rate or manner of surface runoff resulting in flooding onsite or offsite;

3. Generation of runoff water that would exceed the capacity of the existing or planned stormwater drainage systems or result in substantial additional sources of polluted runoff;

4. An impact to a floodway or mapped 100-year floodplain;

5. The degradation of the water quality of any water course or water body, as listed on the Clean Water Act Section 303(d) list and the project will contribute additional pollutants for which the receiving water body is already impaired;

6. An exceedance of applicable Federal or State Drinking Water Standards, for Maximum Contaminant Levels in waters designated in the Basin Plan with an "MUN" beneficial use.

None of the above thresholds will be met during or following development of the Merriam Mountains project.

2. EXISTING DRAINAGE BASINS

The project site consists of natural hills and valleys totaling 2327 acres. From a drainage perspective, the site straddles the divide between three major watersheds. These are the South Fork Moosa Canyon, San Marcos Creek and South Fork Gopher Canyon watersheds. These three major watersheds total 3150 acres of land, including areas outside the project boundary. This drainage study will address the area of the total watershed. Refer to Figure 2 for locations and areas of the existing major watersheds. Existing storm drain systems and design flows for Highway I-15, Deer Springs Road, and Twin Oaks Valley Road were obtained from as-built drawings, from maps at Caltrans and the County. Impacts on existing watercourses and existing structures are discussed in depth in Section 3.2 of this report.

2.1 SOUTH FORK MOOSA CANYON,

The South Fork Moosa Canyon watershed is designated Basin A, and drains to the East toward Highway I-15. This watershed consists of 1081 acres within the project boundary and a total of 1266 acres for the entire South Fork Moosa Canyon. Under existing conditions, flow is conveyed to the east through natural valleys and channels to Highway I-15. Project subbasins discharge under Highway I-15 through multiple culverts and storm drain systems. Under existing conditions, Basin A conveys a calculated maximum runoff rate (Q) of 980 cfs toward the east.

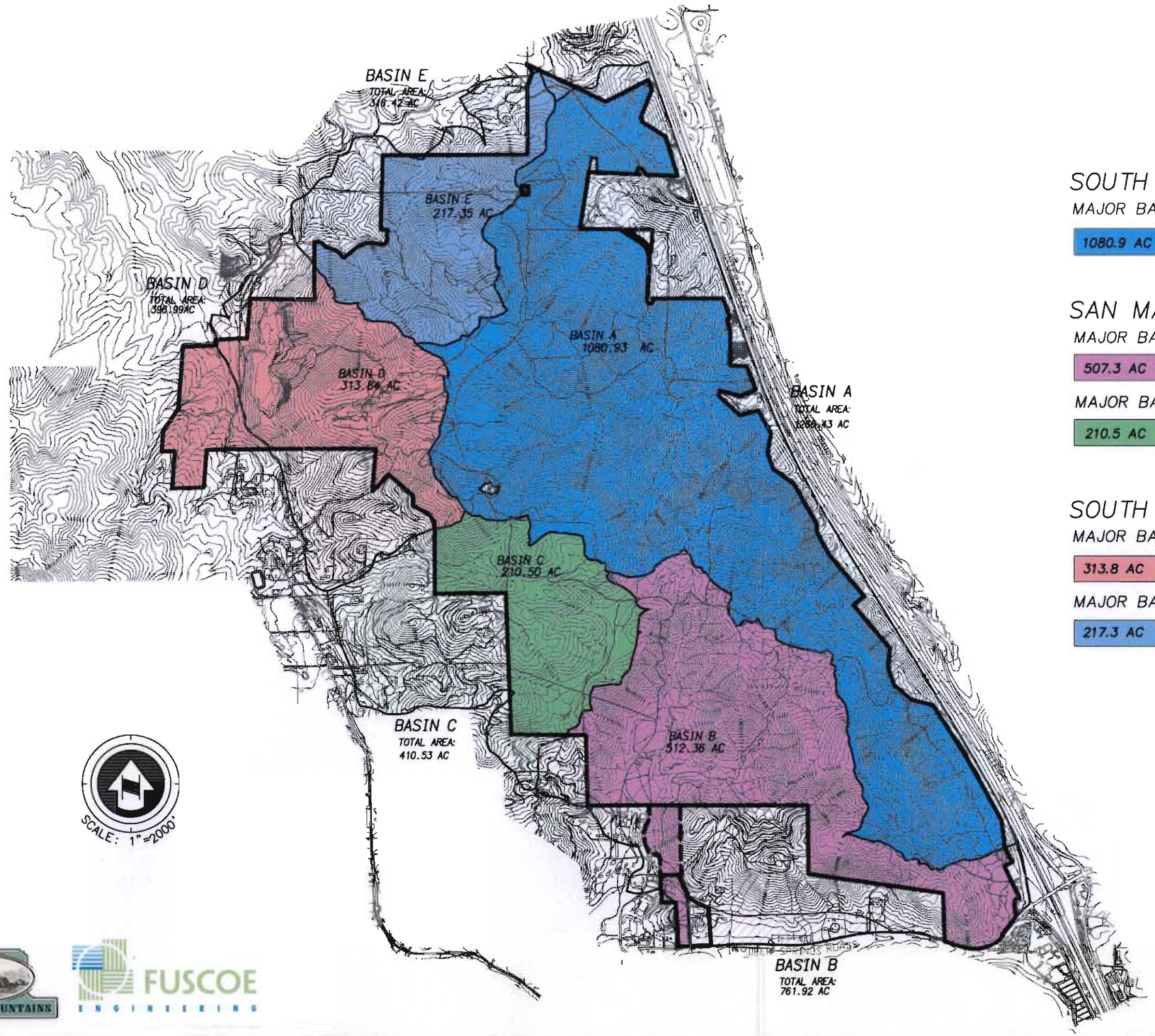
2.2 SAN MARCOS CREEK

The portion of the analysis area draining to San Marcos Creek is divided into two project basins, Basin B and Basin C. Runoff from Basins B and C flows south to Deer Springs Road, where it is conveyed under the roadway through multiple culverts and channels. This watershed consists of 718 acres within the project boundary and total of 1172 acres for the San Marcos Creek watershed. The maximum runoff rate (Q) for existing conditions is 1532 cfs draining to the southwest into San Marcos Creek.

2.3 SOUTH FORK GOPHER CANYON

The portion of the analysis area draining to South Fork Gopher Canyon is also divided into two basins, Basin D and Basin E. Runoff from Basins D and E flows northwest toward Twin Oaks Valley Road. This watershed consists of 531 acres within the project boundary and a total of 713 acres within the area of analysis. The maximum runoff rate (Q) for existing conditions for this area is 1188 cfs.

FIGURE 2
MERRIAM MOUNTAINS
EXISTING MAJOR WATERSHEDS



SOUTH FORK MOOSA CANYON

MAJOR BASIN A

1080.9 AC Project Area — 1266.43 AC Hydraulic Analysis Area

SAN MARCOS CREEK

MAJOR BASIN B

507.3 AC Project Area — 761.92 AC Hydraulic Analysis Area

MAJOR BASIN C

210.5 AC Project Area — 410.53 AC Hydraulic Analysis Area

SOUTH FORK GOPHER CANYON

MAJOR BASIN D

313.8 AC Project Area — 396.99 AC Hydraulic Analysis Area

MAJOR BASIN E

217.3 AC Project Area — 316.42 AC Hydraulic Analysis Area

MERRIAM MOUNTAINS

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M:\PROJECTS\2469\01A\EXHIBITS\HYDROLOGY EXHIBITS\REPORT - 2006 JUNE\FIG 2 - EXISTING MAJOR BASINS EXHIBIT.DWG (03-21-07 9:30:52AM) Plotted by cpatel

3. PROPOSED DRAINAGE BASINS

The drainage system for The Merriam Mountains development has been designed for a storm drain system that will safely convey the 100-year storm event. It will include storm drain pipe, swales, curb and gutter, and detention basins to control runoff. Calculations for the design were made using methodology presented in the County of San Diego Hydrology Manual.

With the development along the divide of the existing watersheds, the drainage area for each designated basin remains within an acre in proposed conditions. Proposed grading and storm drain systems ensure the preservation of the runoff acreage to the original basins where development extends over the ridgeline and diversions of areas occur. Changes to basin drainage area were no more than one acre of diversion in each of the major basins.

For drainage study analysis, the major watersheds are divided into 47 subbasins to quantify flows at particular points of interest. Most of these subbasins remain unchanged within the proposed project site. Where development does occur, swales, storm drain pipe and detention are utilized to maintain or decrease peak runoff rates. Table 3.0 provides a summary of basin areas and peak flows for existing and proposed conditions, including the effects of detention storage as described below.

TABLE 3.0 – Basin Areas and Peak Flows for Existing and Proposed Conditions

MAJOR WATERSHEDS	BASIN	Pre-development		Post-development (After Mitigation)	
		Area (ac)	Q (cfs)	Area (ac)	Q (cfs)
South Fork Moosa Canyon	Basin A	1,266.4	980	1,266.6	956
San Marcos Creek	Basin B	761.9	1109	761.9	1070
	Basin C	410.5	422	410.8	346
South Fork Gopher Canyon	Basin D	397.0	623	397.0	624
	Basin E	316.4	565	316.4	568

Peak flow rates were obtained using Advance Engineering Systems (AES) -2004, Rational Method Hydrologic Analysis. Results for individual subbasins (areas and peak flow rates) are provided in Section 3.1.3 of this report. AES-generated reports for Rational Method Hydrologic Analysis are included in Appendix A.

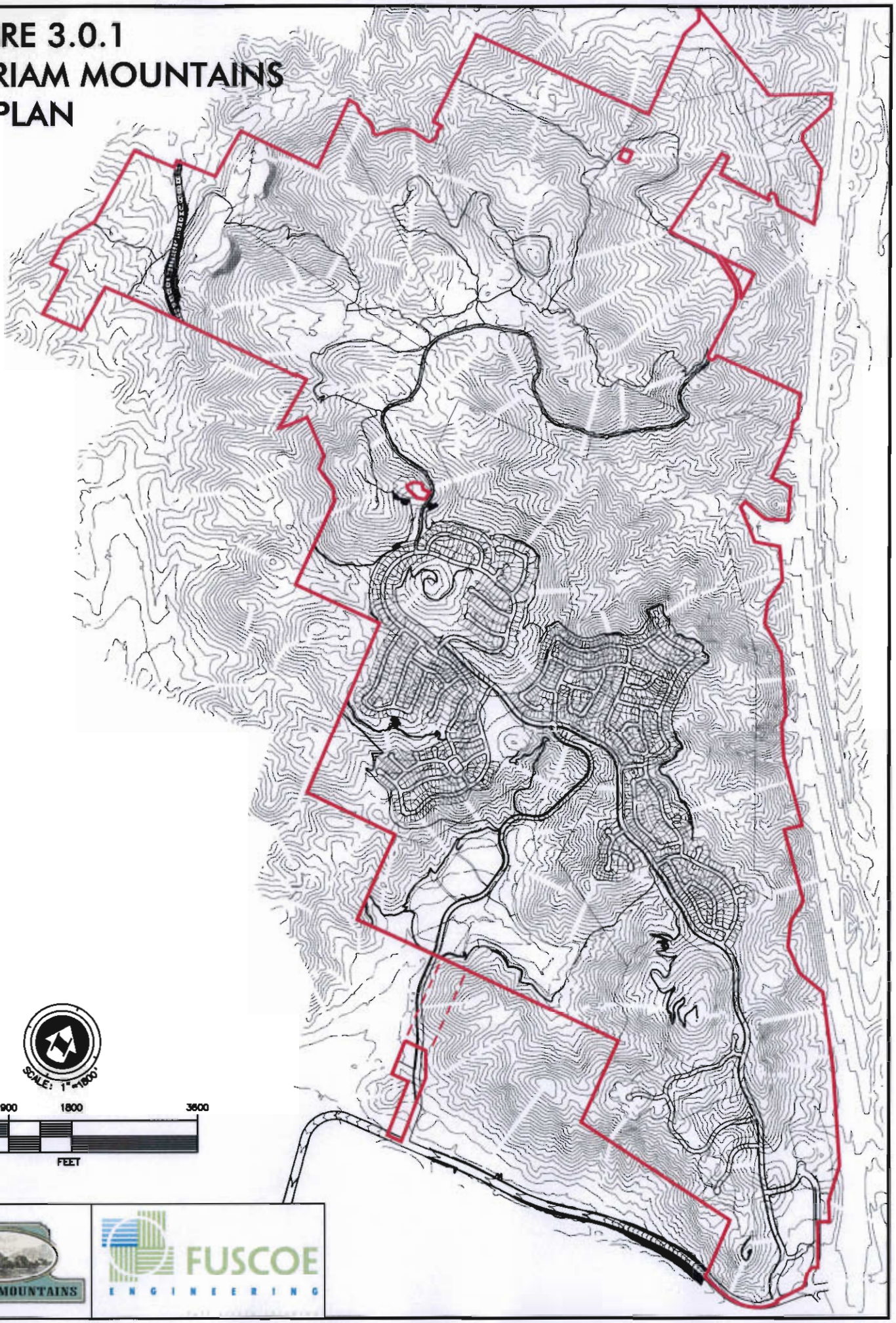
As expected, developed conditions entail an increase in storm runoff and the requirement of peak flow mitigation. In order to reduce peak flows and protect areas downstream of the Merriam Mountains development, a number of detention basins will be implemented. These will reduce peak outlet flows and provide water quality treatment. In addition, where depression storage already exists and would be

available for additional runoff, the existing storage is utilized in order to reduce peak flows from the developed areas. Details regarding storage routing analysis are presented in Section 3.1.2 of this report.

The overall site plan is displayed on Figure 3.0.1, and Figure 3.0.2 shows the extents of the proposed basins. The proposed drainage development is constructed along or near the ridgeline of the existing drainage basins to conserve the natural flow, and runoff flow rates are as close as possible to existing conditions.

Details of drainage basins, subbasins, flow-lines and hydrologic model nodes are shown in the Hydrology Maps later in this report.

FIGURE 3.0.1
MERRIAM MOUNTAINS
SITE PLAN



MERRIAM MOUNTAINS

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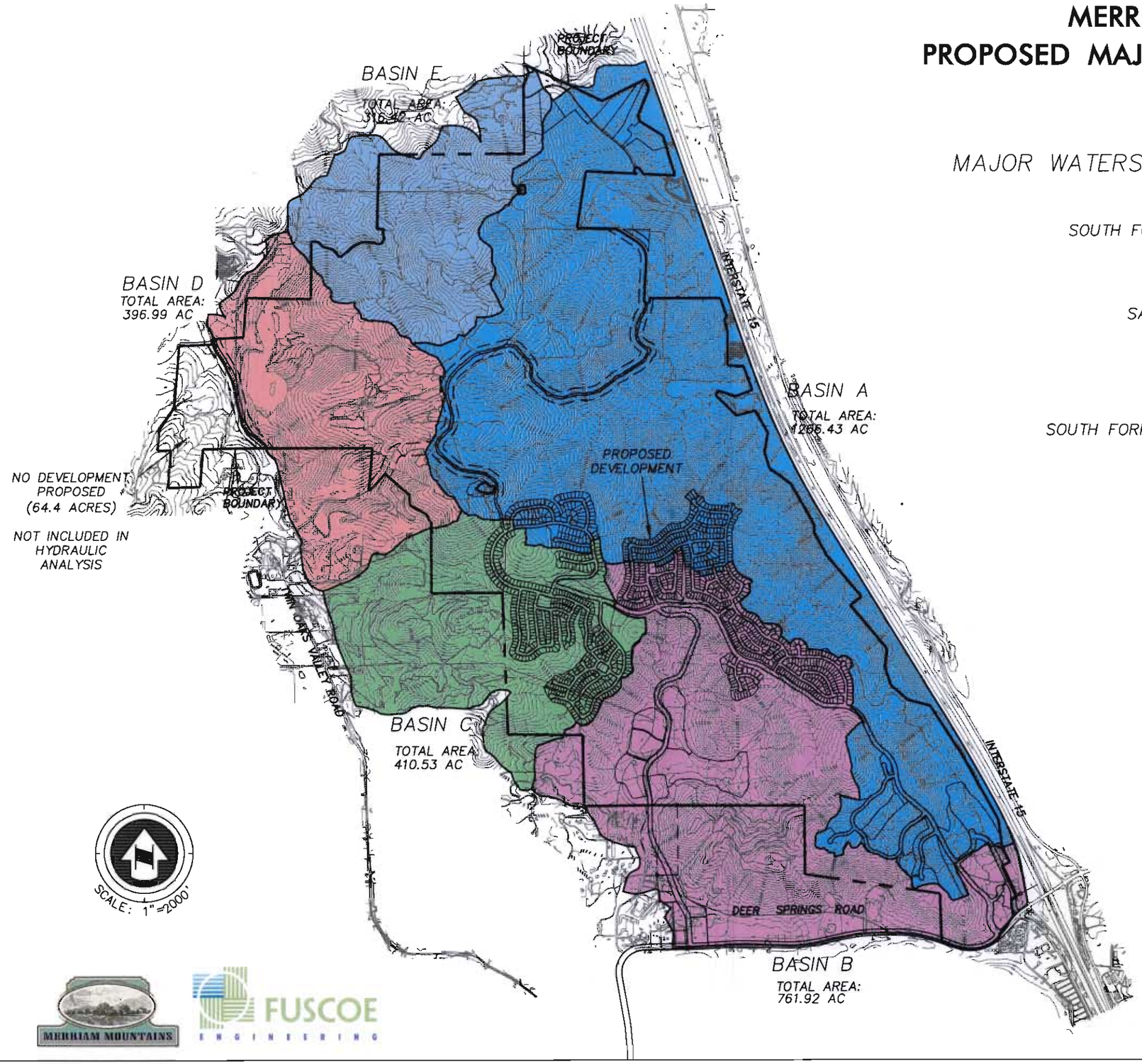
FIGURE 3.0.2
MERRIAM MOUNTAINS
PROPOSED MAJOR WATERSHEDS



MAJOR WATERSHED TRIBUTARY AREA:

SOUTH FORK MOOSA CANYON TRIBUTARY:

1266.43 AC	MAJOR BASIN A

SAN MARCOS CREEK TRIBUTARY:

761.92 AC	MAJOR BASIN B
410.53 AC	MAJOR BASIN C

SOUTH FORK GOPHER CANYON TRIBUTARY:

396.99 AC	MAJOR BASIN D
316.42 AC	MAJOR BASIN E

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M:\PROJECTS\2469\01A\EXHIBITS\HYDROLOGY EXHIBITS\REPORT - 2006 JUNE\FIG 3.0.2 - PROPOSED MAJOR BASINS EXHIBIT.DWG (03-21-07 9:29:1 Plotted by: apotel

3.1 RATIONAL METHOD ANALYSIS: PEAK RUNOFF RATES

The Advanced Engineering Systems (AES) 2004, Rational Method Hydrology software was used to model and estimate maximum runoff rates (Q) and time of concentration (Tc). This latest edition of AES 2004a uses the guidelines set forth in the San Diego County's June 2003 Hydrology Manual. The three watersheds (South Fork Moosa Canyon, San Marcos Creek and South Fork Gopher Canyon) were divided into 5 basins and a total of 47 subbasins for this hydrologic analysis. Subbasins were further divided into smaller subareas as required for modeling.

The following parameters were used for the Rational Method Hydrology, AES 2004 modeling:

- 100 Year Rainfall Event (Q_{100})
- 6-hour duration precipitation: 3.5 inches (see Figure 9: County of San Diego Rainfall Isopluvials Map).
- Flow length for each initial sub-areas is not more than 100' long

3.1.1 RUNOFF COEFFICIENT DETERMINATION

Runoff coefficients (C) for the rational method analysis were determined for each subarea based upon the Hydrologic Soil Group (HSG) of the underlying soil as well as the land use pertaining to the conditions under consideration. Hydrologic Soil Groups for each subbasin were taken from the San Diego County Soils Interpretation Study: Hydrologic Soil Groups – Runoff Potential map (Appendix E2). The amount of land area within each subarea associated with each land use and HSG was determined, and runoff coefficients were computed based upon a weighted average, with the C values indicated in Table 3.1.1 (values are more conservative than coefficients from the current San Diego County Hydrology Manual).

Table 3.1.1 – Runoff Coefficients by Land Use and HSG

Land Use	Runoff Coefficient (C) According to HSG		
	B	C	D
Residential Area	0.77	0.78	0.79
Commercial Area	0.80	0.81	0.82
Paved Roads	0.88	0.89	0.90
Natural Terrain	0.25	0.3	0.35
Offsite Natural Terrain	0.38	0.42	0.46
Offsite Residential (≤4.3 units/acre)	0.45	0.48	0.52

A discussion of AES modeling procedures is included in Section 5, Methodology and Model Development.

3.1.2 DETENTION STORAGE ROUTING ANALYSIS

At a number of locations throughout the project site, detention storage was utilized in order to mitigate increases in peak flow. In several subbasins, the existing storage volume was sufficient to provide adequate attenuation of peak flows. In other cases, it was necessary to design new detention ponds for management of runoff from the proposed development.

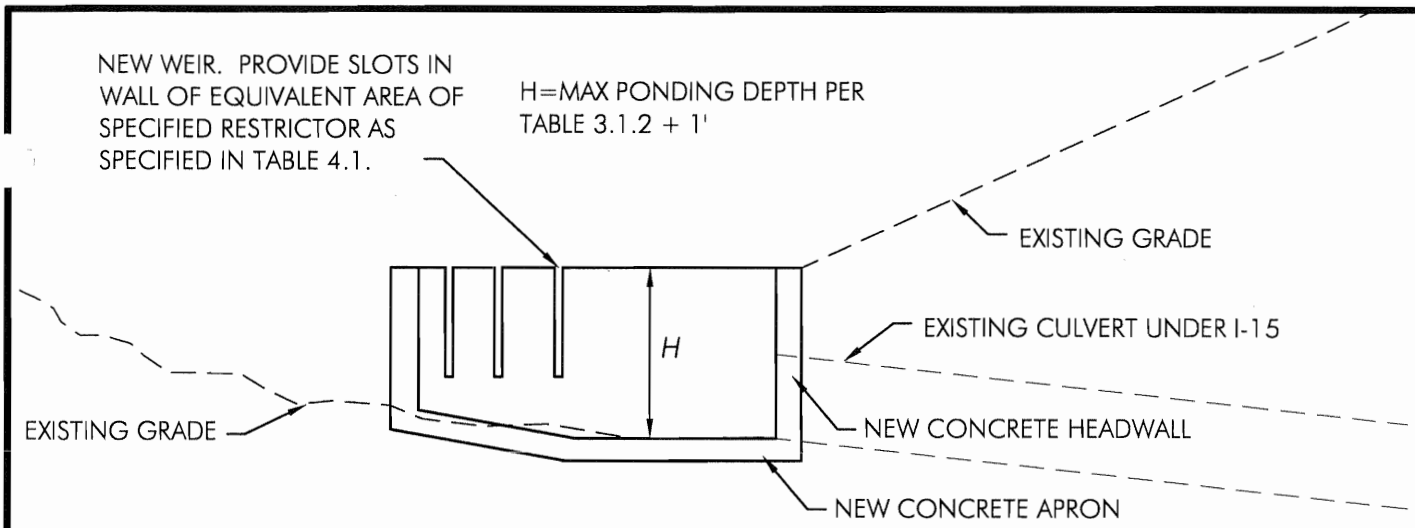
Existing Detention Storage

In Subbasins 1, 10, 13, 16, and 19, existing landscape depressions were modeled under both existing and proposed conditions, and the available storage was utilized in order to mitigate increased peak flows from these areas.

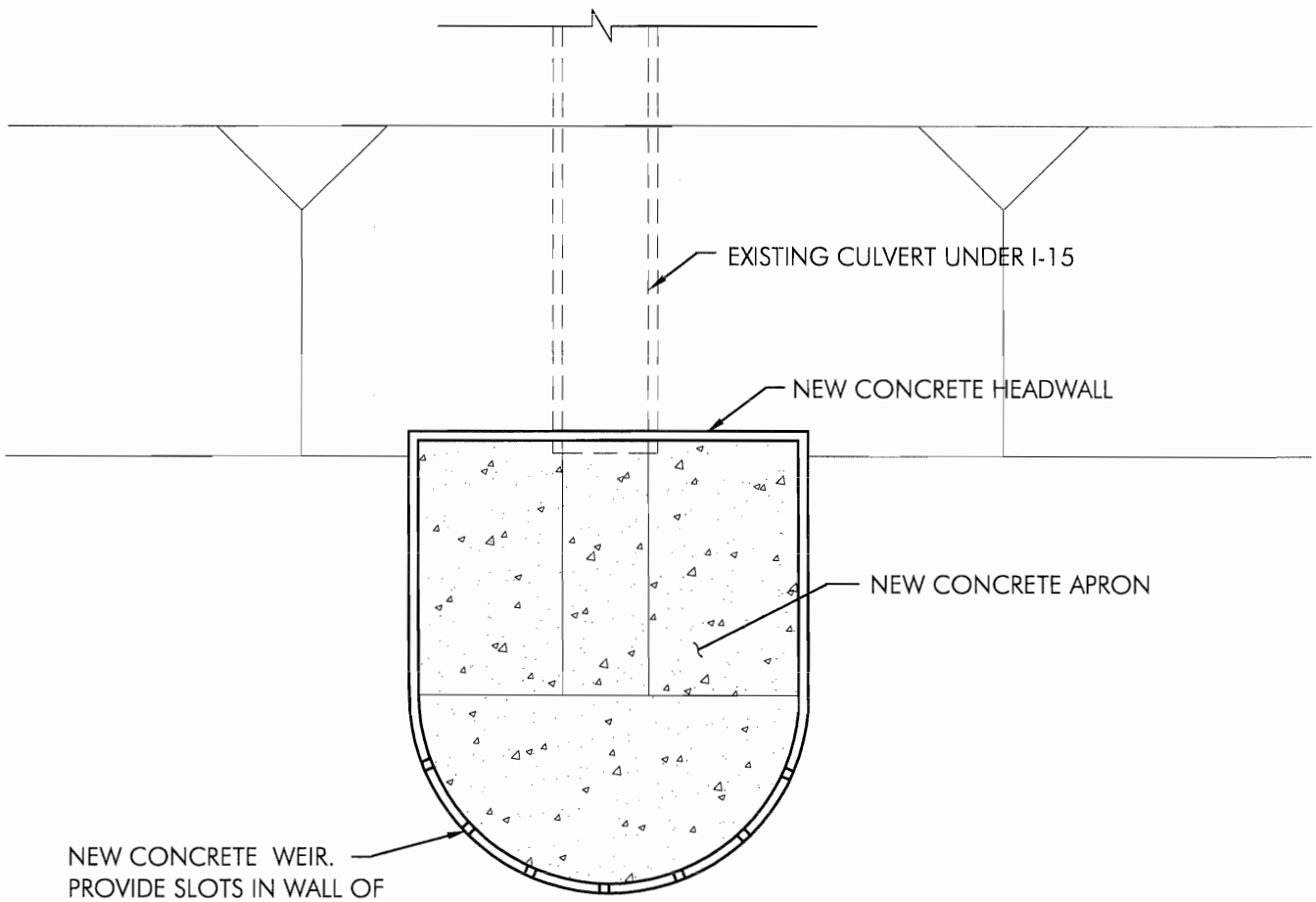
The same procedure was followed for all existing detention storage routing analyses. First, the subbasin under consideration was modeled (using the AES Rational Method Hydrology Program) assuming existing conditions, without including any detention storage routing, and the peak flow (Q) entering the ponding area was determined. Using this flow value, as well as the time of concentration, the 6-hour rainfall, the contributing drainage area, and the average runoff coefficient for the drainage area, the Rational Method hydrograph computation program, RatHydro, from Rick Engineering Company, was used to generate an inflow hydrograph to the existing depression.

The specific dimensions of the existing detention storage were determined by measuring the area of the closed elevation contours marking the depression, and the outflow values associated with particular stages were estimated using I.T.S. nomographs "Headwater Depth For C.M. Pipe Culverts With Inlet Control". With the computed inflow hydrograph and stage-storage-outflow relationship, the existing detention storage was modeled using the Storage Basin Hydrograph Routing Model within the AES Hydraulic Elements II software package. The computed peak outflow was then input into the Rational Method Hydrology simulation for further analysis or reporting. In some cases, a flow restrictor is proposed as a mitigation measure as shown in Table 4.1 to decrease the peak outflow. In those cases, a concrete apron and headwall with a flow restrictor will be constructed around the existing outlet pipe as shown in Figure 3.1.

Details of the Existing Detention Storage Analysis are included in Appendix B. Figures B1-B5 show the extents of the existing detention storage area for both existing and proposed conditions.



SIDE VIEW



PLAN VIEW

FIGURE 3.1

CONCEPTUAL CONRETE APRON/HEADWALL WITH FLOW RESTRICTOR

SCALE: 1"=NTS

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M:\PROJECTS\2469\01A\EXHIBITS\HYDROLOGY EXHIBITS\REPORT - 2007 MARCH\FIG 3.1 - CONCEPTUAL CONCRETE APRON-HEADWALL WITH RESTRICTOR----->LAYOUT: 24X36L BW

Proposed Detention Storage

In Subbasins 21, 25, 26, and 27, it was necessary to design detention storage ponds in order to mitigate increases in peak flow due to development. Analysis for proposed detention basins was similar to that of existing detention storage, except that the size of the basins was determined according to the amount of attenuation required, and not dictated by the existing landscape. The same computer programs and procedures that were used in the existing detention storage analysis were also employed in the design of proposed detention ponds. In Subbasin 25, two separate detention ponds were designed (25A and 25B). In Subbasins 21, 26, and 27, one detention pond was designed per subbasin.

Each subbasin was modeled first without including any detention storage, and peak flow rates at the planned pond inflow locations were determined. This peak flow was used along with other watershed parameters in order to generate an inflow hydrograph to each pond. With this hydrograph and a known target (existing conditions) peak flow value, the dimensions and outflow structure for the pond could be determined via storage routing analysis.

Details of the Proposed Detention Storage Analysis are included in Appendix C. Figures C1-C5 show the extents of the proposed detention storage area.

Proposed Water Quality Storage

There are proposed water quality basins at nodes 1060, 1053, 1040, 1030, 1021, 1011, 1330, and 1321. These basins are used strictly for water quality and were sized to only hold the water quality volume that the project is mandated to treat. For flood routing purposes, they were assumed to be full during the 100 year storm. This is a conservative assumption because it may result in a higher Q downstream. Refer to the Stormwater Management Plan for additional information on these basins.

Summary of Storage Routing Results

Key results from the Existing and Proposed Detention Storage Routing Analysis are included in Table 3.1.2a. Water Quality Basin Sizing is shown in Table 3.1.2b. Depth-Storage-Outflow details for each storage area are shown in Table 3.1.3.

Table 3.1.2a – Detention Storage Routing Analysis Summary

Detention Pond ID	Contributing Drainage Area (acre)	Peak Inflow (cfs)	Peak Outflow (cfs)	Volume Stored (ac*ft)	Maximum Ponding Depth (ft)
Existing Detention Ponds (Existing and Proposed Conditions)					
1 (existing)	71.87	86.94	87.64	0.51	4.87
1 (proposed)	71.87	117.36	84.06	1.05	6.91
10 (existing)	486.89	623.56	109.57	25.11	8.0
10 (proposed)	491.42	657.77	101.19	33.74	10.20
13 (existing)	130.03	151.24	72.77	3.55	6.60
13 (proposed)	108.67	194.50	69.76	3.87	6.93
16 (existing)	29.59	41.40	44.68	0.04	3.13
16 (proposed)	27.75	45.60	43.87	0.08	3.91
19 (existing)	81.22	92.46	91.89	1.29	3.68
19 (proposed)	122.82*	427.64	82.26	10.37	13.06
Proposed Detention Ponds (Proposed Conditions Only)					
21	37.8	155.23	44.37	2.64	4.99
25A	100.57	235.22	69.07	5.51	13.20
25B	445.88	780.20	543.53	19.26	7.42
26	146.36	505.33	137.90	11.93	7.05
27	22.76	88.28	13.01	0.744	3.0

* Includes 30.33 acres diverted from Subbasin 20

Table 3.1.2b – Proposed Water Quality Basin Sizing

Basin ID	Drawdown Time	WQ Volume (acre-f)[1]	Basin Volume Provided (acre-f)	Average Outflow Q (cfs)
WQ 1060	48 hours	0.6	0.6	0.15
WQ 1053	48 hours	0.2	0.2	0.05
WQ 1040	48 hours	1.6	1.6	0.40
WQ 1030	48 hours	0.9	0.9	0.23
WQ 1021	48 hours	0.4	0.4	0.10
WQ 1011	48 hours	0.4	0.4	0.10
WQ 1330	48 hours	0.5	0.5	0.13
WQ 1321	48 hours	0.7	0.7	0.18

[1]WQ Volume based on runoff produced by the 24-hour 85% percentile storm event.

Table 3.1.3 – Detention Basin Depth-Storage-Outflow Tables

Storage 1 (Existing Conditions)			Storage 1 (Proposed Conditions)			Storage 10 (Existing Conditions)			Storage 10 (Proposed Conditions)		
Depth (ft)	Storage (ac-ft)	Q (cfs)	Depth (ft)	Storage (ac-ft)	Q (cfs)	Depth (ft)	Storage (ac-ft)	Q (cfs)	Depth (ft)	Storage (ac-ft)	Q (cfs)
0	0.00	0	0	0.00	0.0	0	0.00	0.0	0	0.00	0.0
2	0.21	26.0	2	0.21	22.0	5	13.60	79.0	5	13.60	60.0
3	0.32	50.0	3	0.32	43.0	10	32.80	130.0	10	32.80	100.0
4	0.42	72.0	4	0.42	57.0	15	56.50	170.0	15	56.50	130.0
5	0.53	90.0	5	0.53	68.0						
10	1.90	140.0	10	1.90	110.0						

Storage 13 (Ex. Cond.)			Storage 13 (Proposed Conditions)			Storage 16 (Existing Conditions)			Storage 16 (Proposed Conditions)		
Depth (ft)	Storage (ac-ft)	Q (cfs)	Depth (ft)	Storage (ac-ft)	Q (cfs)	Depth (ft)	Storage (ac-ft)	Q (cfs)	Depth (ft)	Storage (ac-ft)	Q (cfs)
0	0.00	0.0	0	0.00	0.0	0	0.00	0.0	0	0.00	0.0
5	2.05	60.0	5	2.05	57.0	2.5	0.02	32.0	2.5	0.02	28.0
10	6.75	100.0	10	6.75	90.0	3.5	0.05	52.0	3.5	0.05	39.0
15	13.48	130.0	15	13.48	112.0	4.0	0.09	57.0	4.0	0.09	45.0
						5.0	0.12	63.0	5.0	0.12	50.0

Storage 19 (Existing Conditions)			Storage 19 (Proposed Conditions)			Detention 21			Detention 25A		
Depth (ft)	Storage (ac-ft)	Q (cfs)	Depth (ft)	Storage (ac-ft)	Q (cfs)	Depth (ft)	Storage (ac-ft)	Q (cfs)	Depth (ft)	Storage (ac-ft)	Q (cfs)
0	0.00	0.0	0	0.00	0.0	0	0.00	0.0	0	0.00	0.0
5	1.75	125.0	5	1.75	45.0	2	0.96	24.2	5	0.53	38.9
10	6.13	240.0	10	6.13	70.0	4	2.04	39.1	10	2.69	59.4
15	13.05	325.0	15	13.05	90.0	6	3.24	49.7	15	7.09	74.5
						8	4.57	58.4	20	13.71	86.9
						10	6.03	65.9	25	22.56	97.9
									30	33.65	107.7

Detention 25B			Detention 26			Detention 27		
Depth (ft)	Storage (ac-ft)	Q (cfs)	Depth (ft)	Storage (ac-ft)	Q (cfs)	Depth (ft)	Storage (ac-ft)	Q (cfs)
0	0.00	0.0	0	0.00	0.0	0	0.00	0.0
2	5.19	123.0	5	7.95	107.9	1	0.30	3.3
5	12.98	404.0	10	17.68	181.1	2	0.75	9.0
10	25.95	692.0	15	29.2	232.4	3	1.35	13.0
12	31.14	792.0				4	2.05	16.0
						5	2.83	18.0

3.1.3 RATIONAL METHOD ANALYSIS SUMMARY

Table 3.1.4(a-e) provides a summary of the areas, the longest flow length, peak runoff rates and time of concentration for both existing and proposed conditions for individual basins. The flows indicated in the proposed conditions portion of the table reflect the effects of detention storage as described above. Refer to Table 3.1.2 for existing and proposed conditions peak flows prior to mitigation (i.e., detention basin peak inflows), and to Figure 3.1 for basin breakdown on existing and proposed conditions.

Table 3.1.4a Basin A: Rational Method Hydrologic Analysis

	Pre-Developed (Existing)				Post-Developed (Proposed) (Includes Detention Where Present))				Flow Change
Sub-basin	Area (acre)	Length (ft)	Q (cfs)	Tc (min)	Area (acre)	Length (ft)	Q_{out} (cfs)	Tc (min)	ΔQ (cfs)
1	71.87	3799	87.64	16.48	71.87	3979	84.06	18.12	-4
2	13.16	1135	27.10	10.44	13.16	1135	27.10	10.44	0
3	199.65	5359	217.44	21.30	199.65	5359	219.30	21.30	+2
4	11.64	1841	14.00	14.22	11.64	1841	14.00	14.22	0
5	68.89	4285	72.37	18.76	68.89	4285	74.17	18.66	+2
6	2.45	659	5.27	7.93	2.45	659	5.27	7.93	0
7	2.10	806	3.89	9.21	2.10	806	3.86	9.29	0
8	11.67	1458	16.15	12.51	11.67	1458	16.15	12.51	0
9	25.84	2405	30.46	16.31	25.84	2405	30.46	16.31	0
10	486.89	7580	109.57	19.15	491.42	7868	101.19	23.05	-8
11	21.79	1611	35.78	10.72	21.74	1983	31.30	12.85	-5
12	14.21	1967	23.36	11.55	14.21	1967	23.36	11.55	0
13	130.03	3854	72.77	18.26	108.67	4334	69.76	13.44	-3
14	3.93	1040	6.36	9.60	3.93	1040	6.36	9.60	0
14.1	4.44	1087	6.87	10.15	4.44	1087	6.87	10.15	0
15	43.30	2551	50.75	14.67	35.75	2190	44.01	12.84	-7
15.1	6.84	1380	8.45	13.50	6.84	1380	8.45	13.50	0
16	29.59	2650	38.58	13.22	27.75	2434	39.34	12.48	0
17	14.27	1600	20.87	11.53	14.27	1600	20.78	11.55	0
18	6.50	1498	8.36	13.90	6.50	1498	8.10	14.48	0
19	81.22	4511	91.89	19.97	122.82	5611	82.26	14.52	-10
20	17.56	1882	31.15	12.84	Combines with Basin 19				

Table 3.1.4b Basin B: Rational Method Hydrologic Analysis

	Pre-Developed (Existing)				Post-Developed (Proposed) (Includes Detention Where Present))				Flow Change
Sub-basin	Area (acre)	Length (ft)	Q (cfs)	Tc (min)	Area (acre)	Length (ft)	Q_{out} (cfs)	Tc (min)	ΔQ (cfs)
21	38.61	2150	45.47	20.00	37.80	2765	44.37	10.15	-1
22.4	5.32	1032	9.10	12.53	4.95	1032	8.00	12.53	-1
22.3	4.93	768	12.72	10.28	4.93	768	12.72	10.28	0
22.2	13.38	1507	33.82	11.00	9.99	1230	24.69	11.40	-9
22.1	12.07	1678	26.01	13.58	10.34	1320	24.10	11.94	-2
22	38.42	1995	74.65	16.38	30.79	1716	63.61	14.77	-11
23.4	10.41	2515	16.12	21.59	10.41	2515	16.18	21.51	0
23	24.62	1780	50.47	13.11	22.59	1780	48.61	12.96	-2
23.3	7.49	1369	18.24	11.23	7.49	1369	18.24	11.23	0
23.2	7.90	1580	17.82	12.33	7.90	1580	17.85	12.33	0
23.1	4.45	1076	10.19	11.78	4.45	1076	10.19	11.78	0
24	33.48	1780	79.07	11.82	33.48	1780	79.07	11.82	0
24.2	9.02	1216	18.81	13.53	7.32	1131	15.72	12.97	-3
24.1	10.66	1252	19.99	15.40	12.42	1425	49.59	11.46	+30
25	541.16	7304	676.93	27.70	557.04	8646	643.71	22.51	-33

Table 3.1.4c Basin C: Rational Method Hydrologic Analysis

	Pre-Developed (Existing)				Post-Developed (Proposed) (Includes Detention Where Present))				Flow Change
Sub-basin	Area (acre)	Length (ft)	Q (cfs)	Tc (min)	Area (acre)	Length (ft)	Qout (cfs)	Tc (min)	ΔQ (cfs)
26	174.25	5674	192.62	21.41	178.37	6735	159.48	14.31	-33
27	236.28	6155	229.53	22.74	232.48	6652	186.63	27.13	-43

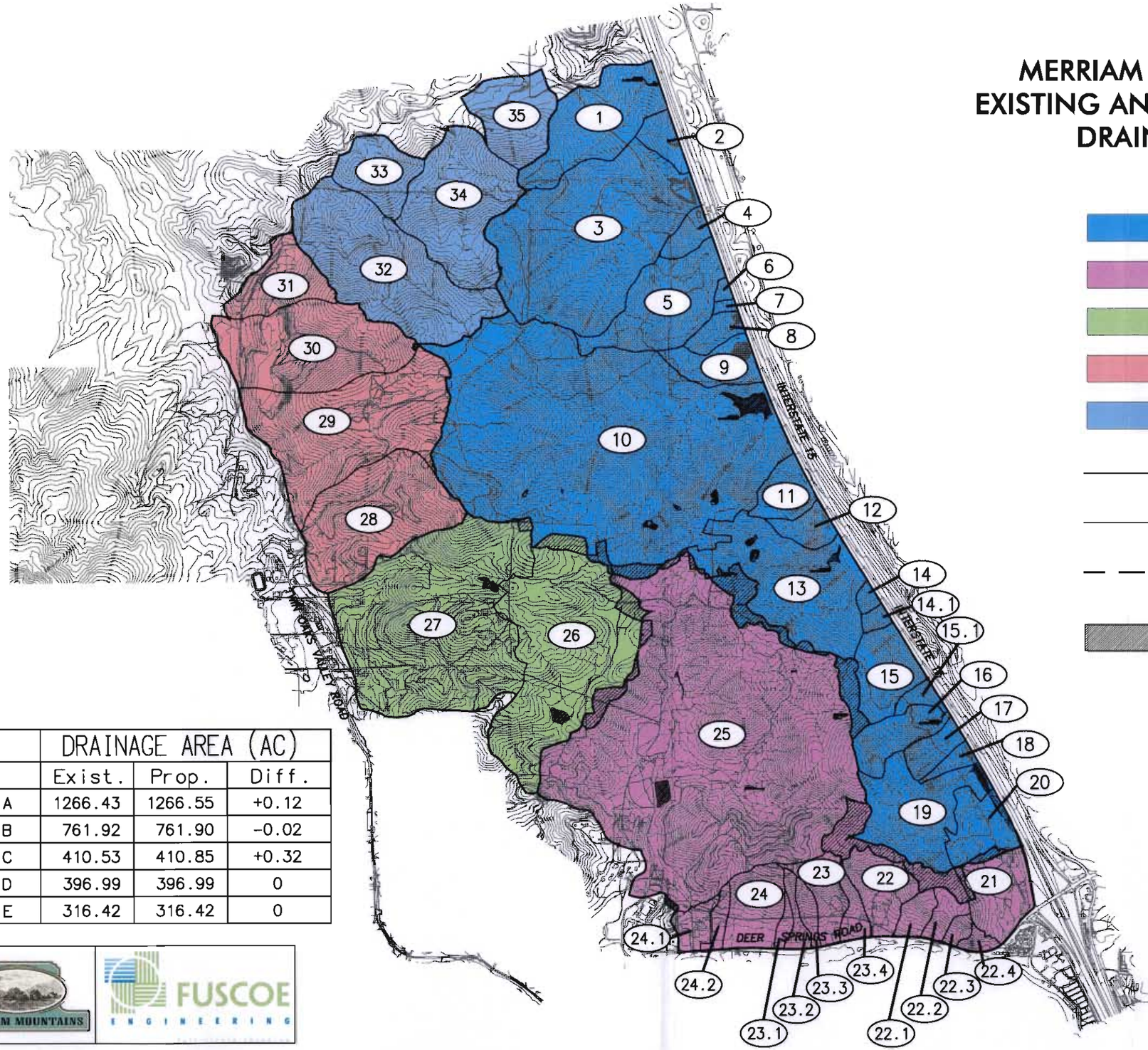
Table 3.1.4d Basin D: Rational Method Hydrologic Analysis

	Pre-Developed (Existing)				Post-Developed (Proposed) (Includes Detention Where Present))				Flow Change
Sub-basin	Area (acre)	Length (ft)	Q (cfs)	Tc (min)	Area (acre)	Length (ft)	Q_{out} (cfs)	Tc (min)	ΔQ (cfs)
28	107.36	3481	133.51	17.42	107.36	3481	135.24	17.39	+2
29	143.86	4158	226.26	20.49	143.86	4158	226.26	20.49	0
30	107.83	4289	181.02	16.88	107.83	4289	181.02	16.88	0
31	37.94	2501	81.71	14.23	37.94	2501	81.71	14.23	0

Table 3.1.4e Basin E: Rational Method Hydrologic Analysis

	Pre-Developed (Existing)				Post-Developed (Proposed) (Includes Detention Where Present))				Flow Change
Sub-basin	Area (acre)	Length (ft)	Q (cfs)	Tc (min)	Area (acre)	Length (ft)	Q_{out} (cfs)	Tc (min)	ΔQ (cfs)
32	136.24	4295	231.83	16.49	136.24	4295	231.83	16.49	0
33	35.60	1790	83.83	12.03	35.60	1790	83.83	12.03	0
34	97.55	3470	156.47	15.56	97.55	3470	156.47	15.56	0
35	47.03	2215	93.10	14.42	47.03	2215	95.70	14.42	+3

FIGURE 3.2
MERRIAM MOUNTAINS EXISTING AND PROPOSED DRAINAGE BASINS



BASIN	DRAINAGE AREA (AC)		
	Exist.	Prop.	Diff.
BASIN - A	1266.43	1266.55	+0.12
BASIN - B	761.92	761.90	-0.02
BASIN - C	410.53	410.85	+0.32
BASIN - D	396.99	396.99	0
BASIN - E	316.42	316.42	0

MERRIAM MOUNTAINS

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M:\PROJECTS\2469\01A\EXHIBITS\HYDROLOGY EXHIBITS\REPORT - 2006 JUNE\EXISTING AND PROPOSED BASINS FIGURE.DWG (03-21-07 7:58:58AM) Plotted by: dpatel

3.2 IMPACTS OF PROPOSED PROJECT ON WATERSHEDS

3.2.1 SOUTH FORK MOOSA CANYON WATERSHED

South Fork Moosa Canyon watershed was divided into 22 subbasins to analyze the runoff to the culverts and storm drain systems that convey water from the west side to the east side of Highway I-15. These original basins were created based on knowledge available at the time of culvert locations. Later research revealed more than 22 inlets leading to storm drain systems under Highway I-15. In some cases, multiple inlets confluence to a single outlet, furthermore, drainage from Highway I-15 can also be included in these systems.

Impacts downstream were first evaluated by comparing storm drain flows for Existing and Proposed conditions (see Table 3.1.4a). Where proposed conditions led to an increase in runoff due to development, existing detention storage was utilized in order to mitigate peak flows. Taking into account the mitigation measures, there were no remaining appreciable increases in storm drain outfall flows. Additional details for each basin are provided in the discussion below.

To check the adequacy of culvert sizes, the peak outflows for proposed conditions were compared to the pipe capacities from Caltrans hydraulic analysis. Also, for each culvert under consideration, an estimate of the minimum pipe diameter required to convey the flow was made. In all cases, the existing culverts were adequately sized to safely convey the flow under proposed conditions without exceeding the existing depth available for headwater at the culvert inlets. A summary of the culvert capacity analysis is included in Table 3.2.1. It should be noted that the "Estimated Pipe Diameter" shows a computed estimate of the theoretical pipe diameter that would be required to carry the predicted flow at a given location, whether or not that size pipe is actually manufactured. It is included as a point of comparison for evaluating the existing structures.

Table 3.2.1 South Fork Moosa Canyon Drainage Basin

As-Built Conditions							Pre-development			Post-development		
Caltrans As-Built Contract No.	Caltrans System	Caltrans Station	Designed Capacity (cfs)	Current Pipe Dia (in)	**Project Sub-basin**	Caltrans Total Capacity (cfs)	Peak Flow Rate (cfs)	Area (AC)	Estimated Pipe Dia (in)	Peak Flow Rate (cfs)	Area (AC)	Estimated Pipe Dia (in)
11-095054	24	1917 ±	174	48	*1*	174	87.64	71.87	48	84.06	71.87	48
11-095054	22	1905 ±	27	30	*2*	27	27.10	13.16	30	27.10	13.16	30
11-095054	20	1897 ±	601	84	*3*	601	217.44	199.65	51	225.08	199.65	51
11-095054	18	1893 ±	35	30	*4*	35	14.00	11.64	18	14.00	11.64	18
11-095054	15	1884 ±	71	30/36	*5.1*	71	20.77	19.94	30	20.73	19.94	30
11-095055	14	1883 ±	140	36/42	*5*	140	52.64	48.95	42	54.43	48.95	42
11-095054	12	1875+50	6	24	*6*	6	5.27	2.45	18	5.27	2.45	18
11-095054	11	1873 ±	4	24	*7*	4	3.89	2.10	18	3.86	2.10	18
11-095054	10	1971+50	48	30	*8*	48	16.15	11.67	18	16.15	11.67	18
11-095054	9	1864+50	70	42	*9*	70	30.46	25.84	27	30.46	25.84	27
11-095054	7	1855 ±	1218	42	*10*	1218	109.57	486.89	42	101.19	491.42	42
11-095054	4	1840 ±	70	42	*11*	70	35.78	21.79	21	31.10	21.74	21
11-095054	2	1833 ±	--	36	*12*	--	23.36	14.21	18	23.36	14.21	18
11-095044	27	1820 ±	396	36	*13*	396	72.77	130.03	36	69.76	108.67	36
11-095044	26	1815 ±	11	24	*14*	11	6.36	3.93	18	6.36	3.93	18
11-095044	25	1810 ±	8	24	*14.1*	8	6.87	4.44	18	6.87	4.44	18
11-095044	24	1806 ±	20	24	*15*	104	50.75	43.30	24	44.01	35.75	24
11-095044	23	1800 ±	84	36 (48)								
11-095044	21	1790 ±	112	42	*16*	112	38.58	29.59	21	39.34	27.75	18
11-095044	20	1785 ±	42	30/36	*17*	42	20.87	14.27	18	20.78	14.27	18
11-095044	19	1780 ±	20	24/30	*18*	20	8.36	6.50	18	8.10	6.50	18
11-095044	18	1775 ±	243	60	*19*	243	92.46	81.22	36	82.26	122.82	48
11-095044	16	1768 ±	34	30	*20*	34	31.15	16.15	21	-	-	-

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Subbasins with Significant Increase in Runoff (Prior to Mitigation)

Subbasin 1 — Low-density residential development is planned for a portion of Subbasin 1, which leads to an increase in runoff from this area. Currently, there is a depression just upstream of the 48" CMP culvert conveying Subbasin 1 runoff below Highway I-15. This depression acts as a detention pond with the culvert as an outlet, and the effects of this ponding area were taken into account under both existing and proposed conditions. Under existing conditions, the peak inflow into the depression was 86.9 cfs, and the peak outflow discharging from the culvert was essentially the same. Under developed conditions, the peak inflow into the depression was 117.4 cfs. The storage routing was then performed assuming a proposed 42" opening restrictor plate will be installed on the culvert, in order to reduce the rate of discharge and utilize more of the existing storage. Under these conditions, the peak discharge rate from the culvert was 84.1 cfs.

Subbasin 10 — Development is planned for the upper portion of Subbasin 10, leading to an increase in runoff production from this area. There is currently a large depression which acts as a detention pond just upstream of the 42" RCP culvert conveying Subbasin 10 runoff below Highway I-15. The effects of this ponding area were taken into account under both existing and proposed conditions. Under existing conditions, the peak inflow into the depression was 623.6 cfs, and the peak outflow discharging from the culvert was 109.6 cfs. Under developed conditions, the peak inflow into the depression was 657.8 cfs. The storage routing was then performed assuming a proposed 36" opening restrictor plate will be installed on the culvert, in order to reduce the rate of discharge and utilize more of the existing storage. Under these conditions, the peak discharge rate from the culvert was 101.2 cfs.

A study of the Caltrans hydrology indicates that the 42-inch culvert exists to convey a runoff capacity of 1,218cfs. The Caltrans hydrology had comparable drainage areas but differences in runoff that would indicate updated methodology and accuracy by the current analysis. The existing detention basin was found to be sized for existing conditions and will be adequate in Post-Developed conditions as well.

Subbasin 13 — Development is planned for the upper portion of Subbasin 13, leading to an increase in runoff production from this area. There is

currently a large depression which acts as a detention pond just upstream of the 36" RCP culvert conveying Subbasin 13 runoff below Highway I-15. The effects of this ponding area were taken into account under both existing and proposed conditions. Under existing conditions, the peak inflow into the depression was 151.2 cfs, and the peak outflow discharging from the culvert was 72.8 cfs. Under developed conditions, the peak inflow into the depression was 194.5 cfs. The storage routing was then performed assuming a proposed 33" opening restrictor plate will be installed on the culvert, in order to reduce the rate of discharge and utilize more of the existing storage. Under these conditions, the peak discharge rate from the culvert was 69.8 cfs.

Caltrans calculations show a design flow capacity of 396 cfs in the 36 inch pipe, far in excess of the anticipated flow under proposed conditions.

Subbasin 16

Road improvement work proposed within Subbasin 16 leads to a slight increase in anticipated runoff production from this area. A small amount of depression storage exists upstream of the 42" CSP culvert conveying Subbasin 16 runoff below Highway I-15. The effects of this ponding area were taken into account under both existing and proposed conditions. Under existing conditions, the peak inflow into the depression was 41.4 cfs, and the peak outflow discharging from the culvert was 44.7 cfs. Under developed conditions, the peak inflow into the depression was 45.6 cfs. The storage routing was then performed assuming a proposed 36" opening restrictor plate will be installed on the culvert, in order to reduce the rate of discharge and utilize more of the existing storage. Under these conditions, the peak discharge rate from the culvert was 43.9 cfs.

Subbasin 19
Subbasin 20

Significant development is planned for both Subbasins 19 and 20, leading to a large increase in runoff production from both areas. In order to maintain 100-year peak flows from both subbasins at or below the existing conditions, the existing detention storage at the outlet of Subbasin 19 will be utilized. Under existing conditions, the modeled peak flow from Subbasin 19 into the depression upstream of the 60" RCP outlet pipe was 92.5 cfs, and the peak flow from Subbasin 20 (42" CSP) was 31.2 cfs. Under developed conditions, assuming no mitigation, the peak flow from Subbasin 19 into the ponding area was 311.6 cfs, and the peak flow from Subbasin 20 was 138.1 cfs. In order to mitigate the increase in peak flow, it is proposed that the flow from Subbasin 20 be diverted to the

depression in Subbasin 19, and that a 30" opening restrictor be installed at the inlet of the 60" RCP in Subbasin 19, in order to reduce the overall peak outflow and utilize additional existing storage volume. With these modifications included in the model, the peak inflow into the storage area was 427.6 cfs, the peak outflow from the storage area (and therefore from Subbasin 19) was 82.3 cfs.

Subbasins with Minor Increase in Runoff

Subbasin 3 — A small area of roadway improvement results in a minor increase (+2 cfs) in peak outflow from this area. This represents an increase of less than 5%, and any necessary mitigation will be addressed in final engineering with small, on-site BMPs.

Subbasin 5 — A short stretch of roadway construction in Subbasin 5 results in a small increase (+2 cfs) in anticipated peak outflow from this area. This is an increase of less than 5%, and any necessary mitigation will be addressed in final engineering with small, on-site BMPs.

The culvert under Highway I-15 draining Subbasin 5 was found to be a system that is composed of multiple inlets on the offsite areas of I-15 and the surface drainage. Subbasin 5 drains to two culverts, a 30 inch and a 36 inch storm drain, and also picks up surface drainage from Highway I-15 and is discharged on the other side by way of a 36 inch and 42 inch. This combination is able to safely convey the designed flows.

Subbasins with No Increase in Runoff

Subbasin 2
Subbasin 4
Subbasin 6
Subbasin 7
Subbasin 8
Subbasin 9
Subbasin 11
Subbasin 12
Subbasin 14
Subbasin 14.1
Subbasin 15
Subbasin 15.1
Subbasin 17
Subbasin 18

No development is planned for Subbasins 2, 4, 6-9, 11,12, 14-15.1, 17, and 18. Anticipated peak flow values therefore remain the same (or are reduced due to reductions in drainage area) between existing and proposed conditions.

Existing culvert sizes are adequate to safely convey flow from these subbasins.

3.2.2 SAN MARCOS CREEK WATERSHED

San Marcos Creek watershed is composed of two basins, Basin B and Basin C. These basins were broken up into a total of 17 subbasins in order to determine the rate of flow to each culvert under Deer Springs Road. In order to evaluate the downstream impacts of any post-developed runoff, two conditions were considered: any increase of maximum runoff rates (Q) between existing and proposed conditions, and the Q to each culvert under Deer Springs Road.

Subbasins with Significant Increase in Runoff (Prior to Mitigation)

Subbasin 21

Significant commercial development is planned for a Subbasin 21, which leads to an increase in runoff. Under existing conditions, the modeled peak flow discharging from Subbasin 21 was 45.5 cfs. Under developed conditions, without any mitigation, the modeled peak flow was 155.2 cfs In order to mitigate the peak flow, a detention basin is proposed at the outlet of Subbasin 21. With the detention basin included, under proposed conditions the modeled peak flow was 44.4 cfs, assuming an outlet of 3 18" pipes. See Section 3.1.2 for discussion of proposed detention basin analysis. Details of storage routing analysis and a plan view of the detention basin are included in Appendix C.

Subbasin 24.1
Subbasin 25

Subbasin 24.1 has an increased flow due to development of the entrance road to the Merriam Mountains development. It is comprised of just over 12 acres, but peak flow from this area increase from 20.0 cfs to 49.6 cfs with the addition of the paved street and increasing the runoff coefficient. Subbasin 24.1 is part of a larger watershed that is tributary to a double grate inlet near the intersection of Deer Springs Road and Sarver Lane. This flow travels southward to Deer Springs Road and existing swales route flows to the west. Proposed mitigation measures include an underground storm drain system to pick up this flow and route it safely to the existing channel where it would normally be conveyed through surface systems.

Under existing conditions, Subbasin 24.1 and Subbasin 25 discharge to the same channel downstream of the project site. Therefore, in determining whether there will be impacts resulting from increased flow, it is appropriate (from the point of confluence downstream) to consider the flows from both subbasins together. While the peak flow from Subbasin 24.1 increases by 30 cfs, the peak flow from Subbasin 25 is reduced by 33 cfs, for a net decrease of 3 cfs. Thus, downstream of the confluence, no impact due to increased flow will occur. Upstream of the point of confluence, the increased flow from Subbasin 24.1 will be conveyed in the proposed storm drain and therefore will not affect any natural watercourse. Water quality treatment for runoff from Subbasin 24.1 will be provided on site by bioswales within the roadway median.

Basin 25 consists of 541 acres under existing conditions, with a peak flow of 676.9 cfs. Under proposed conditions, the peak flow increases to 1015.4 cfs. A series of two detention basins, Detention 25a and 25b are proposed for this subarea, to ultimately reduce the flows to offsite to 643.7 cfs. This not only maintains the existing conditions, it reduces the peak flow to reduce downstream impacts. See Section 3.1.2 for discussion of proposed detention basin analysis. Details of storage routing analysis and a plan view of the detention basin are included in Appendix C.

Subbasin 26

Major Basin C has two subbasins, Subbasins 26 and 27. Subbasin 26 has extensive development, and a detention basin will be constructed downstream of the developed area to limit flows and downstream impacts. Under existing conditions, the runoff peak is 192.6 cfs, which increases to 505.3 cfs under proposed conditions.

A detention basin, Detention 26, has been designed to reduce the peak outflow to 159.5 cfs. This prevents downstream impacts and will serve as a water quality device for the development.

See Section 3.1.2 for discussion of proposed detention basin analysis. Details of storage routing analysis and a plan view of the detention basin are included in Appendix C.

Subbasin 27

Subbasin 27 has some development planned, and a detention basin will be constructed downstream of the developed area to limit flows and downstream impacts. Under existing conditions, the runoff peak is 229.5 cfs, which increases to 270.6 cfs under proposed conditions. A detention basin, Detention 27, has been designed to reduce the peak outflow to 186.6 cfs. This prevents downstream impacts and will serve as a water quality device for the development.

See Section 3.1.2 for discussion of proposed detention basin analysis. Details of storage routing analysis and a plan view of the detention basin are included in Appendix C.

Subbasins with No Increase in Runoff

Subbasin 22
Subbasin 22.1
Subbasin 22.2
Subbasin 22.3
Subbasin 22.4
Subbasin 23
Subbasin 23.1
Subbasin 23.2
Subbasin 23.3
Subbasin 23.4
Subbasin 24
Subbasin 24.2

No development is planned for Subbasins 22-24 and 24.2. Anticipated peak flow values therefore remain the same or are reduced (due to reductions in drainage area) between existing and proposed conditions.

Deer Springs Road Culvert Analysis

The Q to each culvert under Deer Springs Road was analyzed to determine if the ponding depth was reasonable and could be accommodated without overtopping the road. I.T.S. nomographs titled "Headwater Depth For C.M. Pipe Culverts With Inlet Control" were utilized for this analysis. By knowing the pipe diameter and the discharge in cubic feet (from AES Rational Method Analysis), a headwater to diameter

ratio could be derived. That ratio multiplied by the pipe diameter then resulted in a head depth in feet. Results are presented in Table 3.2.2.

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Table 3.2.2 – Deer Springs Road

As-Built Conditions						Existing Conditions		Proposed Conditions		Headwater Depth (CMP Analysis)		
County Road Survey Map				Project Subbasin	Estimated Q at 2% (cfs)	Peak Flow Rate (cfs)	Basin Area (acre)	Peak Flow Rate (cfs)	Basin Area (acre)	Head/Dia Ratio	Head (in)	Head (ft)
Station	Type	Length (ft)	Dia. (in)									
16+30	--	--	--	*24.1*	--	19.99	10.66	49.59	12.42	--	--	--
21+35	CMP	36	18	*24.2*	8.66	18.81	9.02	15.72	7.32	2.85	51.30	4.28
23+75	CMP	64	36	*24*	54.96	79.07	33.48	79.07	33.48	2.28	82.08	6.84
32+40	CMP	46	24	*23.1*	17.33	10.19	4.45	10.19	4.45	0.88	21.12	1.76
37+35	CMP	50	24	*23.2*	17.33	17.82	7.90	17.85	7.90	1.38	33.12	2.76
39+40	CMP	48	18	*23.3*	8.66	18.24	7.49	18.24	7.49	3.80	68.40	5.70
41+60	CMP	70	36	*23*	54.96	50.47	24.62	48.61	22.59	1.35	48.60	4.05
44+64	CMP	64	24	*23.4*	17.33	16.12	10.41	16.18	10.41	1.28	30.72	2.56
50+25	CMP	46	24	*22*	17.33	74.65	38.42	63.61	30.79	--	--	--
54+70	CMP	50	24	*22.1*	17.33	26.01	12.07	24.10	10.34	1.90	45.60	3.80
60+30	CMP	76	24	*22.2*	17.33	33.82	13.38	24.69	9.99	1.93	46.32	3.86
63+50	CMP	42	24	*22.3*	17.33	12.72	4.93	12.72	4.93	1.02	24.48	2.04
66+30	CMP	50	18	*22.4*	8.66	9.10	5.32	8.00	4.95	1.45	26.10	2.18
78+30	CMP	54	18	*21*	8.66	45.47	38.61	44.37	37.80	--	--	--

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County record plans were reviewed to locate and size the existing culverts under Deer Springs Road. Bureau of Public Roads worksheets for Headwater Depth were used to calculate the head required at each culvert to convey the flows predicted by AES. Typical sections show a minimum of 1 foot vertical of shoulder to the driving surface. Culverts that were calculated to have a head greater than the pipe diameter were checked for capacity issues. These included Subbasins 22, 22.1, 22.2, 23.3, 24, and 24.2. In addition, necessary storm drain improvements for Subbasin 24.1 and the proposed detention basin for Subbasin 21 were described in the previous section.

The diameter/headwater ratio for the culvert at Subbasin 22 indicated that the existing system was not able to convey the flow. The County of San Diego plans entitled Road Survey 1040, show a 24" CMP culvert at this location as well as a flow line across Deer Springs Road, simply called "Small Wash", less than a hundred feet away. Field observations indicated that flows from this wash currently are prevented from crossing Deer Springs Road at this location by an existing berm, and instead flow west to the 24" CMP. However, it should be noted that larger flows could easily overtop this berm and flow across Deer Springs Road. Therefore it is not expected that all of the designed runoff for Subbasin 22 will be tributary to the existing culvert.

The culvert for Subbasin 23.3 also appears to be undersized, requiring a head of 5.7 feet to achieve capacity in an 18" CMP. The elevation contours for the area do suggest that there could be enough ponding depth above the flowline of a pipe to achieve the calculated head requirement, but this could not be verified. Similarly, the culvert for Subbasin 24 appears undersized, requiring a head of 6.8 feet to convey the anticipated flow.

The culverts for Subbasins 22.1 and 22.2 are both 24" CMP. The required head for the predicted flows is 3.8 feet. Both of these culverts are on grade with respect to Deer Springs Road and would assume 'flow-by' conditions along the drive path before ponding to those depths. Both subbasins also have flowlines that are labeled 'Small Wash', 'Wash', and 'Draw' adjacent to them, suggesting the tributaries to these culverts are allowed to flow over Deer Springs and not directed entirely to the culverts.

No culvert was found for Subbasin 21. Runoff was assumed to sheet flow across Deer Springs Road and enter the creek. To minimize any potential flooding, storm drain will be constructed to convey the runoff and safely discharge into the creek approximately 620' west of proposed node 2100.

It is anticipated that the project Traffic Report will recommend improvements to Deer Springs Road from Highway I-15 to Twin Oaks Valley Road. These improvements will include replacement or upgrades to all drainage structures above, in the mitigation summary to the satisfaction of the County of San Diego DPW.

SOUTH FORK GOPHER CANYON WATERSHED

South Fork Gopher Canyon watershed is divided into two major basins, Basin D and E. Basin D is comprised of Subbasins 28 through 31, and Basin E is comprised of Subbasins 32 through 35.

Subbasins with Minor Increase in Runoff

Subbasin 28 — The roadway improvement associated with Camino Mayor results in a small increase in impervious area in Subbasin 28, leading to a small increase (+2 cfs) in peak outflow from this area. This represents an increase of less than 5%, and any necessary mitigation will be addressed in final engineering with small, on-site BMPs.

Subbasin 35 — Low-density residential and road improvements are planned for a small portion of Subbasin 35, resulting in a small increase (+3 cfs) in the anticipated peak flow from this area. This represents an increase of less than 5%, and therefore any necessary mitigation will be addressed in final engineering with small, on-site BMPs.

Subbasins with No Increase in Runoff

Subbasin 29
Subbasin 30
Subbasin 31
Subbasin 32
Subbasin 33
Subbasin 34
Subbasin 35

No development is planned for Subbasins 29-34. Anticipated peak flow values therefore remain the same between existing and proposed conditions.

4. SUMMARY

The Merriam Mountains project is a large-scale master planned community with multiple neighborhoods proposed for single family and multi-family living. It will contain access drives and a relatively small area for commercial development. Of the 2327 acres of property, over two thirds of the project is proposed as non-development area preserving its natural resources such as wetlands and steep slopes.

Hydrology calculations have been run on the existing conditions of the site to quantify natural flows. Subbasins were derived from known downstream points of concentration, such as pipes, culverts or major confluences. Once flows were quantified, downstream conditions were analyzed to check for capacity.

Runoff coefficients (C) for the rational method analysis were determined for each subarea based upon the Hydrologic Soil Group (HSG) of the underlying soil as well as the land use pertaining to the conditions under consideration. Selected values for C were more conservative than those indicated in the San Diego County Hydrology Manual.

In the post-developed conditions, it was of specific interest to eliminate any diversion of drainage areas and to minimize or improve any downstream impacts. Through grading and storm drain systems, diversion is less than an acre in all the major basins. In situations where there was an increase of storm runoff, detention basins are proposed to reduce peak flows and serve as water quality mitigation.

This study addresses hydrologic impacts after developed conditions have been reached. By protecting the drainage basin areas, using storm drains and implementing detention basins where required, there will be minor impacts downstream. Many cases show there are no changes to the existing watersheds, and in some cases impacts are actually reduced. Downstream conveyances have been analyzed and proven adequate in most cases; where necessary, mitigation or improvement measures are proposed.

Drainage Mitigation Measures

In addition to utilizing existing detention storage, the mitigation measures summarized in Table 4.1 are proposed:

Table 4.1 Summary of Drainage Mitigation Measures

Subbasin / Location	Proposed Mitigation Measure
Subbasin 1	Install 42" restrictor on existing culvert to utilize existing depression storage for peak flow mitigation.
Subbasin 10	Install 36" restrictor on existing culvert to utilize existing depression storage for peak flow mitigation.
Subbasin 13	Install 33" restrictor on existing culvert to utilize existing depression storage for peak flow mitigation.
Subbasin 16	Install 36" restrictor on existing culvert to utilize existing depression storage for peak flow mitigation.
Subbasin 19	Install 30" restrictor on existing culvert and construct berm to utilize existing depression storage for peak flow mitigation. Runoff diverted from Subbasin 20 managed in same location.
Subbasin 20	Construct grass swale to divert excess flow to storage area in Subbasin 19.
Deer Springs Road, Subbasin 22 (STA 50+25)	Replace existing culvert per improvement plans
Deer Springs Road, Subbasin 22.1 (STA 54+70)	Replace existing culvert per improvement plans
Deer Springs Road, Subbasin 22.2 (STA 60+30)	Replace existing culvert per improvement plans
Deer Springs Road, Subbasin 23.3 (STA 39+40)	Replace existing culvert per improvement plans
Deer Springs Road, Subbasin 24 (STA 23+75)	Replace existing culvert per improvement plans
Deer Springs Road, Subbasin 24.1	Construct storm drain system to convey flow to natural channel
Highway I-15, Subbasins 19 and 20	Construct diversion, flow restrictor, and berm.
Subbasin 21	Construction detention basin as part of grading for that area
Subbasin 25	Construct two detention basins in series as part of grading for those areas
Subbasin 26	Construction detention basin as part of grading for that area
Subbasin 27	Construction detention basin as part of grading for that area

5. METHODOLOGY & MODEL DEVELOPMENT

5.1 COUNTY OF SAN DIEGO DRAINAGE DESIGN CRITERIA

Design Frequency – the flood frequency for determining the design storm discharge is 50 years for drainage that is upstream of any major roadway and 100 years frequency for all design storms at a major roadway, crossing the major roadway thereafter. The 50-year storm shall be contained within the pipe and not encroach into the travel lane. For the 100-year storm this includes allowing one lane of a four-lane road (four or more lanes) to be used for conveyance without encroaching onto private property outside the dedicated street right-of-way. Natural channels that remain natural within private property are excluded from the right-of-way guideline.

Design Method – The choice of method to determine flows (discharge) shall be based on the size of the watershed area. For an area 0 to approximately 1 square mile the Rational Method or the Modified Rational Method shall be used. For watershed areas larger than 1 square mile the NRCS hydrologic method shall be used. Please check with the governing agency for any variations to these guidelines.

5.2 RATIONAL METHOD HYDROLOGIC ANALYSIS

Computer Software Package – AES-2004a
Design Storm – 100-year return interval
Land Use – Natural, Residential and Commercial Development

Soil Type – . Hydrologic Soil Groups for each subbasin were taken from the San Diego County Soils Interpretation Study: Hydrologic Soil Groups – Runoff Potential map (Appendix E2).

Runoff Coefficient – Runoff coefficients were in accordance with the San Diego County Hydrology Manual 2003, based on a conservative imperviousness assumption. See Section 3.1.1 for details.

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

Q = CIA, where:

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

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

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

A = The drainage basin area in acres.

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

The procedure for the sub-area summation model is as follows:

(1) Subdivide the watershed into an initial sub-area and subsequent sub-areas. Per the 2003 San Diego County Hydrology Manual, flow-line for initial sub-area ranges from 50 ft to 100 ft long; initial sub-areas generally are less than 1 acre in size.

(2) Assign upstream and downstream node numbers to each sub-area.

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

(4) Using the initial T_c, determine the corresponding values of I. Then Q = CIA.

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

The nodes are joined together by links, which may be street gutter flows, drainage swales, drainage ditches, pipe flow, or various channel flows. The AES-2004 computer sub-area menu is as follows:

SUBAREA HYDROLOGIC PROCESS

1 Confluence analysis at node

2 Initial sub-area analysis (including time of concentration calculation)

3 Pipeflow travel time (computer estimated)

4 Pipeflow travel time (user specified)

5 Trapezoidal channel travel time

6 Street flow analysis through subarea

7 User-specified information at node

8 Addition of subarea runoff to main line

9 V-gutter flow through area

10 Copy main stream data to memory bank

11 Confluence main stream data with a memory bank

12 Clear a memory bank

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

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

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

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

(i). The most frequent case is where the collection stream with the longer time of concentration has the larger Q. The smaller Q value is adjusted by a ratio of rainfall intensities.

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

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

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

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6. REFERENCES

Drainage Design Manual, City of San Diego: April 1984

Hydrology Manual, San Diego County: June 2003

Caltrans Drainage Design, 11-SD-15, EA 095041: 1974
(Interstate 15, Stations 1765 to 1845+75)

Caltrans Drainage Design, 11-SD-15, EA 144811: 1977
(Interstate 15, Stations 1833 to 1918)

Caltrans As-Built, Contract 11-095044: November 1979

Caltrans As-Built, Contract 11-095054: May 1980

County of San Diego, Road Survey No. 521 (Twin Oaks Valley Road): Oct 1959

County of San Diego, Road Survey No. 1040 (Deer Springs Road): Nov 1959

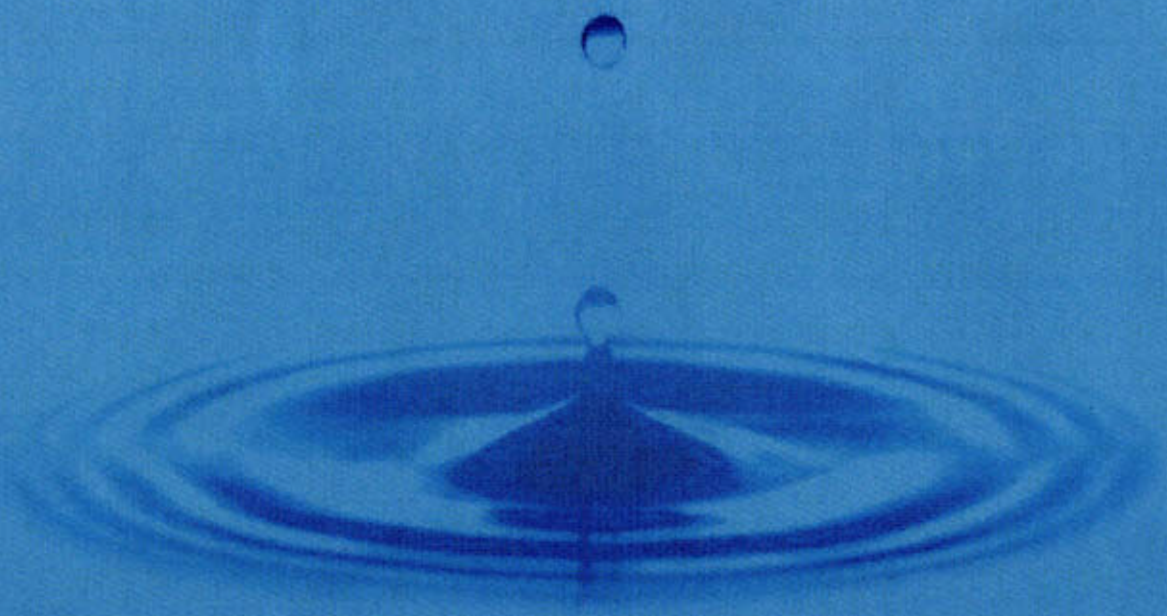
County of San Diego As-Built, Street Improvement Plan for Portion of Deer Springs Road and Sarver Lane (CG 3852): December 1993

Advanced Engineering Systems (AES) 2004a, Hydrology Software

Haestad FlowMaster, Hydraulics Software

SECTION 7

DECLARATION OF RESPONSIBLE CHARGE



MERRIAM MOUNTAINS
DECLARATION OF RESPONSIBLE CHARGE

I HEREBY DECLARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE CHARGE OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSIONS CODE AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS. I UNDERSTAND THAT THE CHECK OF THE PROJECT DRAWINGS AND SPECIFICATIONS BY THE COUNTY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OF WORK, OF MY RESPONSIBILITIES FOR THE PROJECT DESIGN.

FUSCOE ENGINEERING
6390 GREENWICH DRIVE SUITE 170
SAN DIEGO, CA 92122

SIGNED: Eric K. Armstrong *DATE:* 3/23/07

ERIC K. ARMSTRONG
R.C.E. #36083 EXP 06/30/08

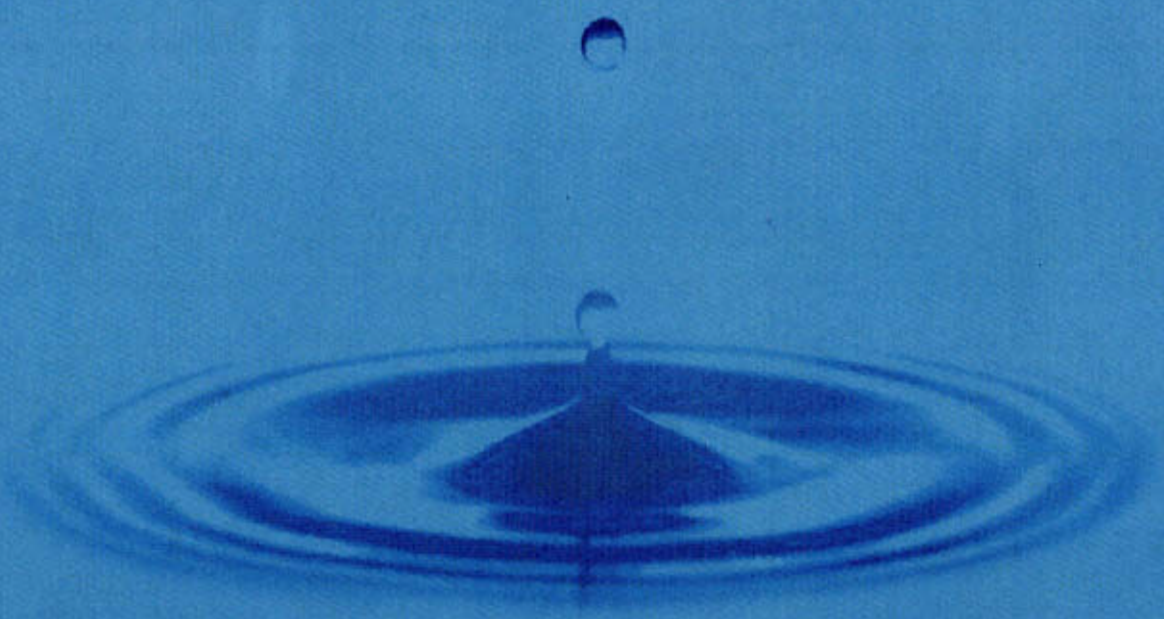
REGISTERED PROFESSIONAL ENGINEER
ERIC K. ARMSTRONG
No. 36083
Exp. 6/30/08
CIVIL
STATE OF CALIFORNIA

MERRIAM MOUNTAINS

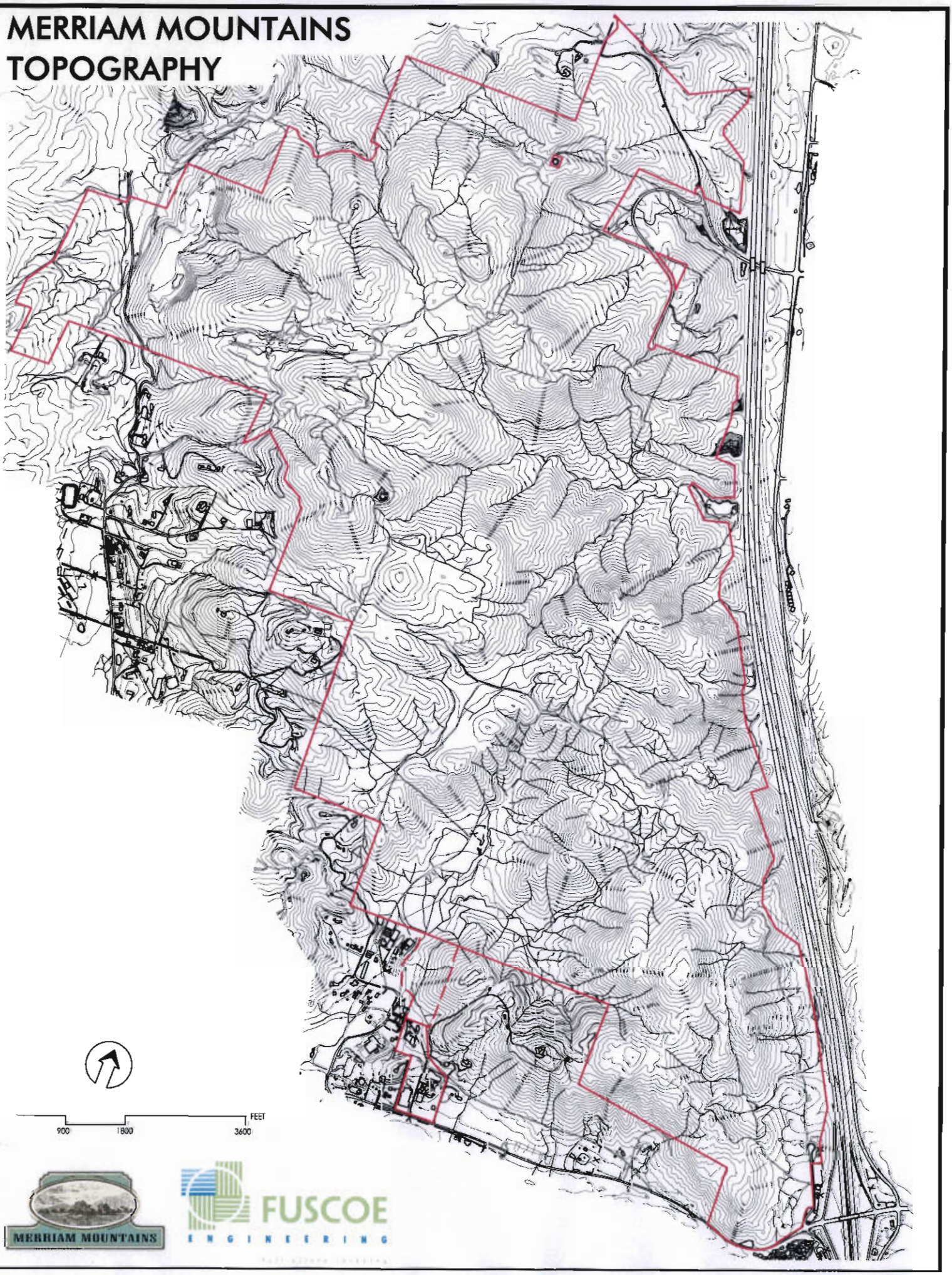
FUSCOE
ENGINEERING

SECTION 8

PROJECT TOPOGRAPHIC MAP



MERRIAM MOUNTAINS TOPOGRAPHY

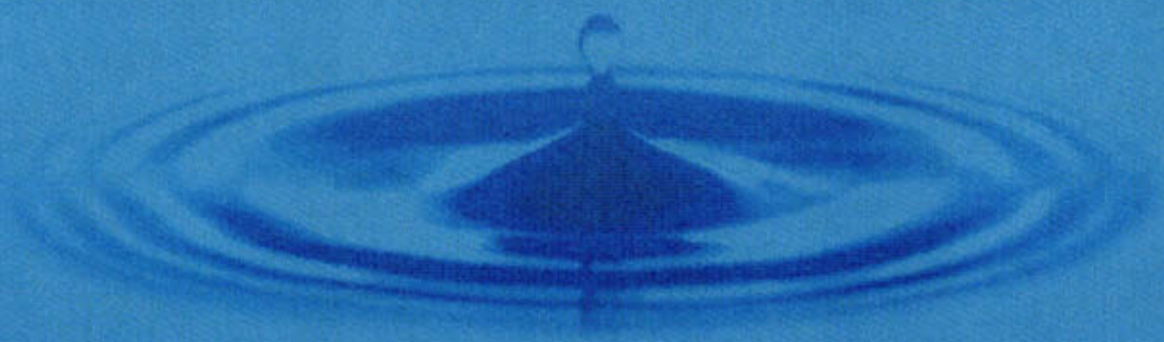


SECTION 9

COUNTY OF SAN DIEGO
RAINFALL ISOPLUVIALS MAP

100 – YEAR RAINFALL EVENT

6 HOURS
24 HOURS

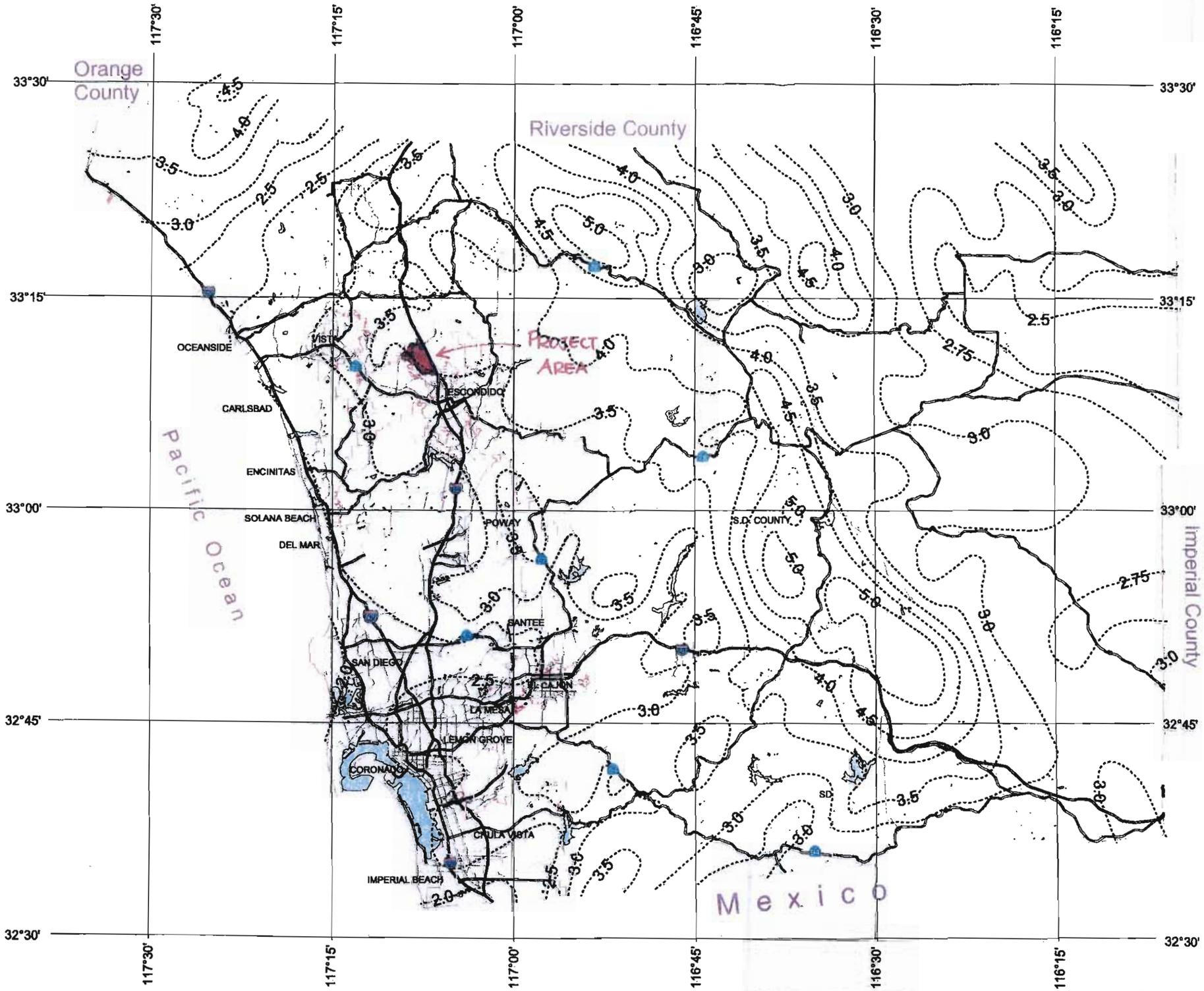


County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)



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N W E S

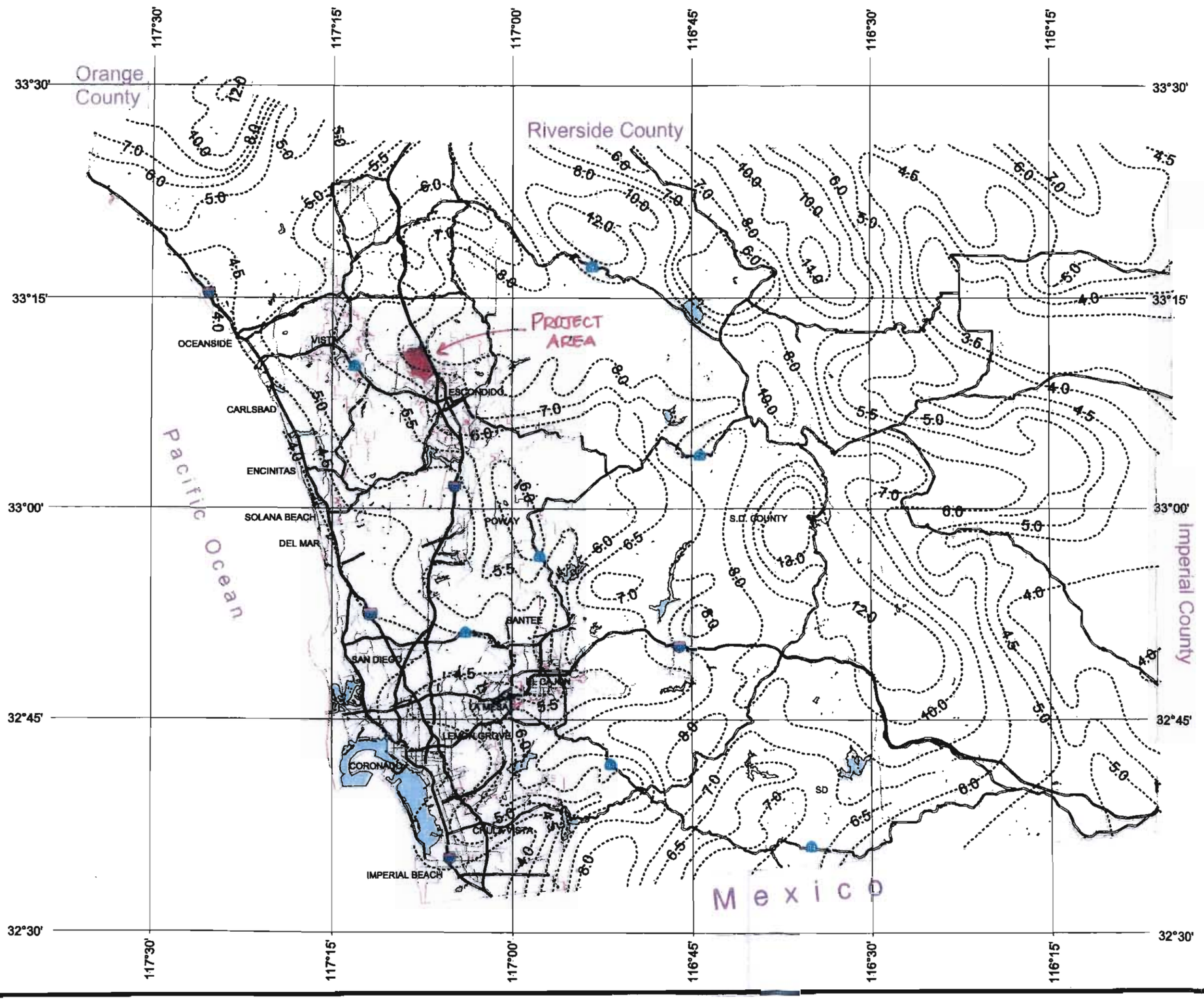
3 0 3 Miles

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

Isopluvial (inches)



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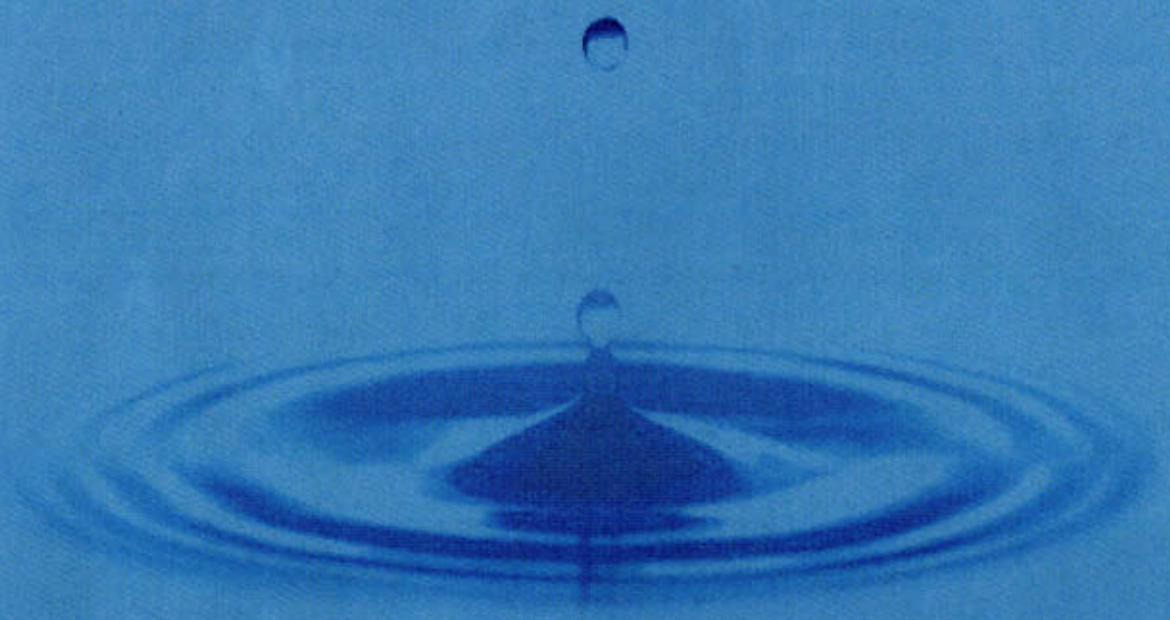
N W E S

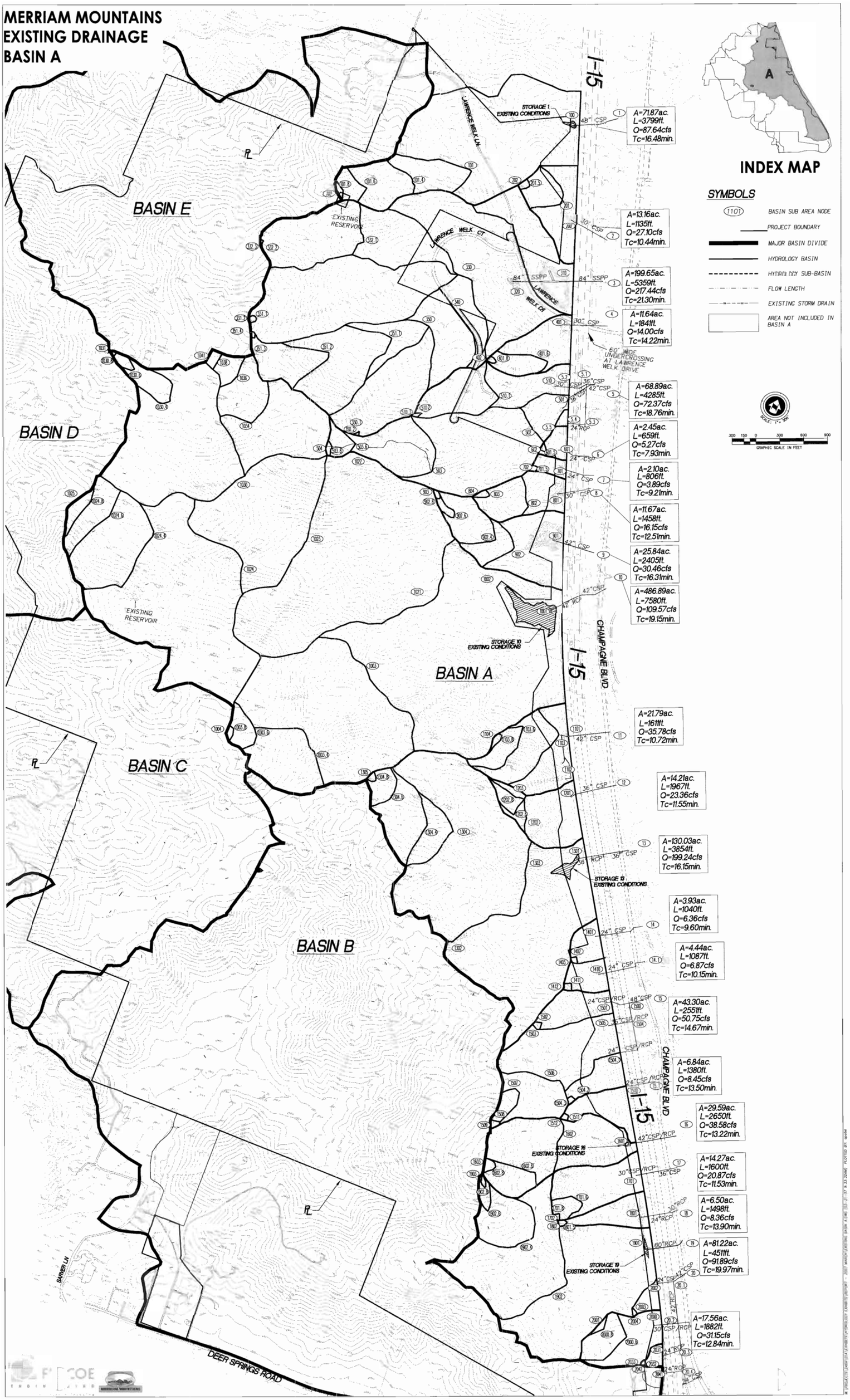
3 0 3 Miles

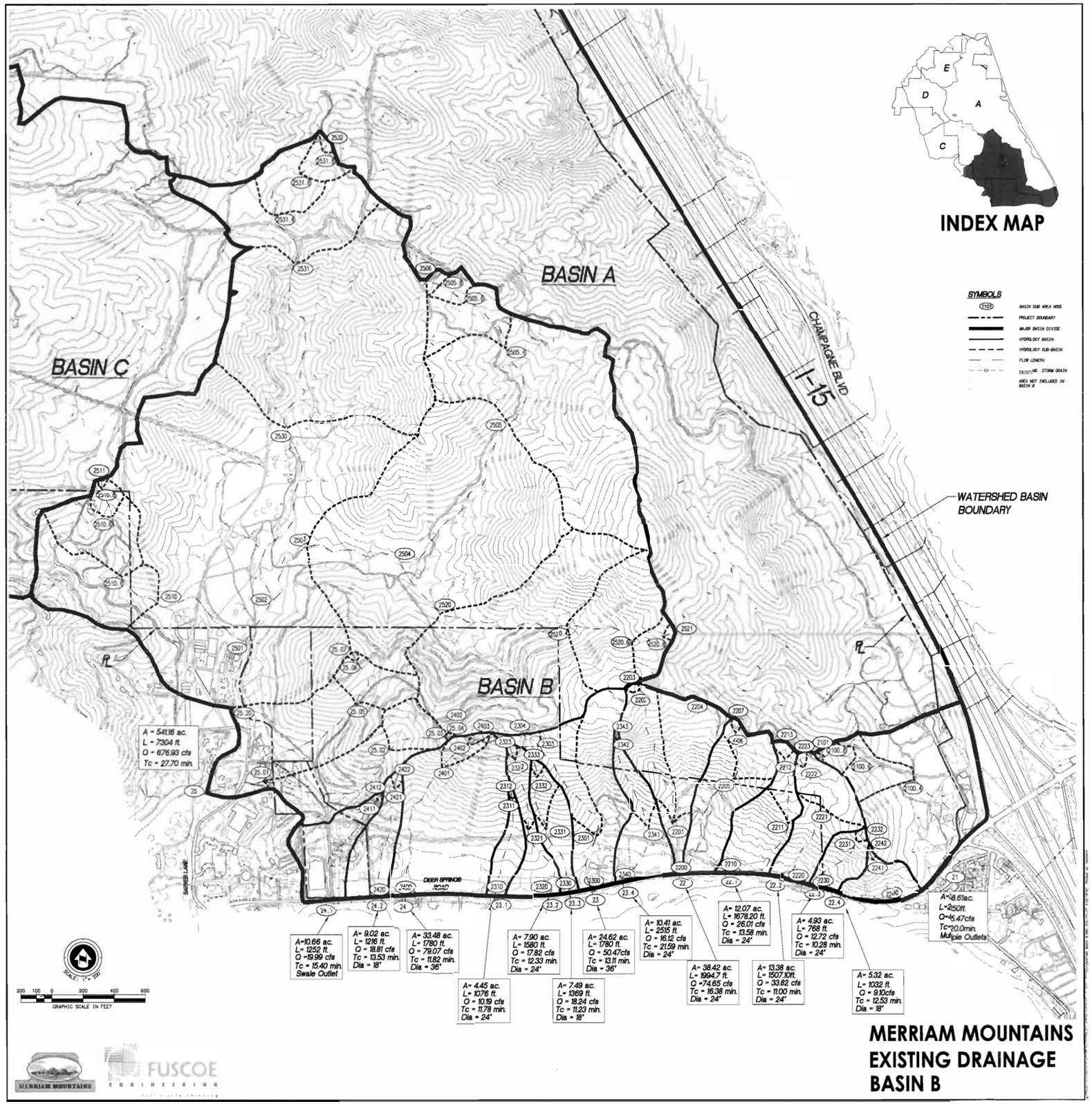
SECTION 10

WATERSHED GEOMETRIC INFORMATION MAP EXISTING CONDITIONS



MERRIAM MOUNTAINS EXISTING DRAINAGE BASIN A





MERRIAM MOUNTAINS EXISTING DRAINAGE BASIN B

BASIN A

BASIN B

BASIN C

BASIN D

TWIN OAKS CREST DRIVE

TWIN OAKS VALLEY RD

CAMINO CALAFIA

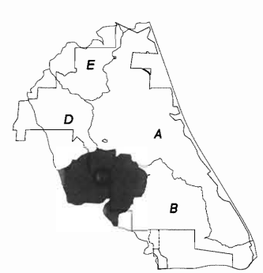
A=236.28ac.
L=6155.4ft.
Q=229.53cfs
Tc=22.74min.

A=174.25ac.
L=5674ft.
Q=192.62cfs
Tc=21.41min.

WATERSHED BASIN BOUNDARY

SYMBOLS

(110)	BASIN SUB AREA NODE
	PROJECT BOUNDARY
	MAJOR BASIN DIVIDE
	HYDROLOGY BASIN
	HYDROLOGY SUB-BASIN
	FLOW LENGTH
	AREA NOT INCLUDED IN BASIN C



INDEX MAP

SCALE: 1" = 200'

200 100 0 200 400 600

GRAPHIC SCALE IN FEET

MERRIAM MOUNTAINS

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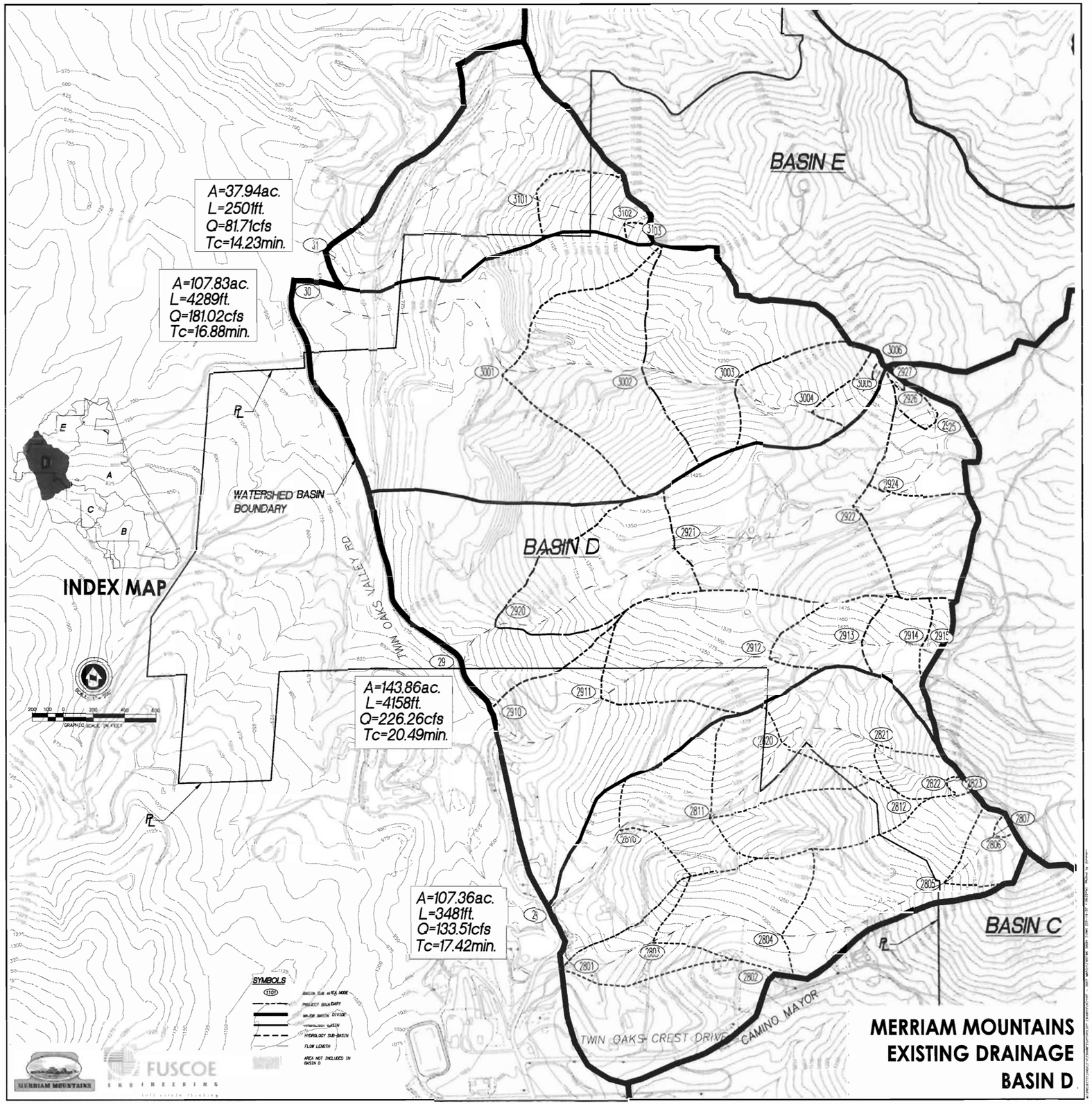
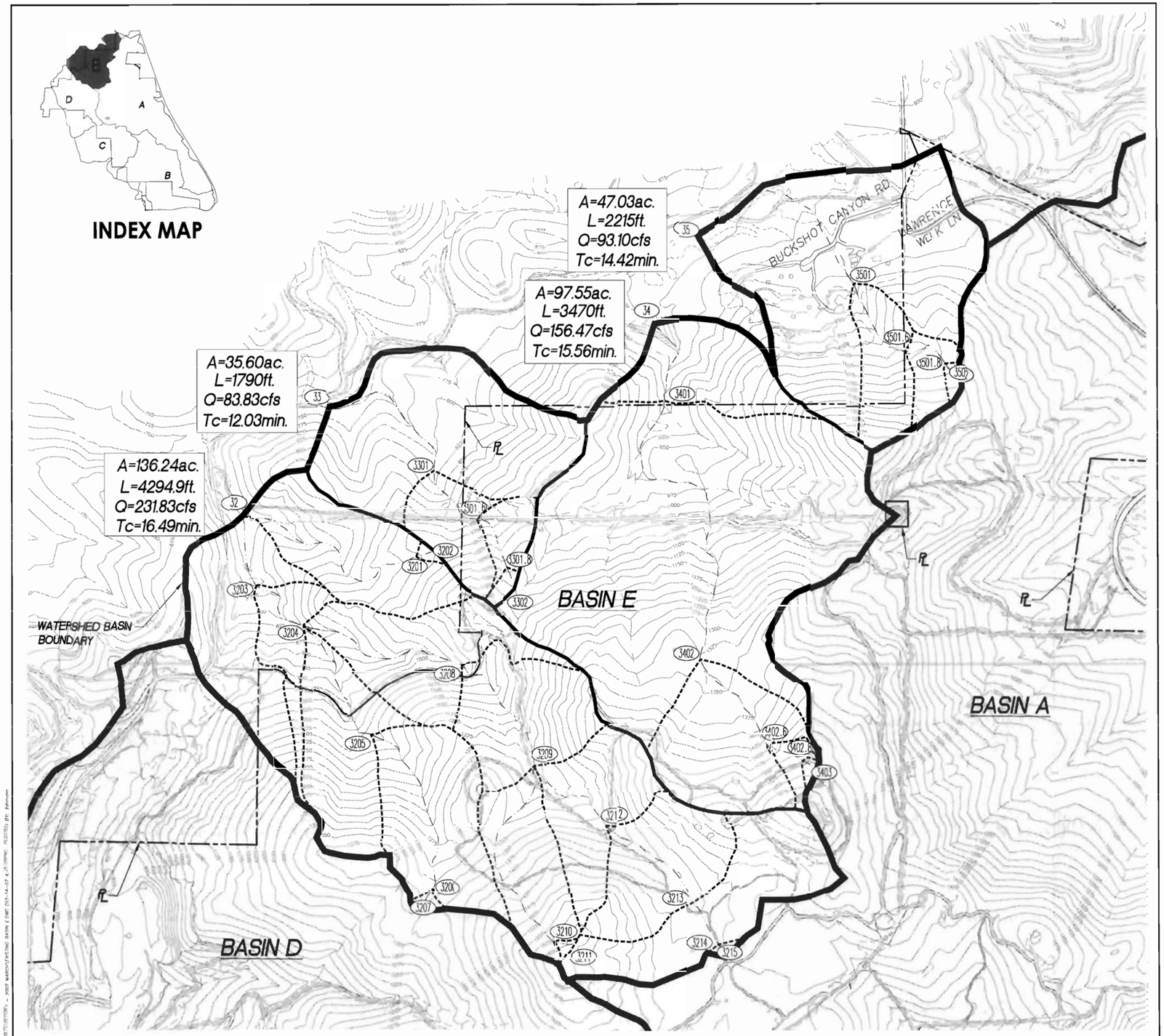
MERRIAM MOUNTAINS
EXISTING DRAINAGE
BASIN C

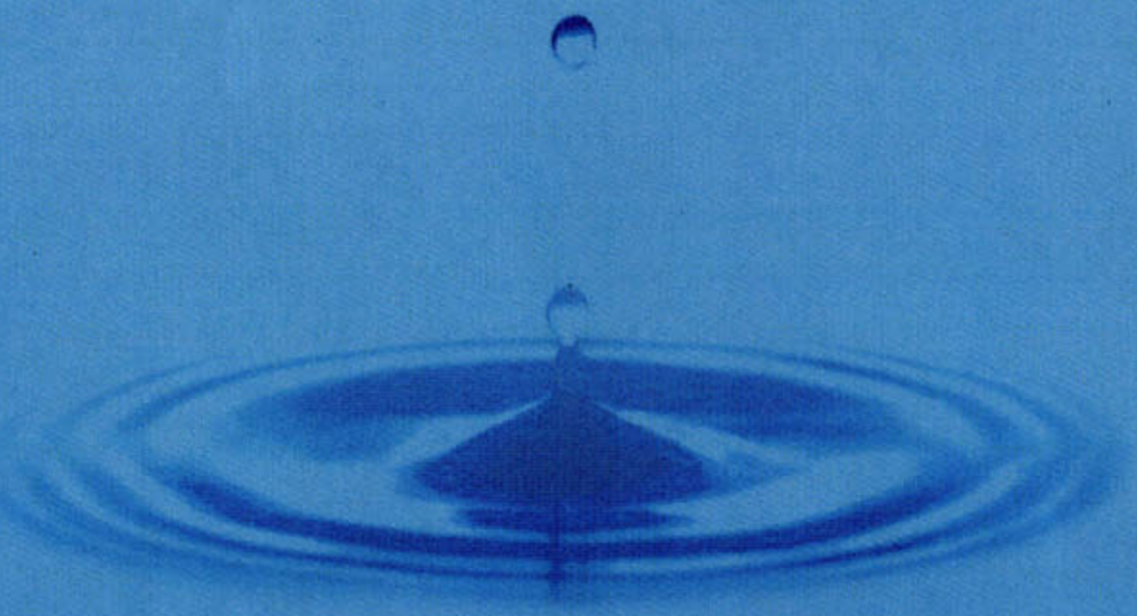

BASIN E
A=37.94ac.
L=2501ft.
Q=81.71cfs
Tc=14.23min.
A=107.83ac.
L=4289ft.
Q=181.02cfs
Tc=16.88min.
WATERSHED BASIN BOUNDARY
INDEX MAP
TWIN OAKS VALLEY RD
BASIN D
A=143.86ac.
L=4158ft.
Q=226.26cfs
Tc=20.49min.
A=107.36ac.
L=3481ft.
Q=133.51cfs
Tc=17.42min.
BASIN C
TWIN OAKS CREST DRIVE
CAMINO MAYOR
SYMBOLS
FUSCOE
ENGINEERING
MERRIAM MOUNTAINS
MERRIAM MOUNTAINS
EXISTING DRAINAGE
BASIN D



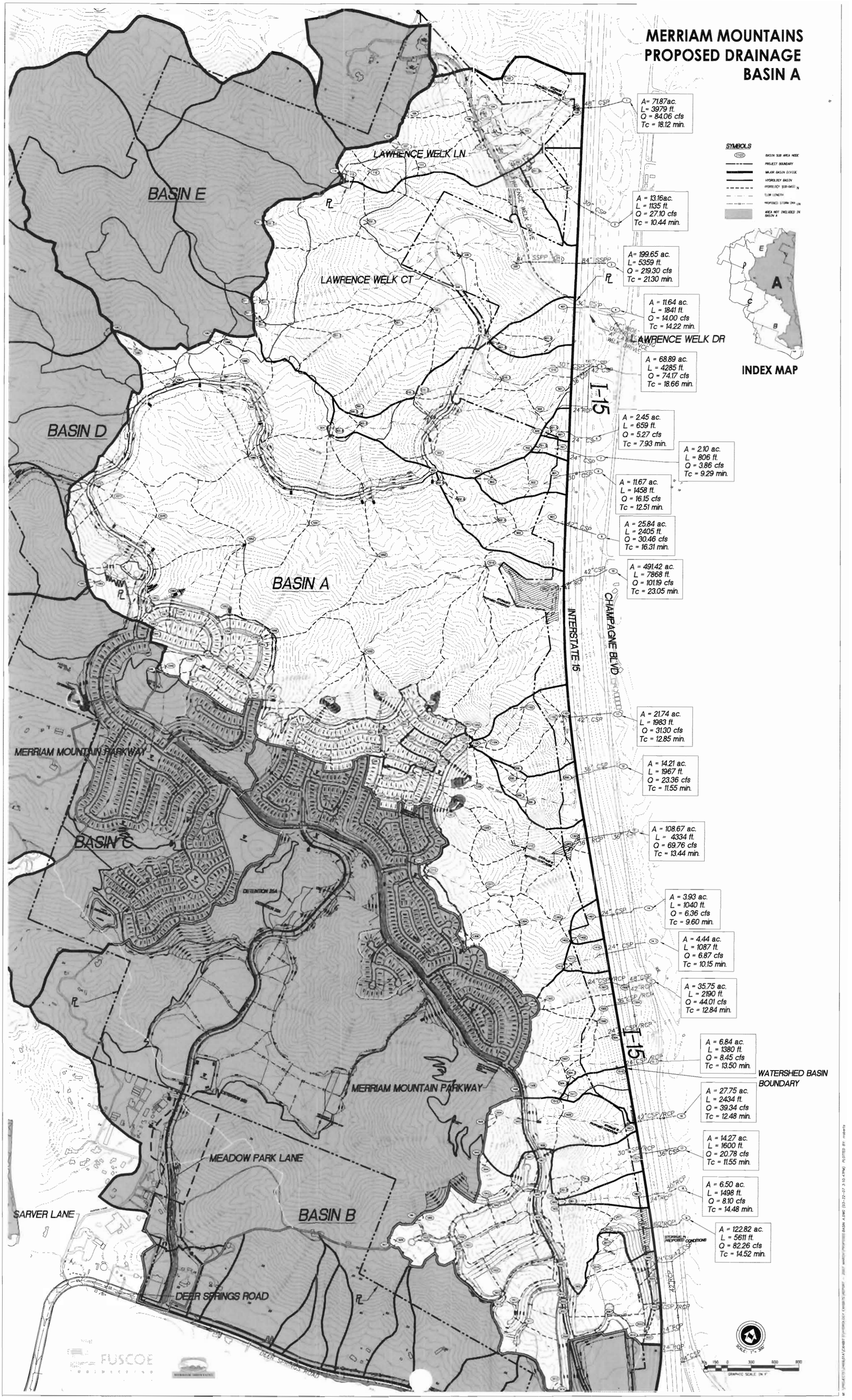
MERRIAM MOUNTAINS EXISTING DRAINAGE BASIN E

SECTION 11

WATERSHED GEOMETRIC INFORMATION MAP PROPOSED CONDITIONS



MERRIAM MOUNTAINS PROPOSED DRAINAGE BASIN A



MERRIAM MOUNTAINS PROPOSED DRAINAGE BASIN B

BASIN A

BASIN B

BASIN C

DETENTION 25A

DETENTION 25B

DEER SPRINGS ROAD

WATERSHED BASIN BOUNDARY

OFFSITE DRAINAGE SYSTEMS IMPROVEMENTS REQUIRED

STORMS B PROPOSED CONDITIONS

A= 557.04 ac.
L= 8646 ft.
Q = 643.71 cfs
Tc = 22.51 min.

A= 12.42 ac.
L= 1425 ft.
Q = 49.59 cfs
Tc = 11.46 min.

A= 7.32 ac.
L= 1131 ft.
Q = 15.72cfs
Tc = 12.97 min.
Dia = 18"

A= 33.48 ac.
L= 1780 ft.
Q = 79.07 cfs
Tc = 11.82 min.
Dia = 36"

A= 4.45 ac.
L= 1076 ft.
Q = 10.19 cfs
Tc = 11.78 min.
Dia = 24"

A= 7.90 ac.
L= 1580 ft.
Q = 17.85 cfs
Tc = 12.33 min.
Dia = 24"

A= 7.49 ac.
L= 1369 ft.
Q = 18.24 cfs
Tc = 11.23 min.
Dia = 18"

A= 22.59 ac.
L= 1780 ft.
Q = 48.61 cfs
Tc = 12.96 min.
Dia = 36"

A= 10.41 ac.
L= 2515 ft.
Q = 16.18 cfs
Tc = 21.51 min.
Dia = 24"

A= 30.79 ac.
L= 1716 ft.
Q = 63.61 cfs
Tc = 14.77 min.
Dia = 24"

A= 10.34 ac.
L= 1320 ft.
Q = 24.10 cfs
Tc = 11.94 min.
Dia = 24"

A= 9.99 ac.
L= 1230 ft.
Q = 24.69 cfs
Tc = 11.40 min.
Dia = 24"

A= 4.93 ac.
L= 768 ft.
Q = 12.72 cfs
Tc = 10.28 min.
Dia = 24"

A= 4.95 ac.
L= 1032 ft.
Q = 8.00 cfs
Tc = 12.53 min.
Dia = 18"

A= 37.80 ac.
L= 2765 ft.
Q = 44.37 cfs
Tc = 10.15 min.

INDEX MAP

MERRIAM MOUNTAINS

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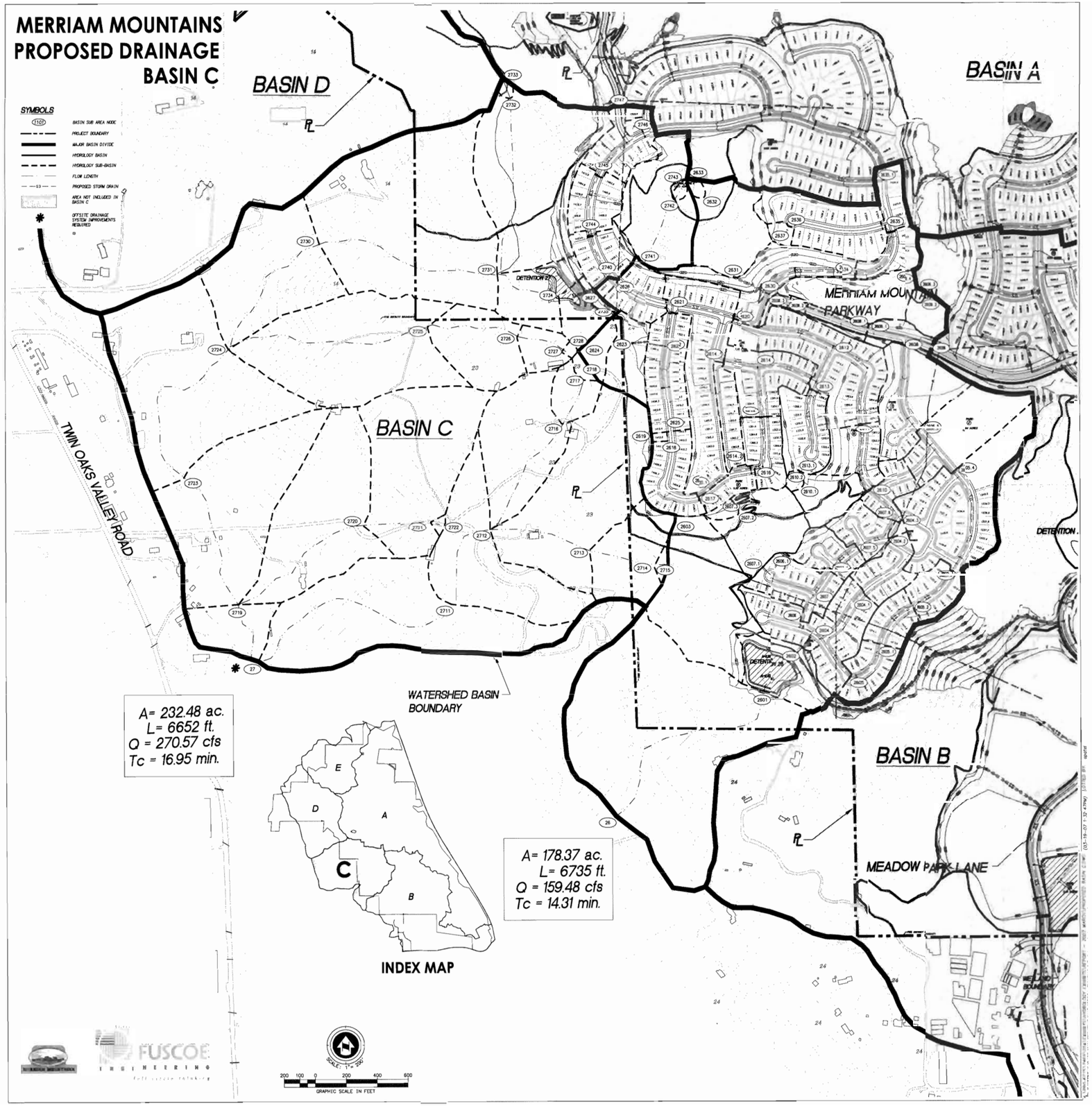
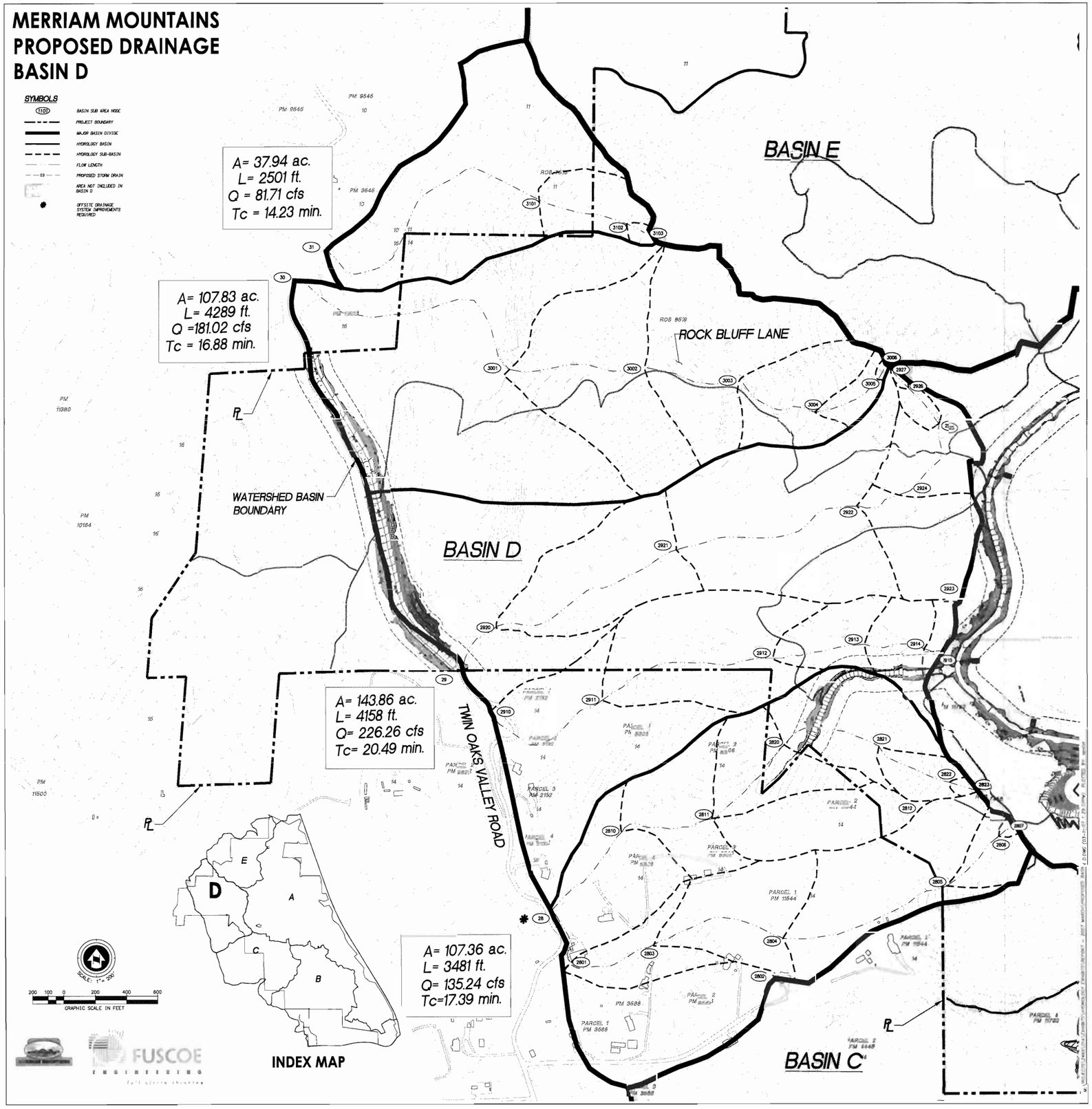
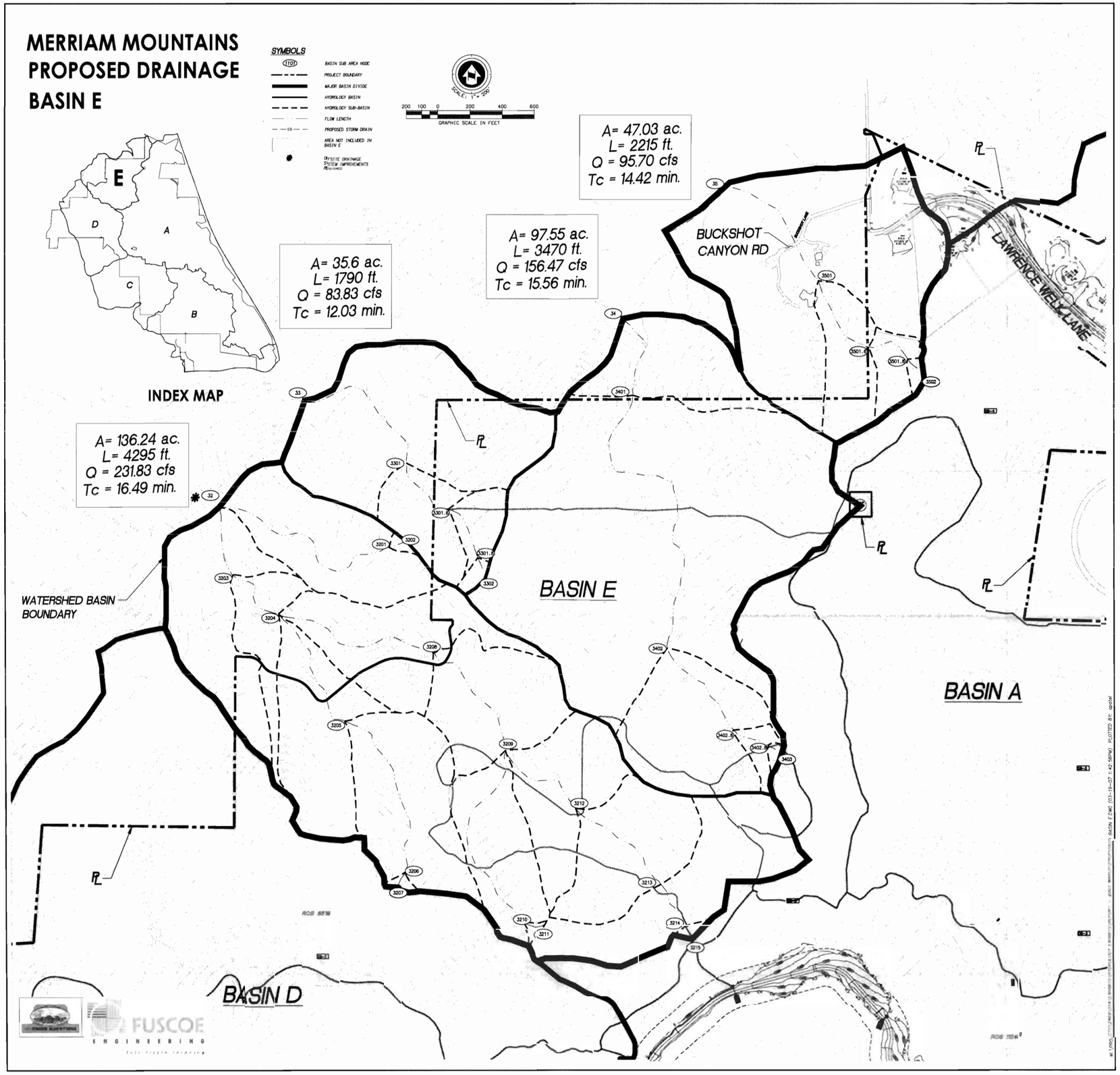
MERRIAM MOUNTAINS PROPOSED DRAINAGE BASIN C



MERRIAM MOUNTAINS PROPOSED DRAINAGE BASIN D



MERRIAM MOUNTAINS PROPOSED DRAINAGE BASIN E



HYDROLOGY/HYDRAULIC REPORT:

Merriam Mountains, TM5381
Env. Log #04-08-028
Volume 2 - March 2007

Prepared For: Stonegate Merriam LLC

Prepared By: Erik K. Armstrong

Job Number: 2469.01A

FUSCOE ENGINEERING

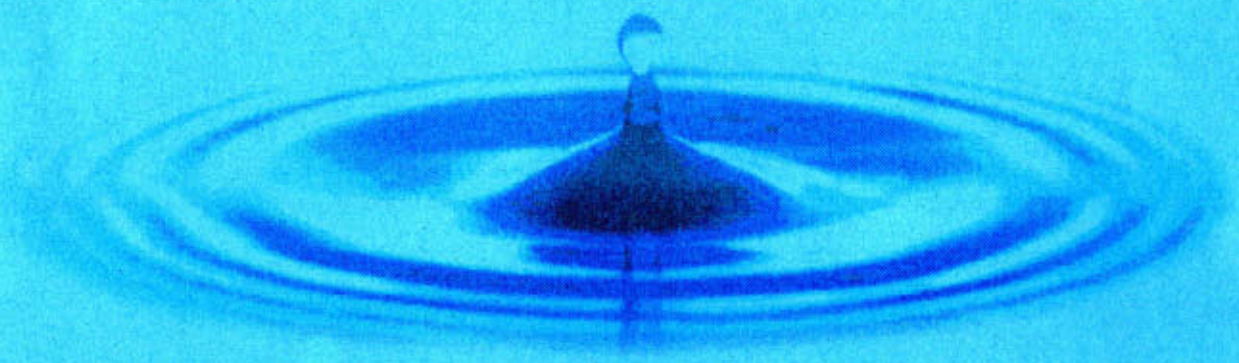
APPENDIX A

AES - 2005

Rational Method Hydrology

Existing Condition

BASIN A



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ENGINEERING
6390 Greenwich Drive, Suite 170
San Diego, California 92122
tel 858.554.1500 • fax 858.597.0335
www.fuscoe.com

Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR01D

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
102	101.8	2	1,225.0	1,205.0	75.0	0.35	0.32	Initial Runoff
101.8	101.6	5	1,205.0	1,135.0	300.0			Channel Flow
101.8	101.6	8				0.35	2.16	Add Area
101.6	101.4	5	1,135.0	1,020.0	600.0			
101.6	101.4	8				0.35	7.7	
101.4	101	5	1,020.0	860.0	740.0			
101.4	101	8				0.32	6.99	
101	100	5	860.0	575.0	1,640.0			
101	100	8				0.26	54.7	
100	100	7						DET OUT Q=87.64
100	1	4	555.4	504.8	444.0			Pipe flow
							71.87	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC.
                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************** DESCRIPTION OF STUDY **************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                  *
* SUBBASIN 1 - WITH DETENTION ROUTING                                     *
* 2469.01A - OCTOBER 2006                                                 *
 **************************************************************************

  FILE NAME: MERR01D.DAT
  TIME/DATE OF STUDY: 10:48 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    101.80 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1225.00
  DOWNSTREAM ELEVATION(FEET) =   1205.00
  ELEVATION DIFFERENCE(FEET) =     20.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.427
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.747
SUBAREA RUNOFF(CFS) =       0.98
TOTAL AREA(ACRES) =       0.32   TOTAL RUNOFF(CFS) =       0.98

****************************************************************************
FLOW PROCESS FROM NODE    101.80 TO NODE    101.60 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1205.00  DOWNSTREAM(FEET) =   1135.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.2333
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1744 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =       0.98
FLOW VELOCITY(FEET/SEC) =   2.34 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.14   Tc(MIN.) =   7.56
LONGEST FLOWPATH FROM NODE    102.00 TO NODE    101.60 =   375.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    101.80 TO NODE    101.60 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.060
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
SUBAREA AREA(ACRES) =    2.16   SUBAREA RUNOFF(CFS) =    5.34
TOTAL AREA(ACRES) =      2.48   TOTAL RUNOFF(CFS) =    6.13
TC(MIN.) =   7.56

****************************************************************************
FLOW PROCESS FROM NODE    101.60 TO NODE    101.40 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1135.00  DOWNSTREAM(FEET) =   1020.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   600.00   CHANNEL SLOPE =  0.1917
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1558 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       6.13
FLOW VELOCITY(FEET/SEC) =   4.04 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.47   Tc(MIN.) =  10.04
LONGEST FLOWPATH FROM NODE    102.00 TO NODE    101.40 =   975.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    101.60 TO NODE    101.40 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.883
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
SUBAREA AREA(ACRES) =    7.70   SUBAREA RUNOFF(CFS) =   15.85
TOTAL AREA(ACRES) =     10.18   TOTAL RUNOFF(CFS) =   20.96
TC(MIN.) =  10.04
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    101.40 TO NODE    101.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1020.00  DOWNSTREAM(FEET) =    860.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   740.00   CHANNEL SLOPE =  0.2162
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1681 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     20.96
  FLOW VELOCITY(FEET/SEC) =   6.32 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.95   Tc(MIN.) =  11.99
  LONGEST FLOWPATH FROM NODE    102.00 TO NODE    101.00 =  1715.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    101.40 TO NODE    101.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.246
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3378
  SUBAREA AREA(ACRES) =    6.99   SUBAREA RUNOFF(CFS) =   11.73
  TOTAL AREA(ACRES) =     17.17   TOTAL RUNOFF(CFS) =   30.43
  TC(MIN.) =  11.99

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    100.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    860.00  DOWNSTREAM(FEET) =    575.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1640.00   CHANNEL SLOPE =  0.1738
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1469 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     30.43
  FLOW VELOCITY(FEET/SEC) =   6.69 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.08   Tc(MIN.) =  16.07
  LONGEST FLOWPATH FROM NODE    102.00 TO NODE    100.00 =  3355.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    100.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.342
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2786
  SUBAREA AREA(ACRES) =   54.70   SUBAREA RUNOFF(CFS) =   61.76
  TOTAL AREA(ACRES) =     71.87   TOTAL RUNOFF(CFS) =   86.94
  TC(MIN.) =  16.07

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    100.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
```

```
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  16.07   RAIN INTENSITY(INCH/HOUR) =  4.34
  TOTAL AREA(ACRES) =    71.87   TOTAL RUNOFF(CFS) =     87.64

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE      1.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   555.40  DOWNSTREAM(FEET) =   504.80
  FLOW LENGTH(FEET) =   444.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  19.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.10
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     87.64
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =  16.48
  LONGEST FLOWPATH FROM NODE    102.00 TO NODE      1.00 =  3799.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     71.87  TC(MIN.) =     16.48
  PEAK FLOW RATE(CFS)   =     87.64
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR02
Page 1

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Friction Coeff.	Area (ac.)	Comments
202	201.5	2	765.0	740.0	75.0	0.25	0.27	Initial Runnoff
201.5	201	5	740.0	600.0	450.0			Channel Flow
201.5	201	8				0.49	4.18	Add Area
201	200	5	600.0	590.0	280.0			
201	200	8				0.28	8.71	
200	2	4	574.4	515.4	480.0			30" CSP Caltrans Pipe
							13.16	Total Area

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

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            Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC.
                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                 *
* SUBBASIN # 2                                                           *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR02.DAT
  TIME/DATE OF STUDY: 16:30 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    201.50 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    765.00
  DOWNSTREAM ELEVATION(FEET) =    740.00
  ELEVATION DIFFERENCE(FEET) =     25.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.151
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.068
SUBAREA RUNOFF(CFS) =       0.54
TOTAL AREA(ACRES) =       0.27   TOTAL RUNOFF(CFS) =       0.54

****************************************************************************
FLOW PROCESS FROM NODE    201.50 TO NODE    201.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    740.00  DOWNSTREAM(FEET) =    600.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.4667
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .2217 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =       0.54
FLOW VELOCITY(FEET/SEC) =   2.64 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.90   Tc(MIN.) =   8.05
LONGEST FLOWPATH FROM NODE    202.00 TO NODE    201.00 =   375.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    201.50 TO NODE    201.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.784
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4900
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4754
SUBAREA AREA(ACRES) =     4.18   SUBAREA RUNOFF(CFS) =   13.90
TOTAL AREA(ACRES) =       4.45   TOTAL RUNOFF(CFS) =   14.35
TC(MIN.) =   8.05

****************************************************************************
FLOW PROCESS FROM NODE    201.00 TO NODE    200.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    600.00  DOWNSTREAM(FEET) =    590.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.0357
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .0357 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =      14.35
FLOW VELOCITY(FEET/SEC) =   2.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.82   Tc(MIN.) =   9.86
LONGEST FLOWPATH FROM NODE    202.00 TO NODE    200.00 =   655.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    201.00 TO NODE    200.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.950
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2800
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3461
SUBAREA AREA(ACRES) =     8.71   SUBAREA RUNOFF(CFS) =   14.51
TOTAL AREA(ACRES) =      13.16   TOTAL RUNOFF(CFS) =   27.10
TC(MIN.) =   9.86
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     200.00 TO NODE      2.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   574.40  DOWNSTREAM(FEET) =   515.40
  FLOW LENGTH(FEET) =   480.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  12.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.89
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     27.10
  PIPE TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =  10.44
  LONGEST FLOWPATH FROM NODE    202.00 TO NODE      2.00 =  1135.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =     13.16  TC(MIN.) =     10.44
  PEAK FLOW RATE(CFS)    =     27.10
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR 03

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
350.2	350.1	2	1,385.0	1,373.0	55.0	0.35	0.05	
350.1	350	5	1,373.0	888.0	1,718.1			
350.1	350	8				0.27	19.21	
350	350	1						1 of 2, con 1
351.4	351.3	2	1,585.0	1,538.0	85.0	0.35	0.08	
351.3	351.2	5	1,538.0	1,190.0	1,021.0			
351.3	351.2	8				0.35	8.07	
351.2	351.1	5	1,190.0	1,005.0	817.0			
351.2	351.1	8				0.30	17.76	
351.1	350	5	1,005.0	888.0	495.0			
351.1	350	8				0.25	5.68	
350	350	1						2 of 2, con 2
350	340	5	888.0	851.0	395.0			
350	340	8				0.25	11.88	
340	330	5	851.0	814.0	545.0			
340	330	8				0.25	6.57	
330	330	1						1 of 3, con 2
331.2	331.1	2	1,622.0	1,585.0	87.0	0.35	0.16	
331.1	330	5	1,585.0	814.0	2,844.0			
331.1	330	8				0.31	42.74	
330	330	1						2 of 3, con 2
332.3	332.2	2	1,375.0	1,368.0	96.8	0.35	0.06	
332.2	332.2	5	1,368.0	980.0	1,350.1			
332.2	332.1	8				0.35	17.65	
332.1	330	5	980.0	814.0	1,361.0			
332.1	330	8				0.35	13.94	
330	330	1						3 of 3, con 2
330	320	5	814.0	600.0	871.0			
330	320	8				0.28	38.87	
320	310	4	600.0	537.0	500.0			Ex. 84" SSPP Caltrans
320	310	8				0.26	16.93	84" SSPP
310	3	4	537.0	522.0	630.0			Ex. 84" SSPP Caltrans
								Storm Drain System
							199.65	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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                         2003,1985,1981 HYDROLOGY MANUAL
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                          Analysis prepared by:

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                        SAN DIEGO, CALIFORNIA 92122
                              (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                 *
* SUBBASIN # 3                                                           *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR03.DAT
  TIME/DATE OF STUDY: 11:18 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE    350.20 TO NODE    350.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    55.00
  UPSTREAM ELEVATION(FEET) =   1385.00
  DOWNSTREAM ELEVATION(FEET) =   1373.00
  ELEVATION DIFFERENCE(FEET) =     12.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.647
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) =      0.16
TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
FLOW PROCESS FROM NODE    350.10 TO NODE    350.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1373.00  DOWNSTREAM(FEET) =    888.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1718.10   CHANNEL SLOPE =  0.2823
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1906 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =      0.16
FLOW VELOCITY(FEET/SEC) =   2.44 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =  11.71   Tc(MIN.) =  16.36
LONGEST FLOWPATH FROM NODE    350.20 TO NODE    350.00 =  1773.10 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    350.00 TO NODE    350.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.293
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2700
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.2702
SUBAREA AREA(ACRES) =   19.21   SUBAREA RUNOFF(CFS) =   22.27
TOTAL AREA(ACRES) =     19.26   TOTAL RUNOFF(CFS) =   22.34
TC(MIN.) =  16.36

****************************************************************************
FLOW PROCESS FROM NODE    350.00 TO NODE    350.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =  16.36
RAINFALL INTENSITY(INCH/HR) =   4.29
TOTAL STREAM AREA(ACRES) =    19.26
PEAK FLOW RATE(CFS) AT CONFLUENCE =     22.34

****************************************************************************
FLOW PROCESS FROM NODE    351.40 TO NODE    351.30 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) =   0
INITIAL SUBAREA FLOW-LENGTH(FEET) =    85.00
UPSTREAM ELEVATION(FEET) =   1585.00
DOWNSTREAM ELEVATION(FEET) =   1538.00
ELEVATION DIFFERENCE(FEET) =     47.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.778
WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.401
SUBAREA RUNOFF(CFS) =      0.24
```

```
  TOTAL AREA(ACRES) =       0.08   TOTAL RUNOFF(CFS) =       0.24

****************************************************************************
  FLOW PROCESS FROM NODE    351.30 TO NODE    351.20 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1538.00  DOWNSTREAM(FEET) =   1190.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1021.00   CHANNEL SLOPE =  0.3408
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2036 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.24
  FLOW VELOCITY(FEET/SEC) =   2.53 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.73   Tc(MIN.) =  12.51
  LONGEST FLOWPATH FROM NODE    351.40 TO NODE    351.20 =  1106.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    351.20 TO NODE    351.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.104
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =     8.07   SUBAREA RUNOFF(CFS) =   14.42
  TOTAL AREA(ACRES) =       8.15   TOTAL RUNOFF(CFS) =   14.56
  TC(MIN.) =  12.51

****************************************************************************
  FLOW PROCESS FROM NODE    351.20 TO NODE    351.10 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1190.00  DOWNSTREAM(FEET) =   1005.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   817.00   CHANNEL SLOPE =  0.2264
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1721 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      14.56
  FLOW VELOCITY(FEET/SEC) =   5.67 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.40   Tc(MIN.) =  14.91
  LONGEST FLOWPATH FROM NODE    351.40 TO NODE    351.10 =  1923.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    351.10 TO NODE    351.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.557
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3157
  SUBAREA AREA(ACRES) =    17.76   SUBAREA RUNOFF(CFS) =   24.28
  TOTAL AREA(ACRES) =      25.91   TOTAL RUNOFF(CFS) =   37.28
  TC(MIN.) =  14.91

****************************************************************************
  FLOW PROCESS FROM NODE    351.10 TO NODE    350.00 IS CODE =  53
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1005.00  DOWNSTREAM(FEET) =    888.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   495.00   CHANNEL SLOPE =  0.2364
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1755 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     37.28
  FLOW VELOCITY(FEET/SEC) =   7.83 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.05   Tc(MIN.) =  15.97
  LONGEST FLOWPATH FROM NODE    351.40 TO NODE    350.00 =  2418.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    350.00 TO NODE    350.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.361
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3039
  SUBAREA AREA(ACRES) =    5.68   SUBAREA RUNOFF(CFS) =    6.19
  TOTAL AREA(ACRES) =     31.59   TOTAL RUNOFF(CFS) =   41.86
  TC(MIN.) =  15.97

****************************************************************************
  FLOW PROCESS FROM NODE    350.00 TO NODE    350.00 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.) =  15.97
  RAINFALL INTENSITY(INCH/HR) =   4.36
  TOTAL STREAM AREA(ACRES) =    31.59
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     41.86

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       22.34    16.36        4.293         19.26
     2       41.86    15.97        4.361         31.59

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       63.67    15.97       4.361
     2       63.55    16.36       4.293

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     63.67   Tc(MIN.) =   15.97
  TOTAL AREA(ACRES) =     50.85
  LONGEST FLOWPATH FROM NODE    351.40 TO NODE    350.00 =  2418.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    350.00 TO NODE    340.00 IS CODE =  53
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    888.00  DOWNSTREAM(FEET) =    851.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   395.00   CHANNEL SLOPE =  0.0937
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0937 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     63.67
  FLOW VELOCITY(FEET/SEC) =   6.83 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.96   Tc(MIN.) =  16.93
  LONGEST FLOWPATH FROM NODE    351.40 TO NODE    340.00 =  2813.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.199
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2834
  SUBAREA AREA(ACRES) =   11.88   SUBAREA RUNOFF(CFS) =   12.47
  TOTAL AREA(ACRES) =     62.73   TOTAL RUNOFF(CFS) =   74.64
  TC(MIN.) =  16.93

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    330.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    851.00  DOWNSTREAM(FEET) =    814.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   545.00   CHANNEL SLOPE =  0.0679
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0679 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     74.64
  FLOW VELOCITY(FEET/SEC) =   6.13 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.48   Tc(MIN.) =  18.41
  LONGEST FLOWPATH FROM NODE    351.40 TO NODE    330.00 =  3358.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    330.00 TO NODE    330.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.978
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2802
  SUBAREA AREA(ACRES) =    6.57   SUBAREA RUNOFF(CFS) =    6.53
  TOTAL AREA(ACRES) =     69.30   TOTAL RUNOFF(CFS) =   77.24
  TC(MIN.) =  18.41

****************************************************************************
  FLOW PROCESS FROM NODE    330.00 TO NODE    330.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  18.41
```

```
  RAINFALL INTENSITY(INCH/HR) =   3.98
  TOTAL STREAM AREA(ACRES) =    69.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     77.24

****************************************************************************
  FLOW PROCESS FROM NODE    331.20 TO NODE    331.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    87.00
  UPSTREAM ELEVATION(FEET) =   1622.00
  DOWNSTREAM ELEVATION(FEET) =   1585.00
  ELEVATION DIFFERENCE(FEET) =     37.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.845
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.338
  SUBAREA RUNOFF(CFS) =      0.47
  TOTAL AREA(ACRES) =      0.16   TOTAL RUNOFF(CFS) =      0.47

****************************************************************************
  FLOW PROCESS FROM NODE    331.10 TO NODE    330.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1585.00  DOWNSTREAM(FEET) =    814.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2844.00   CHANNEL SLOPE =  0.2711
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1870 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.47
  FLOW VELOCITY(FEET/SEC) =   2.42 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  19.57   Tc(MIN.) =  25.42
  LONGEST FLOWPATH FROM NODE    331.20 TO NODE    330.00 =  2931.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    330.00 TO NODE    330.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.231
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3100
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3101
  SUBAREA AREA(ACRES) =   42.74   SUBAREA RUNOFF(CFS) =   42.81
  TOTAL AREA(ACRES) =     42.90   TOTAL RUNOFF(CFS) =   42.99
  TC(MIN.) =  25.42

****************************************************************************
  FLOW PROCESS FROM NODE    330.00 TO NODE    330.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  25.42
  RAINFALL INTENSITY(INCH/HR) =   3.23
  TOTAL STREAM AREA(ACRES) =    42.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     42.99
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    332.30 TO NODE    332.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    96.80
  UPSTREAM ELEVATION(FEET) =   1375.00
  DOWNSTREAM ELEVATION(FEET) =   1368.00
  ELEVATION DIFFERENCE(FEET) =      7.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.869
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.514
  SUBAREA RUNOFF(CFS) =      0.16
  TOTAL AREA(ACRES) =      0.06   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
  FLOW PROCESS FROM NODE    332.20 TO NODE    332.10 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1368.00  DOWNSTREAM(FEET) =    980.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1273.00   CHANNEL SLOPE =  0.3048
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1962 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.16
  FLOW VELOCITY(FEET/SEC) =   2.48 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   8.55   Tc(MIN.) =  15.42
  LONGEST FLOWPATH FROM NODE    332.30 TO NODE    332.10 =  1369.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    332.10 TO NODE    332.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.459
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   17.65   SUBAREA RUNOFF(CFS) =   27.55
  TOTAL AREA(ACRES) =     17.71   TOTAL RUNOFF(CFS) =   27.64
  TC(MIN.) =  15.42

****************************************************************************
  FLOW PROCESS FROM NODE    332.10 TO NODE    330.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    980.00  DOWNSTREAM(FEET) =    814.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1361.00   CHANNEL SLOPE =  0.1220
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1163 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     27.64
  FLOW VELOCITY(FEET/SEC) =   5.77 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.93   Tc(MIN.) =  19.35
  LONGEST FLOWPATH FROM NODE    332.30 TO NODE    330.00 =  2730.80 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    330.00 TO NODE    330.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.852
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   13.94   SUBAREA RUNOFF(CFS) =   18.79
  TOTAL AREA(ACRES) =     31.65   TOTAL RUNOFF(CFS) =   42.67
  TC(MIN.) =  19.35

****************************************************************************
  FLOW PROCESS FROM NODE    330.00 TO NODE    330.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =  19.35
  RAINFALL INTENSITY(INCH/HR) =   3.85
  TOTAL STREAM AREA(ACRES) =    31.65
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     42.67

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       77.24    18.41        3.978         69.30
     2       42.99    25.42        3.231         42.90
     3       42.67    19.35        3.852         31.65

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1      148.97    18.41       3.978
     2      150.20    19.35       3.852
     3      141.52    25.42       3.231

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    150.20   Tc(MIN.) =   19.35
  TOTAL AREA(ACRES) =    143.85
  LONGEST FLOWPATH FROM NODE    351.40 TO NODE    330.00 =  3358.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    330.00 TO NODE    320.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    814.00  DOWNSTREAM(FEET) =    600.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   871.00   CHANNEL SLOPE =  0.2457
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1786 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    150.20
  FLOW VELOCITY(FEET/SEC) =  12.56 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.16   Tc(MIN.) =  20.51
  LONGEST FLOWPATH FROM NODE    351.40 TO NODE    320.00 =  4229.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     320.00 TO NODE     320.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.710
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2993
  SUBAREA AREA(ACRES) =   38.87   SUBAREA RUNOFF(CFS) =   40.38
  TOTAL AREA(ACRES) =    182.72   TOTAL RUNOFF(CFS) =  202.89
  TC(MIN.) =  20.51

****************************************************************************
  FLOW PROCESS FROM NODE     320.00 TO NODE     310.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   600.00  DOWNSTREAM(FEET) =   537.00
  FLOW LENGTH(FEET) =   500.00   MANNING'S N =  0.015
  DEPTH OF FLOW IN  84.0 INCH PIPE IS  18.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  31.75
  GIVEN PIPE DIAMETER(INCH) =  84.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    202.89
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =  20.77
  LONGEST FLOWPATH FROM NODE    351.40 TO NODE    310.00 =  4729.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     310.00 TO NODE     310.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.680
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2959
  SUBAREA AREA(ACRES) =   16.93   SUBAREA RUNOFF(CFS) =   16.20
  TOTAL AREA(ACRES) =    199.65   TOTAL RUNOFF(CFS) =  217.44
  TC(MIN.) =  20.77

****************************************************************************
  FLOW PROCESS FROM NODE     310.00 TO NODE       3.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   537.00  DOWNSTREAM(FEET) =   522.00
  FLOW LENGTH(FEET) =   630.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  84.0 INCH PIPE IS  27.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.79
  GIVEN PIPE DIAMETER(INCH) =  84.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    217.44
  PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =  21.30
  LONGEST FLOWPATH FROM NODE    351.40 TO NODE      3.00 =  5359.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =    199.65  TC(MIN.) =     21.30
  PEAK FLOW RATE(CFS)    =    217.44
============================================================================
```

==========

END OF RATIONAL METHOD ANALYSIS

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR04

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
402	401.8	2	980.0	950.0	110.0	0.25	0.14	Initial Runoff
401.8	401.6	5	950.0	685.0	674.0			Channel Flow
401.8	401.6	8				0.25	3.46	Add Area
401.6	401	5	685.0	585.0	512.0			
401.6	401	8				0.25	8.04	
401	4	4	585.0	515.0	545.0			Ex. 30" CPS Caltrans
								Storm Drain System
							11.64	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2004 Advanced Engineering Software (aes)
            Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC
                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                 *
* SUBBASIN # 4                                                           *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR04.DAT
  TIME/DATE OF STUDY: 14:22 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    401.80 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   110.00
  UPSTREAM ELEVATION(FEET) =    980.00
  DOWNSTREAM ELEVATION(FEET) =    950.00
  ELEVATION DIFFERENCE(FEET) =     30.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.102
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
```

```
          THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.353
  SUBAREA RUNOFF(CFS) =      0.26
  TOTAL AREA(ACRES) =      0.14   TOTAL RUNOFF(CFS) =      0.26

****************************************************************************
  FLOW PROCESS FROM NODE    401.80 TO NODE    401.60 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    950.00  DOWNSTREAM(FEET) =    685.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   674.00   CHANNEL SLOPE =  0.3932
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2128 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.26
  FLOW VELOCITY(FEET/SEC) =   2.58 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.35   Tc(MIN.) =  11.45
  LONGEST FLOWPATH FROM NODE    402.00 TO NODE    401.60 =   784.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    401.80 TO NODE    401.60 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.404
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
  SUBAREA AREA(ACRES) =    3.46   SUBAREA RUNOFF(CFS) =    4.67
  TOTAL AREA(ACRES) =      3.60   TOTAL RUNOFF(CFS) =    4.86
  TC(MIN.) =  11.45

****************************************************************************
  FLOW PROCESS FROM NODE    401.60 TO NODE    401.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    685.00  DOWNSTREAM(FEET) =    585.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   512.00   CHANNEL SLOPE =  0.1953
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1577 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      4.86
  FLOW VELOCITY(FEET/SEC) =   3.77 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.27   Tc(MIN.) =  13.72
  LONGEST FLOWPATH FROM NODE    402.00 TO NODE    401.00 =  1296.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    401.60 TO NODE    401.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.810
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
  SUBAREA AREA(ACRES) =    8.04   SUBAREA RUNOFF(CFS) =    9.67
```

```
  TOTAL AREA(ACRES) =      11.64   TOTAL RUNOFF(CFS) =   14.00
  TC(MIN.) =  13.72

****************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE      4.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   585.00  DOWNSTREAM(FEET) =   515.00
  FLOW LENGTH(FEET) =   545.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS   6.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.15
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.00
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =  14.22
  LONGEST FLOWPATH FROM NODE    402.00 TO NODE      4.00 =  1841.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =     11.64  TC(MIN.) =     14.22
  PEAK FLOW RATE(CFS)    =     14.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR05

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
510.3	510.2	2	1,210.0	1,180.0	110.0	0.25	0.11	Initial Runoff
510.2	510.1	5	1,180.0	860.0	1,145.0			Channel Flow
510.2	510.1	8				0.25	10.24	Add Area
510.1	510	5	860.0	670.0	787.0			
510.1	510	8				0.25	9.05	
510	5.2	4	670.0	610.0	175.0			EX. 30" CSP Caltrans
5.2	5.1	4	610.0	575.0	225.0			Ex. 36" CSP
5.1	5.1	1						1 of 2
5.5	5.4	2	680.0	610.0	185.0	0.27	0.54	Runoff to 24" CSP/RCP
5.4	5.3	4	610.0	580.0	225.0			First segment 24" pipe
5.3	5.1	4	580.0	575.0	520.0			Second segment 24" pipe
5.1	5.1	1						2 of 2
5.1	5	4	575.0	550.0	100.0			36" CSP
5	5	1						1 of 2
504	503.8	2	1,460.0	1,440.0	75.0	0.35	0.21	Initial Runoff
503.8	503.6	5	1,440.0	1,380.0	300.0			Channel Flow
503.8	503.6	8				0.35	2.05	Add Area
503.6	503	5	1,380.0	965.0	1,225.0			
503.6	503	8				0.30	11.86	
503	502	5	965.0	665.0	1,635.0			
503	502	8				0.25	29.85	
502	501	5	665.0	625.0	540.0			
502	501.5	8				0.25	4.98	
501.5	501	4	625.0	575.0	400.0			Ex. 36" CSP Caltrans
501	5	4	575.0	550.0	110.0			Ex. 42" CSP Caltrans
5	5	1						2 of 2
							68.89	Total Area

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

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            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
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             Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

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                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************** DESCRIPTION OF STUDY **************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                  *
* SUBBASIN # 5                                                            *
* 2469.01A - OCTOBER 2006                                                 *
 ***************************************************************************

  FILE NAME: MERR05.DAT
  TIME/DATE OF STUDY: 12:06 10/16/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE    510.30 TO NODE    510.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   110.00
  UPSTREAM ELEVATION(FEET) =   1210.00
  DOWNSTREAM ELEVATION(FEET) =   1180.00
  ELEVATION DIFFERENCE(FEET) =     30.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.102
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
```

```
          THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.353
  SUBAREA RUNOFF(CFS) =       0.20
  TOTAL AREA(ACRES) =       0.11   TOTAL RUNOFF(CFS) =       0.20

****************************************************************************
  FLOW PROCESS FROM NODE    510.20 TO NODE    510.10 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1180.00  DOWNSTREAM(FEET) =    860.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1145.00   CHANNEL SLOPE =  0.2795
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1898 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.20
  FLOW VELOCITY(FEET/SEC) =   2.44 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.82   Tc(MIN.) =  14.92
  LONGEST FLOWPATH FROM NODE    510.30 TO NODE    510.10 =  1255.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    510.20 TO NODE    510.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.555
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
  SUBAREA AREA(ACRES) =   10.24   SUBAREA RUNOFF(CFS) =   11.66
  TOTAL AREA(ACRES) =     10.35   TOTAL RUNOFF(CFS) =   11.79
  TC(MIN.) =  14.92

****************************************************************************
  FLOW PROCESS FROM NODE    510.10 TO NODE    510.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    860.00  DOWNSTREAM(FEET) =    670.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   787.00   CHANNEL SLOPE =  0.2414
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1771 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     11.79
  FLOW VELOCITY(FEET/SEC) =   5.36 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.45   Tc(MIN.) =  17.37
  LONGEST FLOWPATH FROM NODE    510.30 TO NODE    510.00 =  2042.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    510.10 TO NODE    510.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.130
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
  SUBAREA AREA(ACRES) =    9.05   SUBAREA RUNOFF(CFS) =    9.34
```

```
  TOTAL AREA(ACRES) =      19.40   TOTAL RUNOFF(CFS) =    20.03
  TC(MIN.) =  17.37

****************************************************************************
  FLOW PROCESS FROM NODE     510.00 TO NODE      5.20 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   670.00  DOWNSTREAM(FEET) =   610.00
  FLOW LENGTH(FEET) =   175.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  30.0 INCH PIPE IS   8.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.50
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      20.03
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =  17.53
  LONGEST FLOWPATH FROM NODE    510.30 TO NODE      5.20 =  2217.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.20 TO NODE      5.10 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   610.00  DOWNSTREAM(FEET) =   575.00
  FLOW LENGTH(FEET) =   225.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  36.0 INCH PIPE IS   9.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.71
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      20.03
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =  17.80
  LONGEST FLOWPATH FROM NODE    510.30 TO NODE      5.10 =  2442.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.10 TO NODE      5.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  17.80
  RAINFALL INTENSITY(INCH/HR) =   4.07
  TOTAL STREAM AREA(ACRES) =    19.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     20.03

****************************************************************************
  FLOW PROCESS FROM NODE      5.50 TO NODE      5.40 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2700
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   185.00
  UPSTREAM ELEVATION(FEET) =    680.00
  DOWNSTREAM ELEVATION(FEET) =    610.00
  ELEVATION DIFFERENCE(FEET) =     70.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.935
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.467
```

```
  SUBAREA RUNOFF(CFS) =       1.09
  TOTAL AREA(ACRES) =       0.54   TOTAL RUNOFF(CFS) =       1.09

****************************************************************************
  FLOW PROCESS FROM NODE       5.40 TO NODE       5.30 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   610.00  DOWNSTREAM(FEET) =   580.00
  FLOW LENGTH(FEET) =   225.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   2.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.84
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.09
  PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =   7.36
  LONGEST FLOWPATH FROM NODE       5.50 TO NODE       5.30 =   410.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE       5.30 TO NODE       5.10 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   580.00  DOWNSTREAM(FEET) =   575.00
  FLOW LENGTH(FEET) =   520.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   3.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.51
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.09
  PIPE TRAVEL TIME(MIN.) =   2.47    Tc(MIN.) =   9.83
  LONGEST FLOWPATH FROM NODE       5.50 TO NODE       5.10 =   930.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE       5.10 TO NODE       5.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.83
  RAINFALL INTENSITY(INCH/HR) =   5.96
  TOTAL STREAM AREA(ACRES) =     0.54
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.09

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       20.03    17.80        4.065         19.40
     2        1.09     9.83        5.964          0.54

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       12.15     9.83        5.964
     2       20.77    17.80        4.065

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     20.77   Tc(MIN.) =   17.80
```

```
  TOTAL AREA(ACRES) =     19.94
  LONGEST FLOWPATH FROM NODE    510.30 TO NODE      5.10 =  2442.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.10 TO NODE      5.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   575.00  DOWNSTREAM(FEET) =   550.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  36.0 INCH PIPE IS   8.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.40
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     20.77
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  17.90
  LONGEST FLOWPATH FROM NODE    510.30 TO NODE      5.00 =  2542.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  17.90
  RAINFALL INTENSITY(INCH/HR) =   4.05
  TOTAL STREAM AREA(ACRES) =    19.94
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     20.77

****************************************************************************
  FLOW PROCESS FROM NODE    504.00 TO NODE    503.80 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1460.00
  DOWNSTREAM ELEVATION(FEET) =   1440.00
  ELEVATION DIFFERENCE(FEET) =     20.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.427
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.747
  SUBAREA RUNOFF(CFS) =      0.64
  TOTAL AREA(ACRES) =      0.21   TOTAL RUNOFF(CFS) =      0.64

****************************************************************************
  FLOW PROCESS FROM NODE    503.80 TO NODE    503.60 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1440.00  DOWNSTREAM(FEET) =   1380.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.2000
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1600 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.64
  FLOW VELOCITY(FEET/SEC) =   2.24 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.23   Tc(MIN.) =   7.66
  LONGEST FLOWPATH FROM NODE    504.00 TO NODE    503.60 =   375.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    503.80 TO NODE    503.60 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.004
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =     2.05   SUBAREA RUNOFF(CFS) =     5.03
  TOTAL AREA(ACRES) =       2.26   TOTAL RUNOFF(CFS) =     5.54
  TC(MIN.) =   7.66

****************************************************************************
  FLOW PROCESS FROM NODE    503.60 TO NODE    503.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1380.00  DOWNSTREAM(FEET) =    965.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1225.00   CHANNEL SLOPE =  0.3388
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2033 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       5.54
  FLOW VELOCITY(FEET/SEC) =   4.47 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.57   Tc(MIN.) =  12.23
  LONGEST FLOWPATH FROM NODE    504.00 TO NODE    503.00 =  1600.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    503.60 TO NODE    503.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.179
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3080
  SUBAREA AREA(ACRES) =    11.86   SUBAREA RUNOFF(CFS) =   18.43
  TOTAL AREA(ACRES) =      14.12   TOTAL RUNOFF(CFS) =   22.52
  TC(MIN.) =  12.23

****************************************************************************
  FLOW PROCESS FROM NODE    503.00 TO NODE    502.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    965.00  DOWNSTREAM(FEET) =    665.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1635.00   CHANNEL SLOPE =  0.1835
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1517 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      22.52
  FLOW VELOCITY(FEET/SEC) =   6.15 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.43   Tc(MIN.) =  16.66
  LONGEST FLOWPATH FROM NODE    504.00 TO NODE    502.00 =  3235.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    503.00 TO NODE    502.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.243
 *USER SPECIFIED(SUBAREA):
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.2686
 SUBAREA AREA(ACRES) =   29.85   SUBAREA RUNOFF(CFS) =   31.66
 TOTAL AREA(ACRES) =     43.97   TOTAL RUNOFF(CFS) =   50.12
 TC(MIN.) =  16.66

******************************************************************************
 FLOW PROCESS FROM NODE    502.00 TO NODE    501.00 IS CODE =  53
------------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    665.00  DOWNSTREAM(FEET) =    625.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   540.00   CHANNEL SLOPE =  0.0741
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0741 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =     50.12
 FLOW VELOCITY(FEET/SEC) =   5.61 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.60   Tc(MIN.) =  18.26
 LONGEST FLOWPATH FROM NODE    504.00 TO NODE    501.00 =  3775.00 FEET.

******************************************************************************
 FLOW PROCESS FROM NODE    502.00 TO NODE    501.50 IS CODE =  81
------------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.999
 *USER SPECIFIED(SUBAREA):
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.2667
 SUBAREA AREA(ACRES) =    4.98   SUBAREA RUNOFF(CFS) =    4.98
 TOTAL AREA(ACRES) =     48.95   TOTAL RUNOFF(CFS) =   52.21
 TC(MIN.) =  18.26

******************************************************************************
 FLOW PROCESS FROM NODE    501.50 TO NODE    501.00 IS CODE =  41
------------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   625.00  DOWNSTREAM(FEET) =   575.00
 FLOW LENGTH(FEET) =   400.00   MANNING'S N =  0.024
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  16.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.51
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     52.21
 PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =  18.67
 LONGEST FLOWPATH FROM NODE    504.00 TO NODE    501.00 =  4175.00 FEET.

******************************************************************************
 FLOW PROCESS FROM NODE    501.00 TO NODE      5.00 IS CODE =  41
------------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   575.00  DOWNSTREAM(FEET) =   550.00
 FLOW LENGTH(FEET) =   110.00   MANNING'S N =  0.024
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  13.1 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.33
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     52.21
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =  18.76
  LONGEST FLOWPATH FROM NODE    504.00 TO NODE      5.00 =  4285.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  18.76
  RAINFALL INTENSITY(INCH/HR) =   3.93
  TOTAL STREAM AREA(ACRES) =    48.95
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     52.21

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       20.77    17.90        4.050         19.94
     2       52.21    18.76        3.930         48.95

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       70.61    17.90       4.050
     2       72.37    18.76       3.930

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     72.37   Tc(MIN.) =   18.76
  TOTAL AREA(ACRES) =     68.89
  LONGEST FLOWPATH FROM NODE    504.00 TO NODE      5.00 =  4285.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     68.89  TC(MIN.) =     18.76
  PEAK FLOW RATE(CFS)   =     72.37
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR06

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
602	601.5	2	725.0	680.0	76.0	0.3	0.22	
601.5	601	5	680.0	625.0	223.0			
601.5	601	8				0.3	2.23	
601	6	4	625.0	600.0	360.0			Ex. 24" Caltrans
								Storm Drain
							2.45	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                        2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2004 Advanced Engineering Software (aes)
            Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC
                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                            (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                 *
* SUBBASIN # 6                                                           *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR06.DAT
  TIME/DATE OF STUDY: 11:23 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE    602.00 TO NODE    601.50 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    76.00
  UPSTREAM ELEVATION(FEET) =    725.00
  DOWNSTREAM ELEVATION(FEET) =    680.00
  ELEVATION DIFFERENCE(FEET) =     45.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.827
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.354
SUBAREA RUNOFF(CFS) =       0.55
TOTAL AREA(ACRES) =       0.22   TOTAL RUNOFF(CFS) =       0.55

****************************************************************************
FLOW PROCESS FROM NODE    601.50 TO NODE    601.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    680.00  DOWNSTREAM(FEET) =    625.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   223.00   CHANNEL SLOPE =  0.2466
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1789 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =       0.55
FLOW VELOCITY(FEET/SEC) =   2.37 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.57   Tc(MIN.) =   7.40
LONGEST FLOWPATH FROM NODE    602.00 TO NODE    601.00 =   299.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    601.50 TO NODE    601.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.163
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3000
SUBAREA AREA(ACRES) =    2.23   SUBAREA RUNOFF(CFS) =    4.79
TOTAL AREA(ACRES) =      2.45   TOTAL RUNOFF(CFS) =    5.27
TC(MIN.) =   7.40

****************************************************************************
FLOW PROCESS FROM NODE    601.00 TO NODE      6.00 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   625.00  DOWNSTREAM(FEET) =   600.00
FLOW LENGTH(FEET) =   360.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  24.0 INCH PIPE IS   5.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  11.26
GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      5.27
PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =   7.93
LONGEST FLOWPATH FROM NODE    602.00 TO NODE      6.00 =   659.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =      2.45  TC(MIN.) =      7.93
PEAK FLOW RATE(CFS)   =      5.27
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR07

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
702	701.5	2	770.0	735.0	84.0	0.30	0.14	
701.5	701	5	735.0	625.0	347.0			
701.5	701	8				0.28	1.96	
701	7	4	625.0	580.0	375.0			EX. 24" CSP Caltrans
								Storm Drain
							2.1	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
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                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC
                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                 *
* SUBBASIN # 7                                                           *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR07.DAT
  TIME/DATE OF STUDY: 11:26 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE    702.00 TO NODE    701.50 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    84.00
  UPSTREAM ELEVATION(FEET) =    770.00
  DOWNSTREAM ELEVATION(FEET) =    735.00
  ELEVATION DIFFERENCE(FEET) =     35.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.126
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.089
SUBAREA RUNOFF(CFS) =       0.34
TOTAL AREA(ACRES) =       0.14   TOTAL RUNOFF(CFS) =       0.34

****************************************************************************
FLOW PROCESS FROM NODE    701.50 TO NODE    701.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    735.00  DOWNSTREAM(FEET) =    625.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   347.00   CHANNEL SLOPE =  0.3170
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1993 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =       0.34
FLOW VELOCITY(FEET/SEC) =   2.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.31   Tc(MIN.) =   8.44
LONGEST FLOWPATH FROM NODE    702.00 TO NODE    701.00 =   431.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    701.50 TO NODE    701.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.579
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2800
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.2813
SUBAREA AREA(ACRES) =    1.96   SUBAREA RUNOFF(CFS) =    3.61
TOTAL AREA(ACRES) =      2.10   TOTAL RUNOFF(CFS) =    3.89
TC(MIN.) =   8.44

****************************************************************************
FLOW PROCESS FROM NODE    701.00 TO NODE      7.00 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   625.00  DOWNSTREAM(FEET) =   580.00
FLOW LENGTH(FEET) =   375.00   MANNING'S N =  0.024
DEPTH OF FLOW IN  24.0 INCH PIPE IS   5.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   8.11
GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      3.89
PIPE TRAVEL TIME(MIN.) =   0.77    Tc(MIN.) =   9.21
LONGEST FLOWPATH FROM NODE    702.00 TO NODE      7.00 =   806.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =      2.10  TC(MIN.) =      9.21
PEAK FLOW RATE(CFS)   =      3.89
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR08

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
804	803	2	900.0	825.0	120.0	0.25	0.28	
803	802	5	825.0	660.0	518.0			
803	802	8				0.25	5.69	
802	801	5	660.0	590.0	395.0			
802	801	8				0.28	5.7	
801	8	4	590.0	560.0	425.0			EX. 30" CSP Caltrans
								Strorm Drain
							11.67	Total Area

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

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            Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC
                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                 *
* SUBBASIN # 8                                                           *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR08.DAT
  TIME/DATE OF STUDY: 11:27 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE    804.00 TO NODE    803.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   120.00
  UPSTREAM ELEVATION(FEET) =    900.00
  DOWNSTREAM ELEVATION(FEET) =    825.00
  ELEVATION DIFFERENCE(FEET) =     75.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.102
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
```

```
          THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.353
  SUBAREA RUNOFF(CFS) =      0.51
  TOTAL AREA(ACRES) =      0.28   TOTAL RUNOFF(CFS) =      0.51

****************************************************************************
  FLOW PROCESS FROM NODE    803.00 TO NODE    802.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    825.00  DOWNSTREAM(FEET) =    660.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   518.00   CHANNEL SLOPE =  0.3185
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1996 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.51
  FLOW VELOCITY(FEET/SEC) =   2.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.45   Tc(MIN.) =  10.55
  LONGEST FLOWPATH FROM NODE    804.00 TO NODE    802.00 =   638.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    803.00 TO NODE    802.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.696
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
  SUBAREA AREA(ACRES) =    5.69   SUBAREA RUNOFF(CFS) =    8.10
  TOTAL AREA(ACRES) =      5.97   TOTAL RUNOFF(CFS) =    8.50
  TC(MIN.) =  10.55

****************************************************************************
  FLOW PROCESS FROM NODE    802.00 TO NODE    801.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    660.00  DOWNSTREAM(FEET) =    590.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   395.00   CHANNEL SLOPE =  0.1772
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1486 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      8.50
  FLOW VELOCITY(FEET/SEC) =   4.40 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.50   Tc(MIN.) =  12.05
  LONGEST FLOWPATH FROM NODE    804.00 TO NODE    801.00 =  1033.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    802.00 TO NODE    801.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.229
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2647
  SUBAREA AREA(ACRES) =    5.70   SUBAREA RUNOFF(CFS) =    8.35
```

```
  TOTAL AREA(ACRES) =     11.67   TOTAL RUNOFF(CFS) =   16.15
  TC(MIN.) =  12.05

****************************************************************************
  FLOW PROCESS FROM NODE    801.00 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   590.00  DOWNSTREAM(FEET) =   560.00
  FLOW LENGTH(FEET) =   425.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS   8.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.30
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     16.15
  PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =  12.51
  LONGEST FLOWPATH FROM NODE    804.00 TO NODE      8.00 =  1458.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     11.67  TC(MIN.) =     12.51
  PEAK FLOW RATE(CFS)   =     16.15
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR09

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
903	902.8	2	1,015.0	985.0	75.0	0.25	0.15	
902.8	902.6	5	985.0	905.0	300.0			
902.8	902.6	8				0.25	0.58	
902.6	902.4	5	905.0	705.0	658.0			
902.6	902.4	8				0.25	6.61	
902.4	902	5	705.0	645.0	277.0			
902.4	902	8				0.26	3.86	
902	901	5	645.0	580.0	540.0			
902	901	8				0.27	14.64	
901	9	4	580.0	560.0	555.0			EX. 42" CSP Caltrans
							25.84	Total Area

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

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                          Analysis prepared by:

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                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************** DESCRIPTION OF STUDY **************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                  *
* SUBBASIN # 9                                                            *
* 2469.01A - OCTOBER 2006                                                 *
 ***************************************************************************

  FILE NAME: MERR09.DAT
  TIME/DATE OF STUDY: 12:43 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE    903.00 TO NODE    902.80 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1015.00
  DOWNSTREAM ELEVATION(FEET) =    985.00
  ELEVATION DIFFERENCE(FEET) =     30.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.151
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.068
SUBAREA RUNOFF(CFS) =       0.30
TOTAL AREA(ACRES) =       0.15   TOTAL RUNOFF(CFS) =       0.30

****************************************************************************
FLOW PROCESS FROM NODE    902.80 TO NODE    902.60 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    985.00  DOWNSTREAM(FEET) =    905.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.2667
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1856 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =       0.30
FLOW VELOCITY(FEET/SEC) =   2.41 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.07   Tc(MIN.) =   8.22
LONGEST FLOWPATH FROM NODE    903.00 TO NODE    902.60 =   375.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    902.80 TO NODE    902.60 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.690
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
SUBAREA AREA(ACRES) =     0.58   SUBAREA RUNOFF(CFS) =     0.97
TOTAL AREA(ACRES) =       0.73   TOTAL RUNOFF(CFS) =     1.22
TC(MIN.) =   8.22

****************************************************************************
FLOW PROCESS FROM NODE    902.60 TO NODE    902.40 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    905.00  DOWNSTREAM(FEET) =    705.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   658.00   CHANNEL SLOPE =  0.3040
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1960 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       1.22
FLOW VELOCITY(FEET/SEC) =   2.65 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   4.14   Tc(MIN.) =  12.36
LONGEST FLOWPATH FROM NODE    903.00 TO NODE    902.40 =  1033.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    902.60 TO NODE    902.40 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.143
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
SUBAREA AREA(ACRES) =     6.61   SUBAREA RUNOFF(CFS) =     8.50
TOTAL AREA(ACRES) =       7.34   TOTAL RUNOFF(CFS) =     9.44
TC(MIN.) =  12.36
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    902.40 TO NODE    902.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    705.00  DOWNSTREAM(FEET) =    645.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   277.00   CHANNEL SLOPE =  0.2166
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1683 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      9.44
  FLOW VELOCITY(FEET/SEC) =   4.85 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.95   Tc(MIN.) =  13.31
  LONGEST FLOWPATH FROM NODE    903.00 TO NODE    902.00 =  1310.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    902.40 TO NODE    902.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.903
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2534
  SUBAREA AREA(ACRES) =    3.86   SUBAREA RUNOFF(CFS) =    4.92
  TOTAL AREA(ACRES) =     11.20   TOTAL RUNOFF(CFS) =   13.92
  TC(MIN.) =  13.31

****************************************************************************
  FLOW PROCESS FROM NODE    902.00 TO NODE    901.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    645.00  DOWNSTREAM(FEET) =    580.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   540.00   CHANNEL SLOPE =  0.1204
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1152 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     13.92
  FLOW VELOCITY(FEET/SEC) =   4.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.97   Tc(MIN.) =  15.28
  LONGEST FLOWPATH FROM NODE    903.00 TO NODE    901.00 =  1850.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    902.00 TO NODE    901.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.485
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2628
  SUBAREA AREA(ACRES) =   14.64   SUBAREA RUNOFF(CFS) =   17.73
  TOTAL AREA(ACRES) =     25.84   TOTAL RUNOFF(CFS) =   30.46
  TC(MIN.) =  15.28

****************************************************************************
  FLOW PROCESS FROM NODE    901.00 TO NODE      9.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   580.00  DOWNSTREAM(FEET) =   560.00
  FLOW LENGTH(FEET) =   555.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  16.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.00
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     30.46
  PIPE TRAVEL TIME(MIN.) =   1.03    Tc(MIN.) =  16.31
  LONGEST FLOWPATH FROM NODE    903.00 TO NODE      9.00 =  2405.00 FEET.
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     25.84  TC(MIN.) =     16.31
  PEAK FLOW RATE(CFS)   =     30.46
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR10D

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
1041	1038	2	1,485.0	1,470.0	75.0	0.35	0.61	Initial
1038	1036	5	1,470.0	1,460.0	300.0			
1038	1036	8				0.35	2.18	
1036	1034	5	1,460.0	1,325.0	643.0			
1036	1034	8				0.35	8.09	
1034	1030	5	1,325.0	1,175.0	646.0			
1034	1030	8				0.35	20.55	
1030	1030	1						1 of 2
1031	1030.8	2	1,420.0	1,410.0	75.0	0.35	0.62	Initial
1030.8	1030.6	5	1,410.0	1,365.0	300.0			
1030.8	1030.6	8				0.35	10.56	
1030.6	1030.4	5	1,365.0	1,285.0	600.0			
1030.6	1030.4	8				0.35	21.21	
1030.4	1030	5	1,285.0	1,175.0	610.0			
1030.4	1030	8				0.35	18.41	
1030	1030	1						2 of 2
1030	1023	5	1,175.0	950.0	1,130.0			
1030	1023	8				0.342	40.13	
1023	1023	1						1 of 2
1025	1024.8	2	1,480.0	1,470.0	75.0	0.35	1.77	
1024.8	1024.4	5	1,470.0	1,440.0	300.0			
1024.8	1024.6	8				0.35	6.04	
1024.6	1024.4	5	1,440.0	1,360.0	600.0			
1024.6	1024.4	8				0.35	17.55	
1024.4	1024	5	1,360.0	1,080.0	1,175.0			
1024.4	1024	8				0.35	68.27	
1024	1023	5	1,080.0	950.0	805.0			
1023	1023	1						2 of 2
1023	1021	5	950.0	750.0	2,070.0			
1022	1021	8				0.29	91.65	
1021	1002	5	750.0	675.0	625.0			
1002	1002	1						1 of 2
1004	1003.8	2	1,450.0	1,435.0	75.0	0.35	0.27	Initial
1003.8	1003.6	5	1,435.0	1,410.0	300.0			
1003.8	1003.6	8				0.35	2.86	
1003.6	1003.4	5	1,410.0	1,135.0	818.0			
1003.6	1003.4	8				0.27	13.89	
1003.4	1003	5	1,135.0	965.0	1,370.0			
1003.4	1003	8				0.278	55.85	
1003	1002	5	975.0	700.0	1,941.0			
1003	1002	8				0.27	106.38	
1002	1002	1						2 of 2
1002	1001	5	700.0	675.0	1,175.0			
1001	1001	7						DET OUT Q = 109.57

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR10D

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
1001	10	4	675.0	550.0	755.0			Ex. 42" CSP Caltrans
							486.89	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                        2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2004 Advanced Engineering Software (aes)
            Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC.
                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                            (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                 *
* SUBBASIN 10 - WITH DETENTION ROUTING                                   *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR10D.DAT
  TIME/DATE OF STUDY: 11:56 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   1041.00 TO NODE   1038.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1485.00
  DOWNSTREAM ELEVATION(FEET) =   1470.00
  ELEVATION DIFFERENCE(FEET) =     15.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.427
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.747
SUBAREA RUNOFF(CFS) =       1.87
TOTAL AREA(ACRES) =       0.61   TOTAL RUNOFF(CFS) =       1.87

****************************************************************************
FLOW PROCESS FROM NODE   1038.00 TO NODE   1036.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1470.00  DOWNSTREAM(FEET) =   1460.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.0333
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .0333 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       1.87
FLOW VELOCITY(FEET/SEC) =   1.26 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   3.97   Tc(MIN.) =   9.40
LONGEST FLOWPATH FROM NODE   1041.00 TO NODE   1036.00 =   375.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1038.00 TO NODE   1036.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.138
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
SUBAREA AREA(ACRES) =     2.18   SUBAREA RUNOFF(CFS) =     4.68
TOTAL AREA(ACRES) =       2.79   TOTAL RUNOFF(CFS) =     5.99
TC(MIN.) =   9.40

****************************************************************************
FLOW PROCESS FROM NODE   1036.00 TO NODE   1034.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1460.00  DOWNSTREAM(FEET) =   1325.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   643.00   CHANNEL SLOPE =  0.2100
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1650 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       5.99
FLOW VELOCITY(FEET/SEC) =   4.13 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.60   Tc(MIN.) =  11.99
LONGEST FLOWPATH FROM NODE   1041.00 TO NODE   1034.00 =  1018.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1036.00 TO NODE   1034.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.244
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
SUBAREA AREA(ACRES) =     8.09   SUBAREA RUNOFF(CFS) =    14.85
TOTAL AREA(ACRES) =      10.88   TOTAL RUNOFF(CFS) =    19.97
TC(MIN.) =  11.99

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

```
  FLOW PROCESS FROM NODE   1034.00 TO NODE   1030.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1325.00  DOWNSTREAM(FEET) =   1175.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   646.00   CHANNEL SLOPE =  0.2322
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1741 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     19.97
  FLOW VELOCITY(FEET/SEC) =   6.33 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.70   Tc(MIN.) =  13.69
  LONGEST FLOWPATH FROM NODE   1041.00 TO NODE   1030.00 =  1664.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1034.00 TO NODE   1030.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.815
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   20.55   SUBAREA RUNOFF(CFS) =   34.63
  TOTAL AREA(ACRES) =     31.43   TOTAL RUNOFF(CFS) =   52.96
  TC(MIN.) =  13.69

****************************************************************************
  FLOW PROCESS FROM NODE   1030.00 TO NODE   1030.00 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.) =  13.69
  RAINFALL INTENSITY(INCH/HR) =   4.81
  TOTAL STREAM AREA(ACRES) =    31.43
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     52.96

****************************************************************************
  FLOW PROCESS FROM NODE   1031.00 TO NODE   1030.80 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1420.00
  DOWNSTREAM ELEVATION(FEET) =   1410.00
  ELEVATION DIFFERENCE(FEET) =     10.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.427
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.747
  SUBAREA RUNOFF(CFS) =      1.90
  TOTAL AREA(ACRES) =      0.62   TOTAL RUNOFF(CFS) =      1.90

****************************************************************************
  FLOW PROCESS FROM NODE   1030.80 TO NODE   1030.60 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1410.00  DOWNSTREAM(FEET) =   1365.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.1500
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1350 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      1.90
  FLOW VELOCITY(FEET/SEC) =   2.55 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.96   Tc(MIN.) =   7.39
  LONGEST FLOWPATH FROM NODE   1031.00 TO NODE   1030.60 =   375.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1030.80 TO NODE   1030.60 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.167
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   10.56   SUBAREA RUNOFF(CFS) =   26.49
  TOTAL AREA(ACRES) =     11.18   TOTAL RUNOFF(CFS) =   28.05
  TC(MIN.) =   7.39

****************************************************************************
  FLOW PROCESS FROM NODE   1030.60 TO NODE   1030.40 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1365.00  DOWNSTREAM(FEET) =   1285.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   600.00   CHANNEL SLOPE =  0.1333
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1239 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     28.05
  FLOW VELOCITY(FEET/SEC) =   5.98 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.67   Tc(MIN.) =   9.06
  LONGEST FLOWPATH FROM NODE   1031.00 TO NODE   1030.40 =   975.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1030.60 TO NODE   1030.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.284
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   21.21   SUBAREA RUNOFF(CFS) =   46.65
  TOTAL AREA(ACRES) =     32.39   TOTAL RUNOFF(CFS) =   71.24
  TC(MIN.) =   9.06

****************************************************************************
  FLOW PROCESS FROM NODE   1030.40 TO NODE   1030.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1285.00  DOWNSTREAM(FEET) =   1175.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   610.00   CHANNEL SLOPE =  0.1803
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1502 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
  CHANNEL FLOW THRU SUBAREA(CFS) =      71.24
  FLOW VELOCITY(FEET/SEC) =   8.98 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.13   Tc(MIN.) =  10.19
  LONGEST FLOWPATH FROM NODE   1031.00 TO NODE   1030.00 =  1585.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1030.40 TO NODE   1030.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.825
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   18.41   SUBAREA RUNOFF(CFS) =   37.53
  TOTAL AREA(ACRES) =     50.80   TOTAL RUNOFF(CFS) =  103.56
  TC(MIN.) =  10.19

****************************************************************************
  FLOW PROCESS FROM NODE   1030.00 TO NODE   1030.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  10.19
  RAINFALL INTENSITY(INCH/HR) =   5.82
  TOTAL STREAM AREA(ACRES) =    50.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    103.56

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1        52.96    13.69        4.815        31.43
     2       103.56    10.19        5.825        50.80

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       142.99    10.19       5.825
     2       138.57    13.69       4.815

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    142.99   Tc(MIN.) =   10.19
  TOTAL AREA(ACRES) =     82.23
  LONGEST FLOWPATH FROM NODE   1041.00 TO NODE   1030.00 =  1664.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1030.00 TO NODE   1023.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1175.00  DOWNSTREAM(FEET) =    950.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1130.00   CHANNEL SLOPE =  0.1991
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1596 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    142.99
```

```
  FLOW VELOCITY(FEET/SEC) =  11.68 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.61   Tc(MIN.) =  11.81
  LONGEST FLOWPATH FROM NODE   1041.00 TO NODE   1023.00 =  2794.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1030.00 TO NODE   1023.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.298
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3420
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3474
  SUBAREA AREA(ACRES) =   40.13   SUBAREA RUNOFF(CFS) =   72.71
  TOTAL AREA(ACRES) =    122.36   TOTAL RUNOFF(CFS) =  225.20
  TC(MIN.) =  11.81

****************************************************************************
  FLOW PROCESS FROM NODE   1023.00 TO NODE   1023.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.81
  RAINFALL INTENSITY(INCH/HR) =   5.30
  TOTAL STREAM AREA(ACRES) =   122.36
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    225.20

****************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1024.80 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1480.00
  DOWNSTREAM ELEVATION(FEET) =   1470.00
  ELEVATION DIFFERENCE(FEET) =     10.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.427
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.747
  SUBAREA RUNOFF(CFS) =      5.42
  TOTAL AREA(ACRES) =      1.77   TOTAL RUNOFF(CFS) =      5.42

****************************************************************************
  FLOW PROCESS FROM NODE   1024.80 TO NODE   1024.60 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1470.00  DOWNSTREAM(FEET) =   1440.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.1000
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1000 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      5.42
  FLOW VELOCITY(FEET/SEC) =   3.11 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.61   Tc(MIN.) =   7.04
  LONGEST FLOWPATH FROM NODE   1025.00 TO NODE   1024.60 =   375.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1024.80 TO NODE   1024.60 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.398
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =     6.04   SUBAREA RUNOFF(CFS) =   15.64
  TOTAL AREA(ACRES) =       7.81   TOTAL RUNOFF(CFS) =   20.22
  TC(MIN.) =   7.04

****************************************************************************
  FLOW PROCESS FROM NODE   1024.60 TO NODE   1024.40 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1440.00  DOWNSTREAM(FEET) =   1360.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   600.00   CHANNEL SLOPE =  0.1333
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1239 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     20.22
  FLOW VELOCITY(FEET/SEC) =   5.36 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.86   Tc(MIN.) =   8.90
  LONGEST FLOWPATH FROM NODE   1025.00 TO NODE   1024.40 =   975.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1024.60 TO NODE   1024.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.358
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    17.55   SUBAREA RUNOFF(CFS) =   39.05
  TOTAL AREA(ACRES) =      25.36   TOTAL RUNOFF(CFS) =   56.43
  TC(MIN.) =   8.90

****************************************************************************
  FLOW PROCESS FROM NODE   1024.40 TO NODE   1024.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1360.00  DOWNSTREAM(FEET) =   1080.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1175.00   CHANNEL SLOPE =  0.2383
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1761 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     56.43
  FLOW VELOCITY(FEET/SEC) =   9.00 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.18   Tc(MIN.) =  11.07
  LONGEST FLOWPATH FROM NODE   1025.00 TO NODE   1024.00 =  2150.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1024.40 TO NODE   1024.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.521
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
SUBAREA AREA(ACRES) =   68.27   SUBAREA RUNOFF(CFS) =  131.93
TOTAL AREA(ACRES) =     93.63   TOTAL RUNOFF(CFS) =  180.93
TC(MIN.) =  11.07

****************************************************************************
FLOW PROCESS FROM NODE   1024.00 TO NODE   1023.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1080.00  DOWNSTREAM(FEET) =    950.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   805.00   CHANNEL SLOPE =  0.1615
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1407 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =    180.93
FLOW VELOCITY(FEET/SEC) =  11.86 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.13   Tc(MIN.) =  12.21
LONGEST FLOWPATH FROM NODE   1025.00 TO NODE   1023.00 =  2955.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1023.00 TO NODE   1023.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =  12.21
RAINFALL INTENSITY(INCH/HR) =   5.19
TOTAL STREAM AREA(ACRES) =    93.63
PEAK FLOW RATE(CFS) AT CONFLUENCE =    180.93

** CONFLUENCE DATA **
STREAM     RUNOFF      Tc      INTENSITY      AREA
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1      225.20    11.81        5.298        122.36
    2      180.93    12.21        5.186         93.63

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

** PEAK FLOW RATE TABLE **
STREAM     RUNOFF      Tc      INTENSITY
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
    1      400.21    11.81       5.298
    2      401.35    12.21       5.186

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =    401.35   Tc(MIN.) =   12.21
TOTAL AREA(ACRES) =    215.99
LONGEST FLOWPATH FROM NODE   1025.00 TO NODE   1023.00 =  2955.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1023.00 TO NODE   1021.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =    950.00  DOWNSTREAM(FEET) =    750.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2070.00   CHANNEL SLOPE =  0.0966
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0966 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    401.35
  FLOW VELOCITY(FEET/SEC) =  12.81 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.69   Tc(MIN.) =  14.90
  LONGEST FLOWPATH FROM NODE   1025.00 TO NODE   1021.00 =  5025.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1022.00 TO NODE   1021.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.560
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3311
  SUBAREA AREA(ACRES) =   91.65   SUBAREA RUNOFF(CFS) =  121.20
  TOTAL AREA(ACRES) =    307.64   TOTAL RUNOFF(CFS) =  464.46
  TC(MIN.) =  14.90

****************************************************************************
  FLOW PROCESS FROM NODE   1021.00 TO NODE   1002.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    750.00  DOWNSTREAM(FEET) =    675.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   625.00   CHANNEL SLOPE =  0.1200
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1150 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    464.46
  FLOW VELOCITY(FEET/SEC) =  14.68 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.71   Tc(MIN.) =  15.61
  LONGEST FLOWPATH FROM NODE   1025.00 TO NODE   1002.00 =  5650.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1002.00 TO NODE   1002.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  15.61
  RAINFALL INTENSITY(INCH/HR) =   4.43
  TOTAL STREAM AREA(ACRES) =   307.64
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    464.46

****************************************************************************
  FLOW PROCESS FROM NODE   1004.00 TO NODE   1003.80 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1450.00
  DOWNSTREAM ELEVATION(FEET) =   1435.00
  ELEVATION DIFFERENCE(FEET) =     15.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.427
```

```
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.747
  SUBAREA RUNOFF(CFS) =      0.83
  TOTAL AREA(ACRES) =      0.27   TOTAL RUNOFF(CFS) =      0.83

****************************************************************************
  FLOW PROCESS FROM NODE   1003.80 TO NODE   1003.60 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1435.00  DOWNSTREAM(FEET) =   1410.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.0833
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0833 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.83
  FLOW VELOCITY(FEET/SEC) =   1.62 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.09   Tc(MIN.) =   8.52
  LONGEST FLOWPATH FROM NODE   1004.00 TO NODE   1003.60 =   375.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1003.80 TO NODE   1003.60 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.539
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    2.86   SUBAREA RUNOFF(CFS) =    6.55
  TOTAL AREA(ACRES) =      3.13   TOTAL RUNOFF(CFS) =    7.16
  TC(MIN.) =   8.52

****************************************************************************
  FLOW PROCESS FROM NODE   1003.60 TO NODE   1003.40 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1410.00  DOWNSTREAM(FEET) =   1135.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   818.00   CHANNEL SLOPE =  0.3362
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2028 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      7.16
  FLOW VELOCITY(FEET/SEC) =   4.86 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.81   Tc(MIN.) =  11.33
  LONGEST FLOWPATH FROM NODE   1004.00 TO NODE   1003.40 =  1193.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1003.60 TO NODE   1003.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.442
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2847
  SUBAREA AREA(ACRES) =   13.89   SUBAREA RUNOFF(CFS) =   20.41
  TOTAL AREA(ACRES) =     17.02   TOTAL RUNOFF(CFS) =   26.37
  TC(MIN.) =  11.33
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1003.40 TO NODE   1003.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1135.00  DOWNSTREAM(FEET) =    965.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1370.00   CHANNEL SLOPE =  0.1241
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1177 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     26.37
  FLOW VELOCITY(FEET/SEC) =   5.71 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.00   Tc(MIN.) =  15.32
  LONGEST FLOWPATH FROM NODE   1004.00 TO NODE   1003.00 =  2563.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1003.40 TO NODE   1003.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.478
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2811
  SUBAREA AREA(ACRES) =   55.85   SUBAREA RUNOFF(CFS) =   70.03
  TOTAL AREA(ACRES) =     72.87   TOTAL RUNOFF(CFS) =   91.73
  TC(MIN.) =  15.32

****************************************************************************
  FLOW PROCESS FROM NODE   1003.00 TO NODE   1002.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    975.00  DOWNSTREAM(FEET) =    700.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1941.00   CHANNEL SLOPE =  0.1417
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1295 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     91.73
  FLOW VELOCITY(FEET/SEC) =   9.07 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.57   Tc(MIN.) =  18.89
  LONGEST FLOWPATH FROM NODE   1004.00 TO NODE   1002.00 =  4504.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1003.00 TO NODE   1002.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.913
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2745
  SUBAREA AREA(ACRES) =  106.38   SUBAREA RUNOFF(CFS) =  112.39
  TOTAL AREA(ACRES) =    179.25   TOTAL RUNOFF(CFS) =  192.54
  TC(MIN.) =  18.89

****************************************************************************
  FLOW PROCESS FROM NODE   1002.00 TO NODE   1002.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  18.89
  RAINFALL INTENSITY(INCH/HR) =   3.91
  TOTAL STREAM AREA(ACRES) =   179.25
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    192.54

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       464.46    15.61        4.425        307.64
     2       192.54    18.89        3.913        179.25

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       623.56    15.61       4.425
     2       603.23    18.89       3.913

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    623.56   Tc(MIN.) =   15.61
  TOTAL AREA(ACRES) =    486.89
  LONGEST FLOWPATH FROM NODE   1025.00 TO NODE   1002.00 =  5650.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1002.00 TO NODE   1001.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    700.00  DOWNSTREAM(FEET) =    675.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1175.00   CHANNEL SLOPE =  0.0213
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0213 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    623.56
  FLOW VELOCITY(FEET/SEC) =   6.96 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.81   Tc(MIN.) =  18.42
  LONGEST FLOWPATH FROM NODE   1025.00 TO NODE   1001.00 =  6825.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1001.00 TO NODE   1001.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
==============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  18.75   RAIN INTENSITY(INCH/HOUR) =  3.93
  TOTAL AREA(ACRES) =   486.89   TOTAL RUNOFF(CFS) =    109.57

****************************************************************************
  FLOW PROCESS FROM NODE   1001.00 TO NODE     10.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   675.00  DOWNSTREAM(FEET) =   550.00
  FLOW LENGTH(FEET) =   755.00   MANNING'S N =  0.015
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  16.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  31.27
```

```
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    109.57
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =  19.15
  LONGEST FLOWPATH FROM NODE   1025.00 TO NODE     10.00 =  7580.00 FEET.
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =    486.89  TC(MIN.) =     19.15
  PEAK FLOW RATE(CFS)    =    109.57
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR11
Page 1

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
1104	1103.8	2	1,085.0	1,000.0	754.0	0.28	0.31	
1103.8	1103.6	5	1,000.0	850.0	300.0			
1103.8	1103.6	8				0.31	3.63	
1103.6	1103	5	850.0	760.0	495.0			
1103.6	1103	8				0.27	8.63	
1103	1101	5	760.0	740.0	151.0			
1102	1101	8				0.28	9.22	
1101	11	4	740.0	625.0	590.0			EX. 42" CSP Caltrans
								Storm Drain
							21.79	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
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            Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC
                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                 *
* SUBBASIN # 11                                                          *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR11.DAT
  TIME/DATE OF STUDY: 12:45 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   1104.00 TO NODE   1103.80 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2800
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1085.00
  DOWNSTREAM ELEVATION(FEET) =   1000.00
  ELEVATION DIFFERENCE(FEET) =     85.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.934
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.258
SUBAREA RUNOFF(CFS) =      0.72
TOTAL AREA(ACRES) =      0.31   TOTAL RUNOFF(CFS) =      0.72

****************************************************************************
FLOW PROCESS FROM NODE   1103.80 TO NODE   1103.60 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1000.00  DOWNSTREAM(FEET) =    850.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.5000
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .2250 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =      0.72
FLOW VELOCITY(FEET/SEC) =   2.66 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.88   Tc(MIN.) =   7.82
LONGEST FLOWPATH FROM NODE   1104.00 TO NODE   1103.60 =   375.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1103.80 TO NODE   1103.60 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.913
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3100
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3076
SUBAREA AREA(ACRES) =     3.63   SUBAREA RUNOFF(CFS) =     7.78
TOTAL AREA(ACRES) =       3.94   TOTAL RUNOFF(CFS) =    8.38
TC(MIN.) =   7.82

****************************************************************************
FLOW PROCESS FROM NODE   1103.60 TO NODE   1103.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    850.00  DOWNSTREAM(FEET) =    760.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   495.00   CHANNEL SLOPE =  0.1818
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1509 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =      8.38
FLOW VELOCITY(FEET/SEC) =   4.42 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.87   Tc(MIN.) =   9.68
LONGEST FLOWPATH FROM NODE   1104.00 TO NODE   1103.00 =   870.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1103.60 TO NODE   1103.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.020
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2700
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.2818
SUBAREA AREA(ACRES) =     8.63   SUBAREA RUNOFF(CFS) =   14.03
TOTAL AREA(ACRES) =      12.57   TOTAL RUNOFF(CFS) =   21.33
TC(MIN.) =   9.68
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1103.00 TO NODE   1101.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    760.00  DOWNSTREAM(FEET) =    740.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   151.00   CHANNEL SLOPE =  0.1325
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1233 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     21.33
  FLOW VELOCITY(FEET/SEC) =   5.45 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.46   Tc(MIN.) =  10.15
  LONGEST FLOWPATH FROM NODE   1104.00 TO NODE   1101.00 =  1021.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1102.00 TO NODE   1101.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.842
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2810
  SUBAREA AREA(ACRES) =    9.22   SUBAREA RUNOFF(CFS) =   15.08
  TOTAL AREA(ACRES) =     21.79   TOTAL RUNOFF(CFS) =   35.78
  TC(MIN.) =  10.15

****************************************************************************
  FLOW PROCESS FROM NODE   1101.00 TO NODE     11.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   740.00  DOWNSTREAM(FEET) =   625.00
  FLOW LENGTH(FEET) =   590.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  11.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.28
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     35.78
  PIPE TRAVEL TIME(MIN.) =   0.57    Tc(MIN.) =  10.72
  LONGEST FLOWPATH FROM NODE   1104.00 TO NODE     11.00 =  1611.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =     21.79  TC(MIN.) =     10.72
  PEAK FLOW RATE(CFS)    =     35.78
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR12

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
1203	1202.8	2	1,160.0	1,110.0	75.0	0.35	0.69	
1202.8	1202.6	5	1,110.0	1,055.0	300.0			
1202.8	1202.6	8				0.35	1.56	
1202.6	1202	5	1,055.0	1,040.0	137.0			
1202.6	1202	8				0.35	1.08	
1202	1201	5	1,040.0	775.0	910.0			
1202	1201	8				0.28	10.88	
1201	12	4	775.0	650.0	545.0			EX . 36" CSP Caltrans
								Storm Drain
							14.21	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                        2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2004 Advanced Engineering Software (aes)
            Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC
                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************** DESCRIPTION OF STUDY **************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                  *
* SUBBASIN # 12                                                           *
* 2469.01A - OCTOBER 2006                                                 *
 ***************************************************************************

  FILE NAME: MERR12.DAT
  TIME/DATE OF STUDY: 12:47 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   1203.00 TO NODE   1202.80 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1160.00
  DOWNSTREAM ELEVATION(FEET) =   1110.00
  ELEVATION DIFFERENCE(FEET) =     50.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.427
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.747
SUBAREA RUNOFF(CFS) =       2.11
TOTAL AREA(ACRES) =       0.69   TOTAL RUNOFF(CFS) =       2.11

****************************************************************************
FLOW PROCESS FROM NODE   1202.80 TO NODE   1202.60 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1110.00  DOWNSTREAM(FEET) =   1055.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.1833
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1517 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       2.11
FLOW VELOCITY(FEET/SEC) =   2.80 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.79   Tc(MIN.) =   7.21
LONGEST FLOWPATH FROM NODE   1203.00 TO NODE   1202.60 =   375.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1202.80 TO NODE   1202.60 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.280
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
SUBAREA AREA(ACRES) =     1.56   SUBAREA RUNOFF(CFS) =     3.97
TOTAL AREA(ACRES) =       2.25   TOTAL RUNOFF(CFS) =     5.73
TC(MIN.) =   7.21

****************************************************************************
FLOW PROCESS FROM NODE   1202.60 TO NODE   1202.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1055.00  DOWNSTREAM(FEET) =   1040.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   137.00   CHANNEL SLOPE =  0.1095
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1071 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       5.73
FLOW VELOCITY(FEET/SEC) =   3.28 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   0.70   Tc(MIN.) =   7.91
LONGEST FLOWPATH FROM NODE   1203.00 TO NODE   1202.00 =   512.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1202.60 TO NODE   1202.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.859
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
SUBAREA AREA(ACRES) =     1.08   SUBAREA RUNOFF(CFS) =     2.59
TOTAL AREA(ACRES) =       3.33   TOTAL RUNOFF(CFS) =     7.99
TC(MIN.) =   7.91

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

```
  FLOW PROCESS FROM NODE   1202.00 TO NODE   1201.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1040.00  DOWNSTREAM(FEET) =    775.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   910.00   CHANNEL SLOPE =  0.2912
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1928 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      7.99
  FLOW VELOCITY(FEET/SEC) =   4.91 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.09   Tc(MIN.) =  11.00
  LONGEST FLOWPATH FROM NODE   1203.00 TO NODE   1201.00 =  1422.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1202.00 TO NODE   1201.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.546
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2964
  SUBAREA AREA(ACRES) =   10.88   SUBAREA RUNOFF(CFS) =   16.90
  TOTAL AREA(ACRES) =     14.21   TOTAL RUNOFF(CFS) =   23.36
  TC(MIN.) =  11.00

****************************************************************************
  FLOW PROCESS FROM NODE   1201.00 TO NODE     12.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   775.00  DOWNSTREAM(FEET) =   650.00
  FLOW LENGTH(FEET) =   545.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  36.0 INCH PIPE IS   9.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.45
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     23.36
  PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =  11.55
  LONGEST FLOWPATH FROM NODE   1203.00 TO NODE     12.00 =  1967.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     14.21  TC(MIN.) =     11.55
  PEAK FLOW RATE(CFS)   =     23.36
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR13D

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
1305	1304.8	2	1,350.0	1,315.0	75.0	0.25	0.36	
1304.8	1304.6	5	1,315.0	1,270.0	300.0			
1304.8	1304.6	8				0.26	2.77	
1304.6	1304.4	5	1,270.0	195.0	600.0			
1304.6	1304.4	8				0.28	9.59	
1304.4	1304	5	1,195.0	1,150.0	315.0			
1304.4	1304	8				0.28	5.42	
1304	1303	5	1,150.0	835.0	1,044.0			
1304	1303	8				0.30	58.45	
1303	1301	5	835.0	795.0	875.0			
1302	1301	8				0.27	53.44	
1301	1301	7						DET OUT Q = 72.77
1301	13	4	795.0	700.0	645.0			EX. 36" RCP Caltrans
								Storm Drain
							130.03	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2004 Advanced Engineering Software (aes)
            Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC.
                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                 *
* SUBBASIN # 13 - WITH DETENTION ROUTING                                 *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR13D.DAT
  TIME/DATE OF STUDY: 08:33 09/29/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   1305.00 TO NODE   1304.80 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1350.00
  DOWNSTREAM ELEVATION(FEET) =   1315.00
  ELEVATION DIFFERENCE(FEET) =     35.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.151
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.068
SUBAREA RUNOFF(CFS) =       0.73
TOTAL AREA(ACRES) =       0.36   TOTAL RUNOFF(CFS) =       0.73

****************************************************************************
FLOW PROCESS FROM NODE   1304.80 TO NODE   1306.60 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1315.00  DOWNSTREAM(FEET) =   1270.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.1500
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1350 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =       0.73
FLOW VELOCITY(FEET/SEC) =   2.06 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.43   Tc(MIN.) =   8.58
LONGEST FLOWPATH FROM NODE   1305.00 TO NODE   1306.60 =   375.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1304.80 TO NODE   1304.60 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.509
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2600
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.2589
SUBAREA AREA(ACRES) =     2.77   SUBAREA RUNOFF(CFS) =     4.69
TOTAL AREA(ACRES) =       3.13   TOTAL RUNOFF(CFS) =     5.27
TC(MIN.) =   8.58

****************************************************************************
FLOW PROCESS FROM NODE   1304.60 TO NODE   1304.40 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1270.00  DOWNSTREAM(FEET) =   1195.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   600.00   CHANNEL SLOPE =  0.1250
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1183 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       5.27
FLOW VELOCITY(FEET/SEC) =   3.35 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.98   Tc(MIN.) =  11.56
LONGEST FLOWPATH FROM NODE   1305.00 TO NODE   1304.40 =   975.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1304.60 TO NODE   1304.40 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.369
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2800
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.2748
SUBAREA AREA(ACRES) =     9.59   SUBAREA RUNOFF(CFS) =    14.42
TOTAL AREA(ACRES) =      12.72   TOTAL RUNOFF(CFS) =    18.77
TC(MIN.) =  11.56
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1304.40 TO NODE   1304.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1195.00  DOWNSTREAM(FEET) =   1150.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   315.00   CHANNEL SLOPE =  0.1429
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1302 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     18.77
  FLOW VELOCITY(FEET/SEC) =   5.37 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.98   Tc(MIN.) =  12.54
  LONGEST FLOWPATH FROM NODE   1305.00 TO NODE   1304.00 =  1290.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1304.40 TO NODE   1304.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.095
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2764
  SUBAREA AREA(ACRES) =    5.42   SUBAREA RUNOFF(CFS) =    7.73
  TOTAL AREA(ACRES) =     18.14   TOTAL RUNOFF(CFS) =   25.54
  TC(MIN.) =  12.54

****************************************************************************
  FLOW PROCESS FROM NODE   1304.00 TO NODE   1303.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1150.00  DOWNSTREAM(FEET) =    835.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1044.00   CHANNEL SLOPE =  0.3017
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1954 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     25.54
  FLOW VELOCITY(FEET/SEC) =   7.28 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.39   Tc(MIN.) =  14.93
  LONGEST FLOWPATH FROM NODE   1305.00 TO NODE   1303.00 =  2334.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1304.00 TO NODE   1303.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.553
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2944
  SUBAREA AREA(ACRES) =   58.45   SUBAREA RUNOFF(CFS) =   79.84
  TOTAL AREA(ACRES) =     76.59   TOTAL RUNOFF(CFS) =  102.67
  TC(MIN.) =  14.93

****************************************************************************
  FLOW PROCESS FROM NODE   1303.00 TO NODE   1301.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    835.00  DOWNSTREAM(FEET) =    795.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   875.00   CHANNEL SLOPE =  0.0457
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0457 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    102.67
  FLOW VELOCITY(FEET/SEC) =   5.60 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.61   Tc(MIN.) =  17.54
  LONGEST FLOWPATH FROM NODE   1305.00 TO NODE   1301.00 =  3209.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1302.00 TO NODE   1301.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.105
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .2700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2844
  SUBAREA AREA(ACRES) =   53.44   SUBAREA RUNOFF(CFS) =   59.23
  TOTAL AREA(ACRES) =    130.03   TOTAL RUNOFF(CFS) =  151.78
  TC(MIN.) =  17.54

****************************************************************************
  FLOW PROCESS FROM NODE   1301.00 TO NODE   1301.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
==============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  17.90   RAIN INTENSITY(INCH/HOUR) =  4.05
  TOTAL AREA(ACRES) =   130.03   TOTAL RUNOFF(CFS) =     72.77

****************************************************************************
  FLOW PROCESS FROM NODE   1301.00 TO NODE     13.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   795.00  DOWNSTREAM(FEET) =   700.00
  FLOW LENGTH(FEET) =   645.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  13.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  29.97
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     72.77
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =  18.26
  LONGEST FLOWPATH FROM NODE   1305.00 TO NODE     13.00 =  3854.00 FEET.
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =    130.03  TC(MIN.) =     18.26
  PEAK FLOW RATE(CFS)   =     72.77
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR14

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
1403	1402	2	1,075.0	1,030.0	85.0	0.25	0.14	
1402	1401	5	1,030.0	835.0	340.0			
1402	1401	8				0.25	3.79	
1401	14	4	835.0	720.0	615.0			EX. 24" CSP Caltrans
								Storm Drain
							3.93	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                        2003,1985,1981 HYDROLOGY MANUAL
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             Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

                    FUSCOE ENGINEERING - SAN DIEGO, INC
                      6390 GREENWICH DRIVE, SUITE 170
                        SAN DIEGO, CALIFORNIA 92122
                              (858) 554-1500

 ************************** DESCRIPTION OF STUDY **************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                  *
* SUBBASIN # 14                                                           *
* 2469.01A - OCTOBER 2006                                                 *
 **************************************************************************

  FILE NAME: MERR14.DAT
  TIME/DATE OF STUDY: 12:49 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   1403.00 TO NODE   1402.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    85.00
  UPSTREAM ELEVATION(FEET) =   1075.00
  DOWNSTREAM ELEVATION(FEET) =   1030.00
  ELEVATION DIFFERENCE(FEET) =     45.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.548
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.749
SUBAREA RUNOFF(CFS) =       0.27
TOTAL AREA(ACRES) =       0.14   TOTAL RUNOFF(CFS) =       0.27

****************************************************************************
FLOW PROCESS FROM NODE   1402.00 TO NODE   1401.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1030.00  DOWNSTREAM(FEET) =    835.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   340.00   CHANNEL SLOPE =  0.5735
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .2287 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =       0.27
FLOW VELOCITY(FEET/SEC) =   2.68 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.12   Tc(MIN.) =   8.66
LONGEST FLOWPATH FROM NODE   1403.00 TO NODE   1401.00 =   425.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1402.00 TO NODE   1401.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.469
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
SUBAREA AREA(ACRES) =     3.79   SUBAREA RUNOFF(CFS) =     6.13
TOTAL AREA(ACRES) =       3.93   TOTAL RUNOFF(CFS) =    6.36
TC(MIN.) =   8.66

****************************************************************************
FLOW PROCESS FROM NODE   1401.00 TO NODE     14.00 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   835.00  DOWNSTREAM(FEET) =   720.00
FLOW LENGTH(FEET) =   615.00   MANNING'S N =  0.024
DEPTH OF FLOW IN  24.0 INCH PIPE IS   5.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  10.95
GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =       6.36
PIPE TRAVEL TIME(MIN.) =   0.94    Tc(MIN.) =   9.60
LONGEST FLOWPATH FROM NODE   1403.00 TO NODE     14.00 =  1040.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)      =       3.93  TC(MIN.) =      9.60
PEAK FLOW RATE(CFS)    =       6.36
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR141
Page 1

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
1412	1411	2	1,175.0	1,125.0	99.0	0.25	0.2	
1411	1410	5	1,125.0	900.0	358.0			
1411	1410	8				0.25	4.24	
1410	14.1	4	900.0	750.0	630.0			EX. 24" CSP Caltrans
								Storm Drain
							4.44	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
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            Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC
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                       SAN DIEGO, CALIFORNIA 92122
                            (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS -EXISTING HYDROLOGY                                  *
* SUBBASIN # 141                                                         *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR141.DAT
  TIME/DATE OF STUDY: 12:53 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   1412.00 TO NODE   1411.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    99.00
  UPSTREAM ELEVATION(FEET) =   1175.00
  DOWNSTREAM ELEVATION(FEET) =   1125.00
  ELEVATION DIFFERENCE(FEET) =     50.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.067
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
SUBAREA RUNOFF(CFS) =       0.37
TOTAL AREA(ACRES) =       0.20   TOTAL RUNOFF(CFS) =       0.37

****************************************************************************
FLOW PROCESS FROM NODE   1411.00 TO NODE   1410.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1125.00  DOWNSTREAM(FEET) =    900.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   358.00   CHANNEL SLOPE =  0.6285
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .2300 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =       0.37
FLOW VELOCITY(FEET/SEC) =   2.69 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.22   Tc(MIN.) =   9.29
LONGEST FLOWPATH FROM NODE   1412.00 TO NODE   1410.00 =   457.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1411.00 TO NODE   1410.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.185
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
SUBAREA AREA(ACRES) =    4.24   SUBAREA RUNOFF(CFS) =    6.56
TOTAL AREA(ACRES) =      4.44   TOTAL RUNOFF(CFS) =    6.87
TC(MIN.) =   9.29

****************************************************************************
FLOW PROCESS FROM NODE   1410.00 TO NODE     14.10 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   900.00  DOWNSTREAM(FEET) =   750.00
FLOW LENGTH(FEET) =   630.00   MANNING'S N =  0.024
DEPTH OF FLOW IN  24.0 INCH PIPE IS   5.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  12.21
GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      6.87
PIPE TRAVEL TIME(MIN.) =   0.86    Tc(MIN.) =  10.15
LONGEST FLOWPATH FROM NODE   1412.00 TO NODE     14.10 =  1087.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =      4.44  TC(MIN.) =     10.15
PEAK FLOW RATE(CFS)   =      6.87
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR15

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
1509	1508	2	1,535.0	1,500.0	75.0	0.25	0.21	
1508	1507	5	1,500.0	1,335.0	500.0			
1508	1507	8				0.25	1.77	
1507	1506	5	1,335.0	1,135.0	400.0			
1507	1506	8				0.25	8.61	
1506	1505	5	1,135.0	904.0	960.0			
1506	1505	8				0.25	19.77	
1505	1504	4	904.0	857.0	220.0			Ex. 36" CSP/RCP
1504	1504	1						1 of 2
1504.3	1504.2	2	1,225.0	1,195.0	100.0	0.25	0.15	
1504.2	1504.1	5	1,195.0	891.0	1,070.0			
1504.2	1504.1	8				0.25	5.31	
1504.1	1504	4	891.0	857.0	574.0			Ex. 24" CSP/RCP
1504	1504	1						2 of 2
1504	1500	4	857.0	846.0	234.0			Ex. 42" CSP
1500	1500	1						1 of 2
1503	1502	2	1,310.0	1,280.0	100.0	0.25	0.17	
1502	1501	5	1,280.0	902.0	890.0			
1502	1501	8				0.25	7.31	
1501	1500	4	902.0	846.0	344.0			Ex. 24" CSP/RCP
1500	1500	1						2 of 2
1500	15	4	846.0	791.0	162.0			Ex. 48" CSP
							43.3	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                        2003,1985,1981 HYDROLOGY MANUAL
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            Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC
                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************** DESCRIPTION OF STUDY **************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                  *
* SUBBASIN # 15                                                           *
* 2469.01A - OCTOBER 2006                                                 *
 ***************************************************************************

  FILE NAME: MERR15.DAT
  TIME/DATE OF STUDY: 12:51 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   1509.00 TO NODE   1508.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1535.00
  DOWNSTREAM ELEVATION(FEET) =   1500.00
  ELEVATION DIFFERENCE(FEET) =     35.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.151
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.068
SUBAREA RUNOFF(CFS) =       0.42
TOTAL AREA(ACRES) =       0.21   TOTAL RUNOFF(CFS) =       0.42

****************************************************************************
FLOW PROCESS FROM NODE   1508.00 TO NODE   1507.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1500.00  DOWNSTREAM(FEET) =   1335.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   500.00   CHANNEL SLOPE =  0.3300
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .2018 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =       0.42
FLOW VELOCITY(FEET/SEC) =   2.52 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   3.31   Tc(MIN.) =   9.46
LONGEST FLOWPATH FROM NODE   1509.00 TO NODE   1507.00 =   575.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1508.00 TO NODE   1507.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.111
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
SUBAREA AREA(ACRES) =    1.77   SUBAREA RUNOFF(CFS) =    2.70
TOTAL AREA(ACRES) =      1.98   TOTAL RUNOFF(CFS) =    3.02
TC(MIN.) =   9.46

****************************************************************************
FLOW PROCESS FROM NODE   1507.00 TO NODE   1506.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1335.00  DOWNSTREAM(FEET) =   1135.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   400.00   CHANNEL SLOPE =  0.5000
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .2250 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       3.02
FLOW VELOCITY(FEET/SEC) =   3.84 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.74   Tc(MIN.) =  11.20
LONGEST FLOWPATH FROM NODE   1509.00 TO NODE   1506.00 =   975.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1507.00 TO NODE   1506.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.482
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
SUBAREA AREA(ACRES) =    8.61   SUBAREA RUNOFF(CFS) =   11.80
TOTAL AREA(ACRES) =     10.59   TOTAL RUNOFF(CFS) =   14.51
TC(MIN.) =  11.20
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1506.00 TO NODE   1505.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1135.00  DOWNSTREAM(FEET) =    904.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   960.00   CHANNEL SLOPE =  0.2406
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1769 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     14.51
  FLOW VELOCITY(FEET/SEC) =   5.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.79   Tc(MIN.) =  13.99
  LONGEST FLOWPATH FROM NODE   1509.00 TO NODE   1505.00 =  1935.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1506.00 TO NODE   1505.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.749
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
  SUBAREA AREA(ACRES) =   19.77   SUBAREA RUNOFF(CFS) =   23.47
  TOTAL AREA(ACRES) =     30.36   TOTAL RUNOFF(CFS) =   36.05
  TC(MIN.) =  13.99

****************************************************************************
  FLOW PROCESS FROM NODE   1505.00 TO NODE   1504.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   904.00  DOWNSTREAM(FEET) =   857.00
  FLOW LENGTH(FEET) =   220.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  11.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.15
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     36.05
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =  14.19
  LONGEST FLOWPATH FROM NODE   1509.00 TO NODE   1504.00 =  2155.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1504.00 TO NODE   1504.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  14.19
  RAINFALL INTENSITY(INCH/HR) =   4.71
  TOTAL STREAM AREA(ACRES) =    30.36
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     36.05

****************************************************************************
  FLOW PROCESS FROM NODE   1504.30 TO NODE   1504.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1225.00
  DOWNSTREAM ELEVATION(FEET) =   1195.00
  ELEVATION DIFFERENCE(FEET) =     30.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.102
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.353
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.15   TOTAL RUNOFF(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE   1504.20 TO NODE   1504.10 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1195.00  DOWNSTREAM(FEET) =    891.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1070.00   CHANNEL SLOPE =  0.2841
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1910 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.28
  FLOW VELOCITY(FEET/SEC) =   2.45 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.29   Tc(MIN.) =  14.39
  LONGEST FLOWPATH FROM NODE   1504.30 TO NODE   1504.10 =  1170.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1504.20 TO NODE   1504.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.664
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
  SUBAREA AREA(ACRES) =    5.31   SUBAREA RUNOFF(CFS) =    6.19
  TOTAL AREA(ACRES) =      5.46   TOTAL RUNOFF(CFS) =    6.37
  TC(MIN.) =  14.39

****************************************************************************
  FLOW PROCESS FROM NODE   1504.10 TO NODE   1504.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   891.00  DOWNSTREAM(FEET) =   857.00
  FLOW LENGTH(FEET) =   574.00   MANNING'S N =  0.015
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   6.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.18
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      6.37
  PIPE TRAVEL TIME(MIN.) =   0.94    Tc(MIN.) =  15.33
  LONGEST FLOWPATH FROM NODE   1504.30 TO NODE   1504.00 =  1744.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1504.00 TO NODE   1504.00 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.) =  15.33
  RAINFALL INTENSITY(INCH/HR) =   4.48
  TOTAL STREAM AREA(ACRES) =     5.46
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.37

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       36.05    14.19        4.706        30.36
      2        6.37    15.33        4.477         5.46

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       41.94    14.19       4.706
      2       40.66    15.33       4.477

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     41.94   Tc(MIN.) =   14.19
  TOTAL AREA(ACRES) =     35.82
  LONGEST FLOWPATH FROM NODE   1509.00 TO NODE   1504.00 =  2155.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1504.00 TO NODE   1500.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   857.00  DOWNSTREAM(FEET) =   846.00
  FLOW LENGTH(FEET) =   234.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  17.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.81
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     41.94
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =  14.55
  LONGEST FLOWPATH FROM NODE   1509.00 TO NODE   1500.00 =  2389.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1500.00 TO NODE   1500.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  14.55
  RAINFALL INTENSITY(INCH/HR) =   4.63
  TOTAL STREAM AREA(ACRES) =    35.82
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     41.94

****************************************************************************
  FLOW PROCESS FROM NODE   1503.00 TO NODE   1502.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1310.00
```

```
  DOWNSTREAM ELEVATION(FEET) =   1280.00
  ELEVATION DIFFERENCE(FEET) =     30.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.102
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.353
  SUBAREA RUNOFF(CFS) =      0.31
  TOTAL AREA(ACRES) =      0.17   TOTAL RUNOFF(CFS) =      0.31

****************************************************************************
  FLOW PROCESS FROM NODE   1502.00 TO NODE   1501.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1280.00  DOWNSTREAM(FEET) =    902.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   890.00   CHANNEL SLOPE =  0.4247
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2170 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.31
  FLOW VELOCITY(FEET/SEC) =   2.61 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.69   Tc(MIN.) =  12.79
  LONGEST FLOWPATH FROM NODE   1503.00 TO NODE   1501.00 =   990.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1502.00 TO NODE   1501.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.032
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
  SUBAREA AREA(ACRES) =    7.31   SUBAREA RUNOFF(CFS) =    9.20
  TOTAL AREA(ACRES) =      7.48   TOTAL RUNOFF(CFS) =    9.41
  TC(MIN.) =  12.79

****************************************************************************
  FLOW PROCESS FROM NODE   1501.00 TO NODE   1500.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   902.00  DOWNSTREAM(FEET) =   846.00
  FLOW LENGTH(FEET) =   344.00   MANNING'S N =  0.015
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   5.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.31
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      9.41
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =  13.14
  LONGEST FLOWPATH FROM NODE   1503.00 TO NODE   1500.00 =  1334.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1500.00 TO NODE   1500.00 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.) =  13.14
  RAINFALL INTENSITY(INCH/HR) =   4.94
```

```
TOTAL STREAM AREA(ACRES) =      7.48
PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.41

** CONFLUENCE DATA **
STREAM      RUNOFF      Tc       INTENSITY      AREA
NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1        41.94    14.55        4.630         35.82
    2         9.41    13.14        4.945          7.48

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

** PEAK FLOW RATE TABLE **
STREAM      RUNOFF      Tc       INTENSITY
NUMBER       (CFS)    (MIN.)    (INCH/HOUR)
    1        48.68    13.14       4.945
    2        50.75    14.55       4.630

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      50.75   Tc(MIN.) =   14.55
TOTAL AREA(ACRES) =      43.30
LONGEST FLOWPATH FROM NODE   1509.00 TO NODE   1500.00 =  2389.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1500.00 TO NODE     15.00 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   846.00  DOWNSTREAM(FEET) =   791.00
FLOW LENGTH(FEET) =   162.00   MANNING'S N =  0.024
DEPTH OF FLOW IN  48.0 INCH PIPE IS  11.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  22.97
GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      50.75
PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =  14.67
LONGEST FLOWPATH FROM NODE   1509.00 TO NODE     15.00 =  2551.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)      =     43.30  TC(MIN.) =     14.67
PEAK FLOW RATE(CFS)    =     50.75
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR151
Page 1

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
1512	1511	2	1,245.0	1,230.0	100.0	0.25	0.14	
1511	1510	5	1,230.0	908.0	920.0			
1511	1510	8				0.25	6.7	
1510	15.1	4	908.0	834.0	360.0			Ex. 24" CSP/RCP
							6.84	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                        2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2004 Advanced Engineering Software (aes)
            Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC
                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                 *
* SUBBASIN # 151                                                         *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR151.DAT
  TIME/DATE OF STUDY: 12:55 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   1512.00 TO NODE   1511.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1245.00
  DOWNSTREAM ELEVATION(FEET) =   1230.00
  ELEVATION DIFFERENCE(FEET) =     15.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.102
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.353
SUBAREA RUNOFF(CFS) =       0.26
TOTAL AREA(ACRES) =       0.14   TOTAL RUNOFF(CFS) =       0.26

****************************************************************************
FLOW PROCESS FROM NODE   1511.00 TO NODE   1510.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1230.00  DOWNSTREAM(FEET) =    908.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   920.00   CHANNEL SLOPE =  0.3500
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .2052 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =       0.26
FLOW VELOCITY(FEET/SEC) =   2.54 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   6.04   Tc(MIN.) =  13.15
LONGEST FLOWPATH FROM NODE   1512.00 TO NODE   1510.00 =  1020.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1511.00 TO NODE   1510.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.943
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
SUBAREA AREA(ACRES) =    6.70   SUBAREA RUNOFF(CFS) =    8.28
TOTAL AREA(ACRES) =      6.84   TOTAL RUNOFF(CFS) =    8.45
TC(MIN.) =  13.15

****************************************************************************
FLOW PROCESS FROM NODE   1510.00 TO NODE     15.10 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   908.00  DOWNSTREAM(FEET) =   834.00
FLOW LENGTH(FEET) =   360.00   MANNING'S N =  0.015
DEPTH OF FLOW IN  24.0 INCH PIPE IS   5.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  17.18
GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      8.45
PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =  13.50
LONGEST FLOWPATH FROM NODE   1512.00 TO NODE     15.10 =  1380.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =      6.84  TC(MIN.) =     13.50
PEAK FLOW RATE(CFS)   =      8.45
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR16D

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
1603	1602.8	2	1,580.0	1,565.0	75.0	0.35	0.44	
1602.8	1602.6	5	1,565.0	1,325.0	515.0			
1602.8	1602.6	8				0.30	4.58	
1602.6	1602	5	1,325.0	1,210.0	605.0			
1602.6	1602	8				0.27	12.87	
1602	1601	5	1,210.0	950.0	850.0			
1602	1601	8				0.26	11.7	
1601	1601	7						DET OUT Q = 38.58
1601	16	4	950.0	850.0	605.0			Ex. 42" CSP/RCP
							29.59	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                          2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2004 Advanced Engineering Software (aes)
            Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC.
                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                 *
* SUBBASIN #16 - WITH DETENTION ROUTING                                  *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR16D.DAT
  TIME/DATE OF STUDY: 14:57 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   1603.00 TO NODE   1602.80 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1580.00
  DOWNSTREAM ELEVATION(FEET) =   1565.00
  ELEVATION DIFFERENCE(FEET) =     15.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.427
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.747
SUBAREA RUNOFF(CFS) =      1.35
TOTAL AREA(ACRES) =      0.44   TOTAL RUNOFF(CFS) =      1.35

****************************************************************************
FLOW PROCESS FROM NODE   1602.80 TO NODE   1602.60 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1565.00  DOWNSTREAM(FEET) =   1325.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   515.00   CHANNEL SLOPE =  0.4660
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .2216 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =      1.35
FLOW VELOCITY(FEET/SEC) =   2.91 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.95   Tc(MIN.) =   8.38
LONGEST FLOWPATH FROM NODE   1603.00 TO NODE   1602.60 =   590.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1602.80 TO NODE   1602.60 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.611
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3044
SUBAREA AREA(ACRES) =    4.58   SUBAREA RUNOFF(CFS) =    9.08
TOTAL AREA(ACRES) =      5.02   TOTAL RUNOFF(CFS) =   10.10
TC(MIN.) =   8.38

****************************************************************************
FLOW PROCESS FROM NODE   1602.60 TO NODE   1602.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1325.00  DOWNSTREAM(FEET) =   1210.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   605.00   CHANNEL SLOPE =  0.1901
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1550 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =     10.10
FLOW VELOCITY(FEET/SEC) =   4.76 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.12   Tc(MIN.) =  10.49
LONGEST FLOWPATH FROM NODE   1603.00 TO NODE   1602.00 =  1195.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1602.60 TO NODE   1602.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.717
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2700
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.2796
SUBAREA AREA(ACRES) =   12.87   SUBAREA RUNOFF(CFS) =   19.87
TOTAL AREA(ACRES) =     17.89   TOTAL RUNOFF(CFS) =   28.60
TC(MIN.) =  10.49

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

```
  FLOW PROCESS FROM NODE   1602.00 TO NODE   1601.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1210.00  DOWNSTREAM(FEET) =    950.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   850.00   CHANNEL SLOPE =  0.3059
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1965 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     28.60
  FLOW VELOCITY(FEET/SEC) =   7.58 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.87   Tc(MIN.) =  12.36
  LONGEST FLOWPATH FROM NODE   1603.00 TO NODE   1601.00 =  2045.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1602.00 TO NODE   1601.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.144
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2719
  SUBAREA AREA(ACRES) =   11.70   SUBAREA RUNOFF(CFS) =   15.65
  TOTAL AREA(ACRES) =     29.59   TOTAL RUNOFF(CFS) =   41.38
  TC(MIN.) =  12.36

****************************************************************************
  FLOW PROCESS FROM NODE   1601.00 TO NODE   1601.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  12.79   RAIN INTENSITY(INCH/HOUR) =  5.03
  TOTAL AREA(ACRES) =    29.59   TOTAL RUNOFF(CFS) =     38.58

****************************************************************************
  FLOW PROCESS FROM NODE   1601.00 TO NODE     16.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   950.00  DOWNSTREAM(FEET) =   850.00
  FLOW LENGTH(FEET) =   605.00   MANNING'S N =  0.015
  DEPTH OF FLOW IN  42.0 INCH PIPE IS   9.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.26
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     38.58
  PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =  13.22
  LONGEST FLOWPATH FROM NODE   1603.00 TO NODE     16.00 =  2650.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =     29.59  TC(MIN.) =     13.22
  PEAK FLOW RATE(CFS)    =     38.58
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR17
Page 1

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
1702	1701.8	2	1,355.0	1,320.0	75.0	0.35	0.11	
1701.8	1701.6	5	1,320.0	1,120.0	325.0			
1701.8	1701.6	8				0.278	1.78	
1701.6	1701	5	1,120.0	950.0	760.0			
1701.6	1701	8				0.26	12.38	
1701	17	4	950.0	900.0	440.0			EX. 30" CSP Caltrans
								Storm Drain
							14.27	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2004 Advanced Engineering Software (aes)
            Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

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                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************** DESCRIPTION OF STUDY **************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                  *
* SUBBASIN # 17                                                           *
* 2469.01A - OCTOBER 2006                                                 *
 ***************************************************************************

  FILE NAME: MERR17.DAT
  TIME/DATE OF STUDY: 12:58 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   1702.00 TO NODE   1701.80 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1355.00
  DOWNSTREAM ELEVATION(FEET) =   1320.00
  ELEVATION DIFFERENCE(FEET) =     35.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.427
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.747
SUBAREA RUNOFF(CFS) =       0.34
TOTAL AREA(ACRES) =       0.11   TOTAL RUNOFF(CFS) =       0.34

****************************************************************************
FLOW PROCESS FROM NODE   1701.80 TO NODE   1701.60 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1320.00  DOWNSTREAM(FEET) =   1120.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   325.00   CHANNEL SLOPE =  0.6154
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .2300 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =       0.34
FLOW VELOCITY(FEET/SEC) =   2.69 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.02   Tc(MIN.) =   7.44
LONGEST FLOWPATH FROM NODE   1702.00 TO NODE   1701.60 =   400.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1701.80 TO NODE   1701.60 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.134
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2780
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.2822
SUBAREA AREA(ACRES) =     1.78   SUBAREA RUNOFF(CFS) =     3.53
TOTAL AREA(ACRES) =       1.89   TOTAL RUNOFF(CFS) =     3.80
TC(MIN.) =   7.44

****************************************************************************
FLOW PROCESS FROM NODE   1701.60 TO NODE   1701.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1120.00  DOWNSTREAM(FEET) =    950.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   760.00   CHANNEL SLOPE =  0.2237
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1712 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       3.80
FLOW VELOCITY(FEET/SEC) =   3.62 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   3.50   Tc(MIN.) =  10.95
LONGEST FLOWPATH FROM NODE   1702.00 TO NODE   1701.00 =  1160.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1701.60 TO NODE   1701.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.563
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2600
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.2629
SUBAREA AREA(ACRES) =    12.38   SUBAREA RUNOFF(CFS) =    17.91
TOTAL AREA(ACRES) =      14.27   TOTAL RUNOFF(CFS) =    20.87
TC(MIN.) =  10.95
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1701.00 TO NODE     17.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   950.00  DOWNSTREAM(FEET) =   900.00
  FLOW LENGTH(FEET) =   440.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  11.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.58
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     20.87
  PIPE TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =  11.53
  LONGEST FLOWPATH FROM NODE   1702.00 TO NODE     17.00 =  1600.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     14.27  TC(MIN.) =     11.53
  PEAK FLOW RATE(CFS)   =     20.87
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR18

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
1802	1801.5	2	1,370.0	1,365.0	88.0	0.35	0.15	
1801.5	1801	5	1,365.0	950.0	970.0			
1801.5	1801	8				0.26	6.35	
1801	18	4	950.0	925.0	440.0			EX. 24" Caltrans
								Storm Drain
							6.5	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2004 Advanced Engineering Software (aes)
            Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC
                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                 *
* SUBBASIN # 18                                                          *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR18.DAT
  TIME/DATE OF STUDY: 13:00 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   1802.00 TO NODE   1801.50 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    88.00
  UPSTREAM ELEVATION(FEET) =   1370.00
  DOWNSTREAM ELEVATION(FEET) =   1365.00
  ELEVATION DIFFERENCE(FEET) =      5.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.097
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.357
```

```
  SUBAREA RUNOFF(CFS) =       0.39
  TOTAL AREA(ACRES) =       0.15   TOTAL RUNOFF(CFS) =       0.39

****************************************************************************
  FLOW PROCESS FROM NODE   1801.50 TO NODE   1801.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1365.00  DOWNSTREAM(FEET) =    950.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   970.00   CHANNEL SLOPE =  0.4278
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2173 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.39
  FLOW VELOCITY(FEET/SEC) =   2.61 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.19   Tc(MIN.) =  13.29
  LONGEST FLOWPATH FROM NODE   1802.00 TO NODE   1801.00 =  1058.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1801.50 TO NODE   1801.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.909
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2621
  SUBAREA AREA(ACRES) =    6.35   SUBAREA RUNOFF(CFS) =    8.10
  TOTAL AREA(ACRES) =      6.50   TOTAL RUNOFF(CFS) =    8.36
  TC(MIN.) =  13.29

****************************************************************************
  FLOW PROCESS FROM NODE   1801.00 TO NODE     18.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   950.00  DOWNSTREAM(FEET) =   925.00
  FLOW LENGTH(FEET) =   440.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   6.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.99
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      8.36
  PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =  13.90
  LONGEST FLOWPATH FROM NODE   1802.00 TO NODE     18.00 =  1498.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      6.50  TC(MIN.) =     13.90
  PEAK FLOW RATE(CFS)   =      8.36
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR19D

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
1903	1902.8	2	1,595.0	1,530.0	75.0	0.35	0.14	
1902.8	1902.6	5	1,530.0	1,420.0	300.0			
1902.8	1902.6	8				0.35	1.04	
1902.6	1902.4	5	1,420.0	1,245.0	600.0			
1902.6	1902.4	8				0.35	9.05	
1902.4	1902	5	1,245.0	1,090.0	1,145.0			
1902.4	1902	8				0.315	28.68	
1902	1901	5	1,090.0	950.0	1,950.0			
1902	1901	8				0.267	42.31	
1901	1901	7						DET OUT Q = 91.89
1901	19	4	950.0	930.0	441.0			Ex. 60" RCP Caltrans
								Storm Drain
							81.22	Total Area

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

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                          Analysis prepared by:

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                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                 *
* SUBBASIN # 19 - WITH DETENTION ROUTING                                 *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR19D.DAT
  TIME/DATE OF STUDY: 17:02 09/29/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   1903.00 TO NODE   1902.80 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1595.00
  DOWNSTREAM ELEVATION(FEET) =   1530.00
  ELEVATION DIFFERENCE(FEET) =     65.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.427
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.747
SUBAREA RUNOFF(CFS) =       0.43
TOTAL AREA(ACRES) =       0.14   TOTAL RUNOFF(CFS) =       0.43

****************************************************************************
FLOW PROCESS FROM NODE   1902.80 TO NODE   1902.60 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1530.00  DOWNSTREAM(FEET) =   1420.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.3667
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .2082 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =       0.43
FLOW VELOCITY(FEET/SEC) =   2.56 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.96   Tc(MIN.) =   7.38
LONGEST FLOWPATH FROM NODE   1903.00 TO NODE   1902.60 =   375.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1902.80 TO NODE   1902.60 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.171
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
SUBAREA AREA(ACRES) =     1.04   SUBAREA RUNOFF(CFS) =     2.61
TOTAL AREA(ACRES) =       1.18   TOTAL RUNOFF(CFS) =     2.96
TC(MIN.) =   7.38

****************************************************************************
FLOW PROCESS FROM NODE   1902.60 TO NODE   1902.40 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1420.00  DOWNSTREAM(FEET) =   1245.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   600.00   CHANNEL SLOPE =  0.2917
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1929 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       2.96
FLOW VELOCITY(FEET/SEC) =   3.53 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.83   Tc(MIN.) =  10.22
LONGEST FLOWPATH FROM NODE   1903.00 TO NODE   1902.40 =   975.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1902.60 TO NODE   1902.40 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.816
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
SUBAREA AREA(ACRES) =     9.05   SUBAREA RUNOFF(CFS) =    18.42
TOTAL AREA(ACRES) =      10.23   TOTAL RUNOFF(CFS) =    20.83
TC(MIN.) =  10.22
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1902.40 TO NODE   1902.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1245.00  DOWNSTREAM(FEET) =   1090.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1145.00   CHANNEL SLOPE =  0.1354
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1252 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     20.83
  FLOW VELOCITY(FEET/SEC) =   5.45 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.50   Tc(MIN.) =  13.72
  LONGEST FLOWPATH FROM NODE   1903.00 TO NODE   1902.00 =  2120.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1902.40 TO NODE   1902.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.809
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3150
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3242
  SUBAREA AREA(ACRES) =   28.68   SUBAREA RUNOFF(CFS) =   43.45
  TOTAL AREA(ACRES) =     38.91   TOTAL RUNOFF(CFS) =   60.66
  TC(MIN.) =  13.72

****************************************************************************
  FLOW PROCESS FROM NODE   1902.00 TO NODE   1901.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1090.00  DOWNSTREAM(FEET) =    950.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1950.00   CHANNEL SLOPE =  0.0718
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0718 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     60.66
  FLOW VELOCITY(FEET/SEC) =   5.89 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.52   Tc(MIN.) =  19.24
  LONGEST FLOWPATH FROM NODE   1903.00 TO NODE   1901.00 =  4070.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1902.00 TO NODE   1901.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.867
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2670
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2944
  SUBAREA AREA(ACRES) =   42.31   SUBAREA RUNOFF(CFS) =   43.68
  TOTAL AREA(ACRES) =     81.22   TOTAL RUNOFF(CFS) =   92.46
  TC(MIN.) =  19.24

****************************************************************************
  FLOW PROCESS FROM NODE   1901.00 TO NODE   1901.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
```

```
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  19.60   RAIN INTENSITY(INCH/HOUR) =  3.82
  TOTAL AREA(ACRES) =    81.22   TOTAL RUNOFF(CFS) =     91.89

****************************************************************************
  FLOW PROCESS FROM NODE   1901.00 TO NODE     19.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   950.00  DOWNSTREAM(FEET) =   930.00
  FLOW LENGTH(FEET) =   441.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  17.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.10
  GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     91.89
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =  19.97
  LONGEST FLOWPATH FROM NODE   1903.00 TO NODE     19.00 =  4511.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     81.22  TC(MIN.) =     19.97
  PEAK FLOW RATE(CFS)   =     91.89
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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www.fuscoe.com

Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR20

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
2033	2032	2	1,072.0	1,071.0	100.0	0.35	0.09	
2032	2031	5	1,071.0	976.2	257.0			
2032	2031	8				0.35	1.11	
2031	20.3	4	976.2	973.8	236.0			Ex. 24" RCP
20.3	20.3	1						1 of 2
2042	2041	2	1,075.0	990.0	240.0	0.35	1.41	
2041	20.4	4	977.6	976.0	260.0			Ex. 24" RCP
20.4	20.3	4	975.9	973.3	260.0			Ex. 30" RCP
20.3	20.3	1						2 of 2
20.3	20.2	4	973.2	968.7	340.0			Ex. 30" RCP
20.2	20.2	1						1 of 2
2001	2000.8	2	1,065.0	1,055.0	75.0	0.32	0.35	
2000.8	2000.6	5	1,055.0	1,025.0	300.0			
2000.8	2000.6	8				0.305	4.54	
2000.6	2000	5	1,025.0	985.0	475.0			
2000.6	2000	8				0.328	8.04	
2000	20.2	4	986.5	969.1	300.0			Ex. 30" CSP Caltrans
20.2	20.2	1						2 of 2
20.2	20.1	4	968.6	958.0	532.0			Ex. 42" CSP Caltrans
20.1	20.1	1						1 of 2
2004	2003	2	1,050.0	1,045.0	75.0	0.35	0.09	
2003	2002	5	1,045.0	973.0	450.0			
2003	2002	8				0.322	1.93	
2002	20.1	4	966.9	958.8	198.0			Ex. 24" CSP Caltrans
20.1	20.1	1						2 of 2
20.1	20	4	957.0	944.8	200.0			Ex. 42" CSP Caltrans
							17.56	Total Area

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

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                          Analysis prepared by:

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                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                 *
* SUBBASIN #20                                                           *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR20.DAT
  TIME/DATE OF STUDY: 15:10 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   2033.00 TO NODE   2032.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1072.00
  DOWNSTREAM ELEVATION(FEET) =   1071.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =   11.295
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
```

```
THE MAXIMUM OVERLAND FLOW LENGTH =    70.00
(Reference: Table 3-1B of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.452
SUBAREA RUNOFF(CFS) =      0.17
TOTAL AREA(ACRES) =      0.09   TOTAL RUNOFF(CFS) =      0.17

****************************************************************************
FLOW PROCESS FROM NODE   2032.00 TO NODE   2031.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1071.00  DOWNSTREAM(FEET) =    976.20
CHANNEL LENGTH THRU SUBAREA(FEET) =   257.00   CHANNEL SLOPE =  0.3689
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .2086 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =      0.17
FLOW VELOCITY(FEET/SEC) =   2.56 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.67   Tc(MIN.) =  12.97
LONGEST FLOWPATH FROM NODE   2033.00 TO NODE   2031.00 =   357.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2032.00 TO NODE   2031.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.987
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
SUBAREA AREA(ACRES) =    1.11   SUBAREA RUNOFF(CFS) =    1.94
TOTAL AREA(ACRES) =      1.20   TOTAL RUNOFF(CFS) =    2.09
TC(MIN.) =  12.97

****************************************************************************
FLOW PROCESS FROM NODE   2031.00 TO NODE     20.30 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   976.20  DOWNSTREAM(FEET) =   973.80
FLOW LENGTH(FEET) =   236.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  24.0 INCH PIPE IS   5.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   4.35
GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      2.09
PIPE TRAVEL TIME(MIN.) =   0.90    Tc(MIN.) =  13.87
LONGEST FLOWPATH FROM NODE   2033.00 TO NODE     20.30 =   593.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     20.30 TO NODE     20.30 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.) =  13.87
RAINFALL INTENSITY(INCH/HR) =   4.77
TOTAL STREAM AREA(ACRES) =     1.20
PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.09
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   2042.00 TO NODE   2041.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   240.00
  UPSTREAM ELEVATION(FEET) =   1075.00
  DOWNSTREAM ELEVATION(FEET) =    990.00
  ELEVATION DIFFERENCE(FEET) =     85.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      3.93
  TOTAL AREA(ACRES) =      1.41   TOTAL RUNOFF(CFS) =      3.93

****************************************************************************
  FLOW PROCESS FROM NODE   2041.00 TO NODE     20.40 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   977.60  DOWNSTREAM(FEET) =   976.00
  FLOW LENGTH(FEET) =   260.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   7.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.36
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      3.93
  PIPE TRAVEL TIME(MIN.) =   0.99    Tc(MIN.) =   7.26
  LONGEST FLOWPATH FROM NODE   2042.00 TO NODE     20.40 =   500.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     20.40 TO NODE     20.30 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   975.90  DOWNSTREAM(FEET) =   973.30
  FLOW LENGTH(FEET) =   260.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS   6.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.08
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      3.93
  PIPE TRAVEL TIME(MIN.) =   0.85    Tc(MIN.) =   8.11
  LONGEST FLOWPATH FROM NODE   2042.00 TO NODE     20.30 =   760.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     20.30 TO NODE     20.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   8.11
  RAINFALL INTENSITY(INCH/HR) =   6.75
  TOTAL STREAM AREA(ACRES) =     1.41
```

```
PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.93

** CONFLUENCE DATA **
STREAM     RUNOFF      Tc      INTENSITY      AREA
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1        2.09    13.87        4.775         1.20
    2        3.93     8.11        6.748         1.41

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

** PEAK FLOW RATE TABLE **
STREAM     RUNOFF      Tc      INTENSITY
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
    1        5.16     8.11       6.748
    2        4.88    13.87       4.775

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      5.16   Tc(MIN.) =    8.11
TOTAL AREA(ACRES) =      2.61
LONGEST FLOWPATH FROM NODE   2042.00 TO NODE     20.30 =   760.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     20.30 TO NODE     20.20 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   973.20  DOWNSTREAM(FEET) =   968.70
FLOW LENGTH(FEET) =   340.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  30.0 INCH PIPE IS   6.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   6.07
GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      5.16
PIPE TRAVEL TIME(MIN.) =   0.93    Tc(MIN.) =   9.05
LONGEST FLOWPATH FROM NODE   2042.00 TO NODE     20.20 =  1100.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     20.20 TO NODE     20.20 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =   9.05
RAINFALL INTENSITY(INCH/HR) =   6.29
TOTAL STREAM AREA(ACRES) =     2.61
PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.16

****************************************************************************
FLOW PROCESS FROM NODE   2001.00 TO NODE   2000.80 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3200
S.C.S. CURVE NUMBER (AMC II) =   0
INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
UPSTREAM ELEVATION(FEET) =   1065.00
DOWNSTREAM ELEVATION(FEET) =   1055.00
ELEVATION DIFFERENCE(FEET) =     10.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.644
WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.528
SUBAREA RUNOFF(CFS) =       0.96
TOTAL AREA(ACRES) =       0.35   TOTAL RUNOFF(CFS) =       0.96

****************************************************************************
FLOW PROCESS FROM NODE   2000.80 TO NODE   2000.60 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1055.00  DOWNSTREAM(FEET) =   1025.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.1000
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1000 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =       0.96
FLOW VELOCITY(FEET/SEC) =   1.77 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.82   Tc(MIN.) =   8.47
LONGEST FLOWPATH FROM NODE   2001.00 TO NODE   2000.60 =   375.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2000.80 TO NODE   2000.60 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.565
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3050
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3061
SUBAREA AREA(ACRES) =     4.54   SUBAREA RUNOFF(CFS) =     9.09
TOTAL AREA(ACRES) =       4.89   TOTAL RUNOFF(CFS) =    9.83
TC(MIN.) =   8.47

****************************************************************************
FLOW PROCESS FROM NODE   2000.60 TO NODE   2000.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1025.00  DOWNSTREAM(FEET) =    986.50
CHANNEL LENGTH THRU SUBAREA(FEET) =   475.00   CHANNEL SLOPE =  0.0811
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .0811 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       9.83
FLOW VELOCITY(FEET/SEC) =   3.41 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.32   Tc(MIN.) =  10.79
LONGEST FLOWPATH FROM NODE   2001.00 TO NODE   2000.00 =   850.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2000.60 TO NODE   2000.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.616
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3280
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3197
SUBAREA AREA(ACRES) =     8.04   SUBAREA RUNOFF(CFS) =   14.81
TOTAL AREA(ACRES) =      12.93   TOTAL RUNOFF(CFS) =   23.21
TC(MIN.) =  10.79
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   2000.00 TO NODE     20.20 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   986.50  DOWNSTREAM(FEET) =   969.10
  FLOW LENGTH(FEET) =   300.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  14.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.11
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     23.21
  PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =  11.28
  LONGEST FLOWPATH FROM NODE   2001.00 TO NODE     20.20 =  1150.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     20.20 TO NODE     20.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.28
  RAINFALL INTENSITY(INCH/HR) =   5.46
  TOTAL STREAM AREA(ACRES) =    12.93
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     23.21

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1         5.16     9.05        6.291         2.61
     2        23.21    11.28        5.456        12.93

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1        23.77     9.05       6.291
     2        27.69    11.28       5.456

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     27.69   Tc(MIN.) =   11.28
  TOTAL AREA(ACRES) =     15.54
  LONGEST FLOWPATH FROM NODE   2001.00 TO NODE     20.20 =  1150.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     20.20 TO NODE     20.10 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   968.60  DOWNSTREAM(FEET) =   958.00
  FLOW LENGTH(FEET) =   532.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  17.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.06
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     27.69
  PIPE TRAVEL TIME(MIN.) =   1.26    Tc(MIN.) =  12.54
  LONGEST FLOWPATH FROM NODE   2001.00 TO NODE     20.10 =  1682.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     20.10 TO NODE     20.10 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.) =  12.54
  RAINFALL INTENSITY(INCH/HR) =   5.10
  TOTAL STREAM AREA(ACRES) =    15.54
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     27.69

****************************************************************************
  FLOW PROCESS FROM NODE   2004.00 TO NODE   2003.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1050.00
  DOWNSTREAM ELEVATION(FEET) =   1045.00
  ELEVATION DIFFERENCE(FEET) =      5.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.212
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.017
  SUBAREA RUNOFF(CFS) =      0.25
  TOTAL AREA(ACRES) =      0.09   TOTAL RUNOFF(CFS) =      0.25

****************************************************************************
  FLOW PROCESS FROM NODE   2003.00 TO NODE   2002.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1045.00  DOWNSTREAM(FEET) =    973.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   450.00   CHANNEL SLOPE =  0.1600
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1400 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.25
  FLOW VELOCITY(FEET/SEC) =   2.10 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.58   Tc(MIN.) =   9.79
  LONGEST FLOWPATH FROM NODE   2004.00 TO NODE   2002.00 =   525.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2003.00 TO NODE   2002.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.978
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3220
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3232
  SUBAREA AREA(ACRES) =    1.93   SUBAREA RUNOFF(CFS) =    3.71
  TOTAL AREA(ACRES) =      2.02   TOTAL RUNOFF(CFS) =    3.90
  TC(MIN.) =   9.79

****************************************************************************
  FLOW PROCESS FROM NODE   2002.00 TO NODE     20.10 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   966.90  DOWNSTREAM(FEET) =   958.80
  FLOW LENGTH(FEET) =   198.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   6.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.54
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      3.90
  PIPE TRAVEL TIME(MIN.) =   0.60    Tc(MIN.) =  10.39
  LONGEST FLOWPATH FROM NODE   2004.00 TO NODE     20.10 =   723.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE     20.10 TO NODE     20.10 IS CODE =   1
------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  10.39
  RAINFALL INTENSITY(INCH/HR) =   5.75
  TOTAL STREAM AREA(ACRES) =     2.02
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.90

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       27.69    12.54        5.097         15.54
     2        3.90    10.39        5.754          2.02

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       28.43    10.39       5.754
     2       31.15    12.54       5.097

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     31.15   Tc(MIN.) =   12.54
  TOTAL AREA(ACRES) =     17.56
  LONGEST FLOWPATH FROM NODE   2001.00 TO NODE     20.10 =  1682.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE     20.10 TO NODE     20.00 IS CODE =  41
------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   957.00  DOWNSTREAM(FEET) =   944.80
  FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  14.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.96
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     31.15
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =  12.84
  LONGEST FLOWPATH FROM NODE   2001.00 TO NODE     20.00 =  1882.00 FEET.
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =     17.56  TC(MIN.) =     12.84
  PEAK FLOW RATE(CFS)    =     31.15
==============================================================================
```

==========

END OF RATIONAL METHOD ANALYSIS

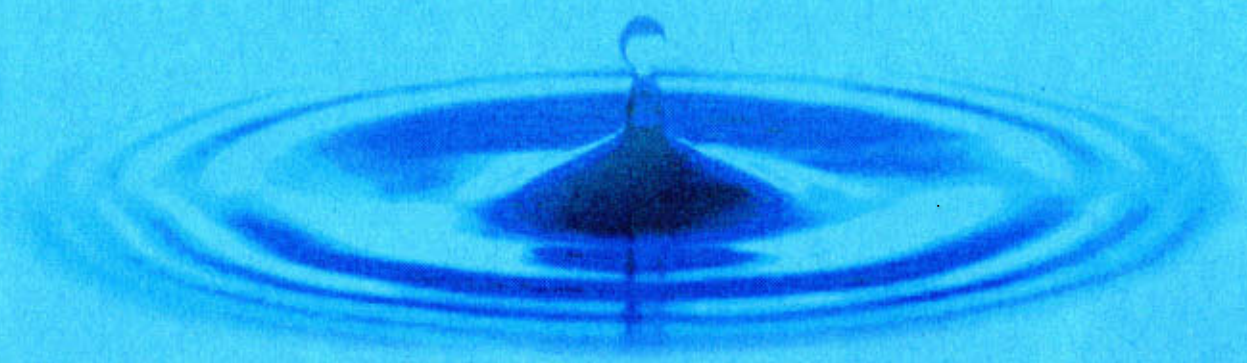
APPENDIX A

AES - 2005

Rational Method Hydrology

Existing Condition

BASIN B



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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR21

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
2101	2100.8	2	1,235.0	1,215.0	75.0	0.30	0.11	
2100.8	2100.6	5	1,215.0	1,105.0	300.0			
2100.8	2100.6	8				0.26	1.52	
2100.6	2100.4	5	1,105.0	1,045.0	600.0			
2100.6	2100.4	8				0.28	5.09	
2100.4	21	5	1,045.0	1,000.0	1,175.0			
2100.4	21	8				0.32	31.89	
							38.61	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
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            Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC.
                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                 *
* SUBBASIN #21                                                           *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR21.DAT
  TIME/DATE OF STUDY: 15:12 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   2101.00 TO NODE   2100.80 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1235.00
  DOWNSTREAM ELEVATION(FEET) =   1215.00
  ELEVATION DIFFERENCE(FEET) =     20.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.789
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.390
SUBAREA RUNOFF(CFS) =       0.28
TOTAL AREA(ACRES) =       0.11   TOTAL RUNOFF(CFS) =       0.28

****************************************************************************
FLOW PROCESS FROM NODE   2100.80 TO NODE   2100.60 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1215.00  DOWNSTREAM(FEET) =   1105.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.3667
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .2082 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =       0.28
FLOW VELOCITY(FEET/SEC) =   2.56 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.96   Tc(MIN.) =   7.75
LONGEST FLOWPATH FROM NODE   2101.00 TO NODE   2100.60 =   375.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2100.80 TO NODE   2100.60 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.953
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2600
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.2627
SUBAREA AREA(ACRES) =     1.52   SUBAREA RUNOFF(CFS) =     2.75
TOTAL AREA(ACRES) =       1.63   TOTAL RUNOFF(CFS) =     2.98
TC(MIN.) =   7.75

****************************************************************************
FLOW PROCESS FROM NODE   2100.60 TO NODE   2100.40 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1105.00  DOWNSTREAM(FEET) =   1045.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   600.00   CHANNEL SLOPE =  0.1000
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1000 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       2.98
FLOW VELOCITY(FEET/SEC) =   2.55 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   3.93   Tc(MIN.) =  11.67
LONGEST FLOWPATH FROM NODE   2101.00 TO NODE   2100.40 =   975.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2100.60 TO NODE   2100.40 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.337
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2800
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.2758
SUBAREA AREA(ACRES) =     5.09   SUBAREA RUNOFF(CFS) =     7.61
TOTAL AREA(ACRES) =       6.72   TOTAL RUNOFF(CFS) =     9.89
TC(MIN.) =  11.67
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   2100.40 TO NODE     21.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1045.00  DOWNSTREAM(FEET) =   1000.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1175.00   CHANNEL SLOPE =  0.0383
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0383 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       9.89
  FLOW VELOCITY(FEET/SEC) =   2.35 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   8.33   Tc(MIN.) =  20.00
  LONGEST FLOWPATH FROM NODE   2101.00 TO NODE     21.00 =  2150.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2100.40 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.771
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3123
  SUBAREA AREA(ACRES) =   31.89   SUBAREA RUNOFF(CFS) =   38.48
  TOTAL AREA(ACRES) =     38.61   TOTAL RUNOFF(CFS) =   45.47
  TC(MIN.) =  20.00
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     38.61  TC(MIN.) =     20.00
  PEAK FLOW RATE(CFS)   =     45.47
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR22
Page 1

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
2203	2202	2	1,445.0	1,405.0	100.0	0.35	0.2	
2202	2201	5	1,405.0	890.0	1,382.2			
2202	2201	8				0.452	8.69	
2204	2201	8				0.457	10.77	
2201	2200	5	890.0	830.0	471.5			
2201	2200	8				0.428	2.31	
2200	2200	1						1 of 2
2207	2206	2	1,290.0	1,265.0	76.3	0.35	0.21	
2206	2205	5	1,265.0	1,065.0	461.7			
2206	2205	8				0.46	4.73	
2205	2200	5	1,065.0	830.0	1,125.6			
2205	2200	8				0.45	11.51	
2200	2200	1						2 of 2
2200	22	4	817.0	815.0	46.0			EX. 24" CMP
							38.42	Total Area

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

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            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
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                          Analysis prepared by:

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                            (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                 *
* SUBBASIN # 22                                                          *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR22.DAT
  TIME/DATE OF STUDY: 13:03 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  =====  ====== =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   2203.00 TO NODE   2202.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    95.00
  UPSTREAM ELEVATION(FEET) =   1445.00
  DOWNSTREAM ELEVATION(FEET) =   1405.00
  ELEVATION DIFFERENCE(FEET) =     40.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.108
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.105
SUBAREA RUNOFF(CFS) =       0.57
TOTAL AREA(ACRES) =       0.20   TOTAL RUNOFF(CFS) =       0.57

****************************************************************************
FLOW PROCESS FROM NODE   2202.00 TO NODE   2201.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1405.00  DOWNSTREAM(FEET) =    890.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1382.20   CHANNEL SLOPE =  0.3726
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .2092 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =       0.57
FLOW VELOCITY(FEET/SEC) =   2.56 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   8.99   Tc(MIN.) =  15.10
LONGEST FLOWPATH FROM NODE   2203.00 TO NODE   2201.00 =  1477.20 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2202.00 TO NODE   2201.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.520
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4520
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4497
SUBAREA AREA(ACRES) =     8.69   SUBAREA RUNOFF(CFS) =   17.76
TOTAL AREA(ACRES) =       8.89   TOTAL RUNOFF(CFS) =   18.07
TC(MIN.) =  15.10

****************************************************************************
FLOW PROCESS FROM NODE   2204.00 TO NODE   2201.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.520
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4570
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4537
SUBAREA AREA(ACRES) =    10.77   SUBAREA RUNOFF(CFS) =   22.25
TOTAL AREA(ACRES) =      19.66   TOTAL RUNOFF(CFS) =   40.32
TC(MIN.) =  15.10

****************************************************************************
FLOW PROCESS FROM NODE   2201.00 TO NODE   2200.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    890.00  DOWNSTREAM(FEET) =    830.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   471.50   CHANNEL SLOPE =  0.1273
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1198 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =      40.32
FLOW VELOCITY(FEET/SEC) =   6.64 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.18   Tc(MIN.) =  16.29
LONGEST FLOWPATH FROM NODE   2203.00 TO NODE   2200.00 =  1948.70 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   2201.00 TO NODE   2200.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.306
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4280
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4510
  SUBAREA AREA(ACRES) =    2.31   SUBAREA RUNOFF(CFS) =    4.26
  TOTAL AREA(ACRES) =     21.97   TOTAL RUNOFF(CFS) =   42.66
  TC(MIN.) =  16.29

****************************************************************************
  FLOW PROCESS FROM NODE   2200.00 TO NODE   2200.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  16.29
  RAINFALL INTENSITY(INCH/HR) =   4.31
  TOTAL STREAM AREA(ACRES) =    21.97
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     42.66

****************************************************************************
  FLOW PROCESS FROM NODE   2207.00 TO NODE   2206.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    76.30
  UPSTREAM ELEVATION(FEET) =   1290.00
  DOWNSTREAM ELEVATION(FEET) =   1265.00
  ELEVATION DIFFERENCE(FEET) =     25.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.474
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.698
  SUBAREA RUNOFF(CFS) =      0.64
  TOTAL AREA(ACRES) =      0.21   TOTAL RUNOFF(CFS) =      0.64

****************************************************************************
  FLOW PROCESS FROM NODE   2206.00 TO NODE   2205.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1265.00  DOWNSTREAM(FEET) =   1065.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   461.70   CHANNEL SLOPE =  0.4332
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2180 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.64
  FLOW VELOCITY(FEET/SEC) =   2.61 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.94   Tc(MIN.) =   8.42
  LONGEST FLOWPATH FROM NODE   2207.00 TO NODE   2205.00 =   538.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2206.00 TO NODE   2205.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.590
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4553
  SUBAREA AREA(ACRES) =     4.73   SUBAREA RUNOFF(CFS) =   14.34
  TOTAL AREA(ACRES) =       4.94   TOTAL RUNOFF(CFS) =   14.82
  TC(MIN.) =   8.42

********************************************************************************
  FLOW PROCESS FROM NODE   2205.00 TO NODE   2200.00 IS CODE =  53
--------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1065.00  DOWNSTREAM(FEET) =    830.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1125.00   CHANNEL SLOPE =  0.2089
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1644 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      14.82
  FLOW VELOCITY(FEET/SEC) =   5.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.36   Tc(MIN.) =  11.78
  LONGEST FLOWPATH FROM NODE   2207.00 TO NODE   2200.00 =  1663.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE   2205.00 TO NODE   2200.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.305
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4516
  SUBAREA AREA(ACRES) =    11.51   SUBAREA RUNOFF(CFS) =   27.48
  TOTAL AREA(ACRES) =      16.45   TOTAL RUNOFF(CFS) =   39.41
  TC(MIN.) =  11.78

********************************************************************************
  FLOW PROCESS FROM NODE   2200.00 TO NODE   2200.00 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.78
  RAINFALL INTENSITY(INCH/HR) =   5.31
  TOTAL STREAM AREA(ACRES) =    16.45
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     39.41

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1        42.66    16.29        4.306        21.97
     2        39.41    11.78        5.305        16.45

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

  ** PEAK FLOW RATE TABLE **
```

```
STREAM      RUNOFF      Tc       INTENSITY
NUMBER       (CFS)    (MIN.)   (INCH/HOUR)
    1        70.28    11.78       5.305
    2        74.65    16.29       4.306

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     74.65   Tc(MIN.) =   16.29
TOTAL AREA(ACRES) =     38.42
LONGEST FLOWPATH FROM NODE   2203.00 TO NODE   2200.00 =  1948.70 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2200.00 TO NODE     22.00 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   817.00  DOWNSTREAM(FEET) =   815.00
FLOW LENGTH(FEET) =    46.00   MANNING'S N =  0.024
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) =   8.51
(PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
 AT DEPTH = 0.94 * DIAMETER)
GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     74.65
PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =  16.38
LONGEST FLOWPATH FROM NODE   2203.00 TO NODE     22.00 =  1994.70 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =     38.42  TC(MIN.) =     16.38
PEAK FLOW RATE(CFS)   =     74.65
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR221

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
2213	2212	2	1,260.0	1,230.0	100.0	0.35	0.47	
2212	2211	5	1,230.0	1,095.0	647.9			
2212	2211	8				0.46	3.03	
2211	2210	5	1,095.0	843.4	880.3			
2211	2210	8				0.443	8.57	
2210	22.1	4	831.0	827.0	50.0			Ex. 24" CMP
								Storm Drain
							12.07	Total Area

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

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                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC
                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************** DESCRIPTION OF STUDY **************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                   *
* SUBBASIN # 221                                                           *
* 2469.01A - OCTOBER 2006                                                  *
 ***************************************************************************

  FILE NAME: MERR221.DAT
  TIME/DATE OF STUDY: 13:05 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   2213.00 TO NODE   2212.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1260.00
  DOWNSTREAM ELEVATION(FEET) =   1230.00
  ELEVATION DIFFERENCE(FEET) =     30.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
SUBAREA RUNOFF(CFS) =       1.31
TOTAL AREA(ACRES) =       0.47   TOTAL RUNOFF(CFS) =       1.31

****************************************************************************
FLOW PROCESS FROM NODE   2212.00 TO NODE   2211.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1230.00  DOWNSTREAM(FEET) =   1095.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   647.90   CHANNEL SLOPE =  0.2084
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1642 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       1.31
FLOW VELOCITY(FEET/SEC) =   2.48 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   4.35   Tc(MIN.) =  10.61
LONGEST FLOWPATH FROM NODE   2213.00 TO NODE   2211.00 =   747.90 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2212.00 TO NODE   2211.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.675
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4452
SUBAREA AREA(ACRES) =     3.03   SUBAREA RUNOFF(CFS) =     7.91
TOTAL AREA(ACRES) =       3.50   TOTAL RUNOFF(CFS) =     8.84
TC(MIN.) =  10.61

****************************************************************************
FLOW PROCESS FROM NODE   2211.00 TO NODE   2210.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1095.00  DOWNSTREAM(FEET) =    843.40
CHANNEL LENGTH THRU SUBAREA(FEET) =   880.30   CHANNEL SLOPE =  0.2858
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1915 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       8.84
FLOW VELOCITY(FEET/SEC) =   5.06 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.90   Tc(MIN.) =  13.51
LONGEST FLOWPATH FROM NODE   2213.00 TO NODE   2210.00 =  1628.20 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2211.00 TO NODE   2210.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.856
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4430
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4436
SUBAREA AREA(ACRES) =     8.57   SUBAREA RUNOFF(CFS) =    18.44
TOTAL AREA(ACRES) =      12.07   TOTAL RUNOFF(CFS) =    26.01
TC(MIN.) =  13.51

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

```
  FLOW PROCESS FROM NODE   2210.00 TO NODE     22.10 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   831.00  DOWNSTREAM(FEET) =   827.00
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.60
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     26.01
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =  13.58
  LONGEST FLOWPATH FROM NODE   2213.00 TO NODE     22.10 =  1678.20 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     12.07  TC(MIN.) =     13.58
  PEAK FLOW RATE(CFS)   =     26.01
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR222

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
2223	2222	2	1,260.0	1,210.0	92.1	0.35	0.23	
2222	2221	5	1,210.0	1,115.0	382.1			
2222	2221	8				0.454	5.99	
2221	2220	5	1,115.0	885.0	797.9			
2221	2220	8				0.449	7.16	
2220	22.2	4	885.0	845.0	235.0			EX. 24" CMP
								Storm Drain
							13.38	Total Area

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

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                          Analysis prepared by:

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                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                 *
* SUBBASIN # 222                                                         *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR222.DAT
  TIME/DATE OF STUDY: 13:06 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  5.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****************************************************************************
  FLOW PROCESS FROM NODE   2223.00 TO NODE   2222.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    92.10
  UPSTREAM ELEVATION(FEET) =   1260.00
  DOWNSTREAM ELEVATION(FEET) =   1210.00
  ELEVATION DIFFERENCE(FEET) =     50.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.014
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.186
SUBAREA RUNOFF(CFS) =      0.66
TOTAL AREA(ACRES) =      0.23   TOTAL RUNOFF(CFS) =      0.66

****************************************************************************
FLOW PROCESS FROM NODE   2222.00 TO NODE   2221.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1210.00  DOWNSTREAM(FEET) =   1115.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   382.10   CHANNEL SLOPE =  0.2486
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1795 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =      0.66
FLOW VELOCITY(FEET/SEC) =   2.37 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.68   Tc(MIN.) =   8.70
LONGEST FLOWPATH FROM NODE   2223.00 TO NODE   2221.00 =   474.20 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2222.00 TO NODE   2221.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.452
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4540
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4502
SUBAREA AREA(ACRES) =    5.99   SUBAREA RUNOFF(CFS) =   17.55
TOTAL AREA(ACRES) =      6.22   TOTAL RUNOFF(CFS) =   18.07
TC(MIN.) =   8.70

****************************************************************************
FLOW PROCESS FROM NODE   2221.00 TO NODE   2220.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1115.00  DOWNSTREAM(FEET) =    885.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   797.90   CHANNEL SLOPE =  0.2883
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1921 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =     18.07
FLOW VELOCITY(FEET/SEC) =   6.43 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.07   Tc(MIN.) =  10.76
LONGEST FLOWPATH FROM NODE   2223.00 TO NODE   2220.00 =  1272.10 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2221.00 TO NODE   2220.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.623
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4490
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4495
SUBAREA AREA(ACRES) =    7.16   SUBAREA RUNOFF(CFS) =   18.08
TOTAL AREA(ACRES) =     13.38   TOTAL RUNOFF(CFS) =   33.82
TC(MIN.) =  10.76
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   2220.00 TO NODE     22.20 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   885.00  DOWNSTREAM(FEET) =   845.00
  FLOW LENGTH(FEET) =   235.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.55
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     33.82
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =  11.00
  LONGEST FLOWPATH FROM NODE   2223.00 TO NODE     22.20 =  1507.10 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     13.38  TC(MIN.) =     11.00
  PEAK FLOW RATE(CFS)   =     33.82
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR223

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Friction Coeff.	Area (ac.)	Comments
2232	2231	2	1,240.0	1,195.0	100.0	0.35	0.26	
2231	2230	5	1,195.0	895.0	628.0			
2231	2230	8				0.449	4.67	
2230	22.3	4	895.0	888.9	40.0			EX. 24" Caltrans
								Storm Drain
							4.93	Total Area

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

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                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                 *
* SUBBASIN # 223                                                         *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR223.DAT
  TIME/DATE OF STUDY: 13:07 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   2232.00 TO NODE   2231.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1240.00
  DOWNSTREAM ELEVATION(FEET) =   1195.00
  ELEVATION DIFFERENCE(FEET) =     45.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
SUBAREA RUNOFF(CFS) =       0.73
TOTAL AREA(ACRES) =       0.26   TOTAL RUNOFF(CFS) =       0.73

****************************************************************************
FLOW PROCESS FROM NODE   2231.00 TO NODE   2230.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1195.00  DOWNSTREAM(FEET) =    895.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   628.00   CHANNEL SLOPE =  0.4777
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .2228 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =       0.73
FLOW VELOCITY(FEET/SEC) =   2.64 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   3.96   Tc(MIN.) =  10.23
LONGEST FLOWPATH FROM NODE   2232.00 TO NODE   2230.00 =   728.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2231.00 TO NODE   2230.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.813
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4490
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4438
SUBAREA AREA(ACRES) =    4.67   SUBAREA RUNOFF(CFS) =   12.19
TOTAL AREA(ACRES) =      4.93   TOTAL RUNOFF(CFS) =   12.72
TC(MIN.) =  10.23

****************************************************************************
FLOW PROCESS FROM NODE   2230.00 TO NODE     22.30 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   895.00  DOWNSTREAM(FEET) =   888.90
FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.024
DEPTH OF FLOW IN  24.0 INCH PIPE IS   8.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  12.40
GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     12.72
PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =  10.28
LONGEST FLOWPATH FROM NODE   2232.00 TO NODE     22.30 =   768.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =      4.93  TC(MIN.) =     10.28
PEAK FLOW RATE(CFS)   =     12.72
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR224

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
2242	2241	2	1,205.0	1,135.0	100.0	0.35	0.15	
2241	2240	5	1,135.0	920.0	874.5			
2241	2240	8				0.333	5.17	
2240	22.4	4	920.0	915.0	57.5			EX. 18" CMP
							5.32	Total Area

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

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                          Analysis prepared by:

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                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************** DESCRIPTION OF STUDY **************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                  *
* SUBBASIN # 224                                                          *
* 2469.01A - OCTOBER 2006                                                 *
 ***************************************************************************

  FILE NAME: MERR224.DAT
  TIME/DATE OF STUDY: 13:09 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   2242.00 TO NODE   2241.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1205.00
  DOWNSTREAM ELEVATION(FEET) =   1135.00
  ELEVATION DIFFERENCE(FEET) =     70.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
SUBAREA RUNOFF(CFS) =       0.42
TOTAL AREA(ACRES) =       0.15   TOTAL RUNOFF(CFS) =       0.42

****************************************************************************
FLOW PROCESS FROM NODE   2241.00 TO NODE   2240.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1135.00  DOWNSTREAM(FEET) =    920.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   874.50   CHANNEL SLOPE =  0.2459
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1786 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =       0.42
FLOW VELOCITY(FEET/SEC) =   2.37 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   6.16   Tc(MIN.) =  12.42
LONGEST FLOWPATH FROM NODE   2242.00 TO NODE   2240.00 =   974.50 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2241.00 TO NODE   2240.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.127
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .3330
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3335
SUBAREA AREA(ACRES) =     5.17   SUBAREA RUNOFF(CFS) =     8.83
TOTAL AREA(ACRES) =       5.32   TOTAL RUNOFF(CFS) =    9.10
TC(MIN.) =  12.42

****************************************************************************
FLOW PROCESS FROM NODE   2240.00 TO NODE     22.40 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   920.00  DOWNSTREAM(FEET) =   915.00
FLOW LENGTH(FEET) =    57.50   MANNING'S N =  0.024
DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   9.31
GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      9.10
PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  12.53
LONGEST FLOWPATH FROM NODE   2242.00 TO NODE     22.40 =  1032.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =      5.32  TC(MIN.) =     12.53
PEAK FLOW RATE(CFS)   =      9.10
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR23

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
2304	2303	2	1,325.0	1,268.0	100.0	0.35	1.04	
2303	2301	5	1,268.0	863.0	1,070.0			
2303	2301	8				0.345	7.47	
2301	2300	5	863.0	808.0	510.0			
2301	2300	8				0.446	16.114	
2300	23	4	808.0	801.0	100.0			Existing 36"CMP Culvert
								Storm Drain
							24.624	Total Area

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

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                       SAN DIEGO, CALIFORNIA 92122
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 ************************** DESCRIPTION OF STUDY **************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                  *
* SUBBASIN # 23                                                           *
* 2469.01A - OCTOBER 2006                                                 *
 **************************************************************************

  FILE NAME: MERR23.DAT
  TIME/DATE OF STUDY: 13:10 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   2304.00 TO NODE   2303.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1325.00
  DOWNSTREAM ELEVATION(FEET) =   1268.00
  ELEVATION DIFFERENCE(FEET) =     57.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
SUBAREA RUNOFF(CFS) =       2.90
TOTAL AREA(ACRES) =       1.04   TOTAL RUNOFF(CFS) =       2.90

****************************************************************************
FLOW PROCESS FROM NODE   2303.00 TO NODE   2301.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1268.00  DOWNSTREAM(FEET) =    863.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1070.00   CHANNEL SLOPE =  0.3785
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .2102 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       2.90
FLOW VELOCITY(FEET/SEC) =   3.66 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   4.87   Tc(MIN.) =  11.14
LONGEST FLOWPATH FROM NODE   2304.00 TO NODE   2301.00 =  1170.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2303.00 TO NODE   2301.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.501
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .3450
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3456
SUBAREA AREA(ACRES) =     7.47   SUBAREA RUNOFF(CFS) =   14.18
TOTAL AREA(ACRES) =       8.51   TOTAL RUNOFF(CFS) =   16.18
TC(MIN.) =  11.14

****************************************************************************
FLOW PROCESS FROM NODE   2301.00 TO NODE   2300.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    863.00  DOWNSTREAM(FEET) =    808.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   510.00   CHANNEL SLOPE =  0.1078
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1059 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =      16.18
FLOW VELOCITY(FEET/SEC) =   4.60 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.85   Tc(MIN.) =  12.98
LONGEST FLOWPATH FROM NODE   2304.00 TO NODE   2300.00 =  1680.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2301.00 TO NODE   2300.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.983
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4460
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4113
SUBAREA AREA(ACRES) =    16.11   SUBAREA RUNOFF(CFS) =   35.81
TOTAL AREA(ACRES) =      24.62   TOTAL RUNOFF(CFS) =   50.47
TC(MIN.) =  12.98

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

```
  FLOW PROCESS FROM NODE   2300.00 TO NODE     23.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   808.00  DOWNSTREAM(FEET) =   801.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  19.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.17
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     50.47
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =  13.11
  LONGEST FLOWPATH FROM NODE   2304.00 TO NODE     23.00 =  1780.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =     24.62  TC(MIN.) =     13.11
  PEAK FLOW RATE(CFS)    =     50.47
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR231
Page 1

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Friction Coeff.	Area (ac.)	Comments
2312	2311	2	1,150.0	1,080.0	100.0	0.46	0.13	
2311	2310	5	1,080.0	815.0	930.0			
2311	2310	8				0.428	4.32	
2310	23.1	4	815.0	813.0	46.0			EX. 24" CMP Culvert
							4.45	Total Area

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

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                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                 *
* SUBBASIN # 231                                                         *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR231.DAT
  TIME/DATE OF STUDY: 13:11 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   2312.00 TO NODE   2311.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1150.00
  DOWNSTREAM ELEVATION(FEET) =   1080.00
  ELEVATION DIFFERENCE(FEET) =     70.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.348
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.830
SUBAREA RUNOFF(CFS) =       0.53
TOTAL AREA(ACRES) =       0.13   TOTAL RUNOFF(CFS) =       0.53

****************************************************************************
  FLOW PROCESS FROM NODE   2311.00 TO NODE   2310.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1080.00  DOWNSTREAM(FEET) =    815.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   930.00   CHANNEL SLOPE =  0.2849
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1912 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.53
  FLOW VELOCITY(FEET/SEC) =   2.45 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.33   Tc(MIN.) =  11.68
  LONGEST FLOWPATH FROM NODE   2312.00 TO NODE   2310.00 =  1030.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2311.00 TO NODE   2310.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.336
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4280
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4289
  SUBAREA AREA(ACRES) =    4.32   SUBAREA RUNOFF(CFS) =    9.87
  TOTAL AREA(ACRES) =      4.45   TOTAL RUNOFF(CFS) =   10.19
  TC(MIN.) =  11.68

****************************************************************************
  FLOW PROCESS FROM NODE   2310.00 TO NODE     23.10 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   815.00  DOWNSTREAM(FEET) =   813.00
  FLOW LENGTH(FEET) =    46.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  10.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.38
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     10.19
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  11.78
  LONGEST FLOWPATH FROM NODE   2312.00 TO NODE     23.10 =  1076.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      4.45  TC(MIN.) =     11.78
  PEAK FLOW RATE(CFS)   =     10.19
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR232
Page 1

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
2323	2322	2	1,350.0	1,300.0	100.0	0.46	0.29	
2322	2321	5	1,300.0	950.0	715.0			
2322	2321	8				0.46	2.78	
2321	2320	5	950.0	810.0	715.0			
2321	2320	8				0.42	4.83	
2320	23.2	4	810.0	808.0	50.0			Existing 24"CMP culvert
							7.9	Total Area

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

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                          Analysis prepared by:

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                              (858) 554-1500

 ************************** DESCRIPTION OF STUDY **************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                  *
* SUBBASIN # 232                                                          *
* 2469.01A - OCTOBER 2006                                                 *
 ***************************************************************************

  FILE NAME: MERR232.DAT
  TIME/DATE OF STUDY: 13:13 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   2323.00 TO NODE   2322.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1350.00
  DOWNSTREAM ELEVATION(FEET) =   1300.00
  ELEVATION DIFFERENCE(FEET) =     50.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.348
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.830
SUBAREA RUNOFF(CFS) =       1.18
TOTAL AREA(ACRES) =       0.29   TOTAL RUNOFF(CFS) =       1.18

****************************************************************************
FLOW PROCESS FROM NODE   2322.00 TO NODE   2321.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1300.00  DOWNSTREAM(FEET) =    950.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   715.00   CHANNEL SLOPE =  0.4895
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .2240 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       1.18
FLOW VELOCITY(FEET/SEC) =   2.80 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   4.26   Tc(MIN.) =   9.61
LONGEST FLOWPATH FROM NODE   2323.00 TO NODE   2321.00 =   815.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2322.00 TO NODE   2321.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.052
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4600
SUBAREA AREA(ACRES) =     2.78   SUBAREA RUNOFF(CFS) =     7.74
TOTAL AREA(ACRES) =       3.07   TOTAL RUNOFF(CFS) =    8.55
TC(MIN.) =   9.61

****************************************************************************
FLOW PROCESS FROM NODE   2321.00 TO NODE   2320.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    950.00  DOWNSTREAM(FEET) =    810.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   715.00   CHANNEL SLOPE =  0.1958
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1579 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       8.55
FLOW VELOCITY(FEET/SEC) =   4.55 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.62   Tc(MIN.) =  12.23
LONGEST FLOWPATH FROM NODE   2323.00 TO NODE   2320.00 =  1530.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2321.00 TO NODE   2320.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.180
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4200
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4355
SUBAREA AREA(ACRES) =     4.83   SUBAREA RUNOFF(CFS) =   10.51
TOTAL AREA(ACRES) =       7.90   TOTAL RUNOFF(CFS) =   17.82
TC(MIN.) =  12.23

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

```
  FLOW PROCESS FROM NODE   2320.00 TO NODE     23.20 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   810.00  DOWNSTREAM(FEET) =   808.00
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.16
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     17.82
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  12.33
  LONGEST FLOWPATH FROM NODE   2323.00 TO NODE     23.20 =  1580.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =      7.90  TC(MIN.) =     12.33
  PEAK FLOW RATE(CFS)    =     17.82
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR233

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
2333	2332	2	1,270.0	1,195.0	100.0	0.46	0.32	
2332	2331	5	1,195.0	925.0	515.0			
2332	2331	8				0.46	2.23	
2331	2330	5	925.0	810.0	700.0			
2331	2330	8				0.432	4.94	
2330	23.3	4	810.0	808.0	54.0			Existing 18"CMP Culvert
							7.49	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2004 Advanced Engineering Software (aes)
            Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC
                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************** DESCRIPTION OF STUDY **************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                  *
* SUBBASIN # 233                                                          *
* 2469.01A - OCTOBER 2006                                                 *
 ***************************************************************************

  FILE NAME: MERR233.DAT
  TIME/DATE OF STUDY: 13:15 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   2333.00 TO NODE   2332.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1270.00
  DOWNSTREAM ELEVATION(FEET) =   1195.00
  ELEVATION DIFFERENCE(FEET) =     75.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.348
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.830
SUBAREA RUNOFF(CFS) =       1.30
TOTAL AREA(ACRES) =       0.32   TOTAL RUNOFF(CFS) =       1.30

****************************************************************************
FLOW PROCESS FROM NODE   2332.00 TO NODE   2331.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1195.00  DOWNSTREAM(FEET) =    925.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   515.00   CHANNEL SLOPE =  0.5243
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .2262 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       1.30
FLOW VELOCITY(FEET/SEC) =   2.91 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.95   Tc(MIN.) =   8.30
LONGEST FLOWPATH FROM NODE   2333.00 TO NODE   2331.00 =   615.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2332.00 TO NODE   2331.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.650
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4600
SUBAREA AREA(ACRES) =     2.23   SUBAREA RUNOFF(CFS) =     6.82
TOTAL AREA(ACRES) =       2.55   TOTAL RUNOFF(CFS) =    7.80
TC(MIN.) =   8.30

****************************************************************************
FLOW PROCESS FROM NODE   2331.00 TO NODE   2330.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    925.00  DOWNSTREAM(FEET) =    810.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   700.00   CHANNEL SLOPE =  0.1643
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1421 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       7.80
FLOW VELOCITY(FEET/SEC) =   4.18 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.79   Tc(MIN.) =  11.09
LONGEST FLOWPATH FROM NODE   2333.00 TO NODE   2330.00 =  1315.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2331.00 TO NODE   2330.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.517
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4320
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4415
SUBAREA AREA(ACRES) =     4.94   SUBAREA RUNOFF(CFS) =   11.77
TOTAL AREA(ACRES) =       7.49   TOTAL RUNOFF(CFS) =   18.24
TC(MIN.) =  11.09

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

```
  FLOW PROCESS FROM NODE   2330.00 TO NODE     23.30 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   810.00  DOWNSTREAM(FEET) =   808.00
  FLOW LENGTH(FEET) =    54.00   MANNING'S N =  0.024
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.48
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.94 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     18.24
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =  11.23
  LONGEST FLOWPATH FROM NODE   2333.00 TO NODE     23.30 =  1369.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      7.49  TC(MIN.) =     11.23
  PEAK FLOW RATE(CFS)   =     18.24
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR234

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
2343	2342	2	1,360.0	1,305.0	100.0	0.341	0.12	
2342	2341	5	1,305.0	890.0	1,720.0			
2342	2341	8				0.451	3.46	
2341	2340	5	890.0	810.0	631.0			
2341	2340	8				0.42	6.83	
2340	23.4	4	810.0	808.0	64.0			Existing 24"CMP Culvert
							10.41	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                          2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2004 Advanced Engineering Software (aes)
            Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC
                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                 *
* SUBBASIN # 234                                                         *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR234.DAT
  TIME/DATE OF STUDY: 13:16 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   2343.00 TO NODE   2342.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .3410
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1360.00
  DOWNSTREAM ELEVATION(FEET) =   1305.00
  ELEVATION DIFFERENCE(FEET) =     55.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.342
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.911
SUBAREA RUNOFF(CFS) =       0.33
TOTAL AREA(ACRES) =       0.12   TOTAL RUNOFF(CFS) =       0.33

****************************************************************************
FLOW PROCESS FROM NODE   2342.00 TO NODE   2341.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1305.00  DOWNSTREAM(FEET) =    890.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1720.00   CHANNEL SLOPE =  0.2413
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1771 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =       0.33
FLOW VELOCITY(FEET/SEC) =   2.36 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =  12.16   Tc(MIN.) =  18.51
LONGEST FLOWPATH FROM NODE   2343.00 TO NODE   2341.00 =  1820.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2342.00 TO NODE   2341.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.965
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4510
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4472
SUBAREA AREA(ACRES) =     3.46   SUBAREA RUNOFF(CFS) =     6.19
TOTAL AREA(ACRES) =       3.58   TOTAL RUNOFF(CFS) =     6.35
TC(MIN.) =  18.51

****************************************************************************
FLOW PROCESS FROM NODE   2341.00 TO NODE   2340.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    890.00  DOWNSTREAM(FEET) =    810.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   631.00   CHANNEL SLOPE =  0.1268
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1195 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       6.35
FLOW VELOCITY(FEET/SEC) =   3.58 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.93   Tc(MIN.) =  21.44
LONGEST FLOWPATH FROM NODE   2343.00 TO NODE   2340.00 =  2451.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2341.00 TO NODE   2340.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.606
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4200
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4294
SUBAREA AREA(ACRES) =     6.83   SUBAREA RUNOFF(CFS) =    10.34
TOTAL AREA(ACRES) =      10.41   TOTAL RUNOFF(CFS) =    16.12
TC(MIN.) =  21.44
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   2340.00 TO NODE     23.40 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   810.00  DOWNSTREAM(FEET) =   808.00
  FLOW LENGTH(FEET) =    64.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.24
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     16.12
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =  21.59
  LONGEST FLOWPATH FROM NODE   2343.00 TO NODE     23.40 =  2515.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     10.41  TC(MIN.) =     21.59
  PEAK FLOW RATE(CFS)   =     16.12
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR24
Page 1

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
2403	2402	2	1,360.0	1,310.0	95.0	0.46	0.33	
2402	2401	5	1,310.0	1,130.0	305.0			
2402	2401	8				0.46	1.82	
2401	2400	5	1,130.0	805.0	1,330.0			
2401	2400	8				0.443	31.33	
2400	24	4	805.0	803.0	50.0			Existing 36" CMP culvert
							33.48	Total Area

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

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            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
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                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC
                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                 *
* SUBBASIN # 24                                                          *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR24.DAT
  TIME/DATE OF STUDY: 13:19 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   2403.00 TO NODE   2402.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    95.00
  UPSTREAM ELEVATION(FEET) =   1360.00
  DOWNSTREAM ELEVATION(FEET) =   1310.00
  ELEVATION DIFFERENCE(FEET) =     50.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.212
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.978
SUBAREA RUNOFF(CFS) =       1.36
TOTAL AREA(ACRES) =       0.33   TOTAL RUNOFF(CFS) =       1.36

****************************************************************************
FLOW PROCESS FROM NODE   2402.00 TO NODE   2401.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1310.00  DOWNSTREAM(FEET) =   1130.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   305.00   CHANNEL SLOPE =  0.5902
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .2295 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       1.36
FLOW VELOCITY(FEET/SEC) =   2.97 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.71   Tc(MIN.) =   6.92
LONGEST FLOWPATH FROM NODE   2403.00 TO NODE   2401.00 =   400.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2402.00 TO NODE   2401.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.477
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4600
SUBAREA AREA(ACRES) =     1.82   SUBAREA RUNOFF(CFS) =     6.26
TOTAL AREA(ACRES) =       2.15   TOTAL RUNOFF(CFS) =     7.39
TC(MIN.) =   6.92

****************************************************************************
FLOW PROCESS FROM NODE   2401.00 TO NODE   2400.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1130.00  DOWNSTREAM(FEET) =    805.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1330.00   CHANNEL SLOPE =  0.2444
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1781 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       7.39
FLOW VELOCITY(FEET/SEC) =   4.60 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   4.82   Tc(MIN.) =  11.74
LONGEST FLOWPATH FROM NODE   2403.00 TO NODE   2400.00 =  1730.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2401.00 TO NODE   2400.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.318
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4430
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4441
SUBAREA AREA(ACRES) =    31.33   SUBAREA RUNOFF(CFS) =    73.81
TOTAL AREA(ACRES) =      33.48   TOTAL RUNOFF(CFS) =    79.07
TC(MIN.) =  11.74

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

```
  FLOW PROCESS FROM NODE   2400.00 TO NODE     24.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   805.00  DOWNSTREAM(FEET) =   803.00
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.024
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.69
  (PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
   AT DEPTH = 0.94 * DIAMETER)
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     79.07
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =  11.82
  LONGEST FLOWPATH FROM NODE   2403.00 TO NODE     24.00 =  1780.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     33.48  TC(MIN.) =     11.82
  PEAK FLOW RATE(CFS)   =     79.07
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR25
Page 1

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
2532	2531.8	2	1,315.0	1,300.0	75.0	0.25	0.36	
2531.8	2531.6	5	1,295.0	1,250.0	300.0			
2531.8	2531.6	8				0.25	2.59	
2531.6	2531.4	5	1,250.0	1,195.0	600.0			
2531.6	2531.4	8				0.25	6.81	
2531.4	2531	5	1,195.0	1,170.0	525.0			
2531.4	2531	8				0.25	19.66	
2531	2530	5	1,170.0	915.0	1,765.0			
2531	2530	8				0.27	74.78	
2530	2502	5	915.0	835.0	1,820.0			L=1820*ADD
2502	2502	10						Memory Bank
2506	2505.8	2	1,330.0	1,315.0	75.0	0.25	0.67	
2505.8	2505.6	5	1,315.0	1,285.0	300.0			
2505.8	2505.6	8				0.29	1.87	
2505.6	2505.4	5	1,285.0	1,220.0	600.0			
2505.6	2505.4	8				0.26	8.11	
2505.4	2505	5	1,220.0	1,105.0	815.0			
2505.4	2505	8				0.31	54.68	
2505	2504	5	1,105.0	885.0	1,775.0			
2505	2504	8				0.42	88.48	
2504	2504	1						1 of 2
2521	2520.8	2	1,400.0	1,375.0	75.0	0.35	0.26	
2520.8	2520.6	5	1,375.0	1,290.0	300.0			
2520.8	2520.6	8				0.33	3.33	
2520.6	2520.4	5	1,290.0	1,120.0	680.0			L= 680
2520.6	2520.4	8				0.34	17.84	
2520.4	2520	5	1,120.0	935.0	1,225.0			L=1225
2520.4	2520	8				0.43	53.58	
2520	2504	5	935.0	885.0	590.0			
2504	2504	1						2 of 2
2504	2502	5	885.0	835.0	1,655.0			L= 1655
2502	2502	11						Add Memory Bank
2502	2501	5	835.0	825.0	475.0			
2501	2501	1						1 of 2
2511	2510.8	2	1,180.0	1,155.0	75.0	0.38	0.14	
2510.8	2510.6	5	1,155.0	1,070.0	300.0			
2510.8	2510.6	8				0.38	1.86	
2510.6	2510.4	5	1,070.0	955.0	600.0			
2510.6	2510.4	8				0.38	10.41	
2510.4	2510	5	955.0	885.0	440.0			
2510.4	2510	8				0.38	16.1	
2510	2501	5	885.0	825.0	1,010.0			
2501	2501	1						2 of 2
2501	25.2	5	825.0	815.0	660.0			

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR241
Page 1

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
2412	2411	2	987.0	953.0	91.0	0.42	0.08	
2411	24.1	5	953.0	805.0	1,161.0			
2411	24.1	8				0.42	10.58	
							10.66	Total Area

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

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                          Analysis prepared by:

                      Fuscoe Engineering, San Diego
                       6390 Greenwich Dr. Suite 170
                           San Diego, CA 92122
                               858-554-1500

 ************************** DESCRIPTION OF STUDY **************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                  *
* SUBBASIN # 24.1                                                         *
* 2469.01A - MARCH 2007                                                   *
 ***************************************************************************

  FILE NAME: MERR241.DAT
  TIME/DATE OF STUDY: 09:55 02/19/2007
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   2412.00 TO NODE   2411.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4200
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    91.00
  UPSTREAM ELEVATION(FEET) =    987.00
  DOWNSTREAM ELEVATION(FEET) =    953.00
  ELEVATION DIFFERENCE(FEET) =     34.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.420
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.754
SUBAREA RUNOFF(CFS) =       0.29
TOTAL AREA(ACRES) =       0.08   TOTAL RUNOFF(CFS) =       0.29

****************************************************************************
FLOW PROCESS FROM NODE   2411.00 TO NODE   24.10 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    953.00  DOWNSTREAM(FEET) =    805.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1161.00   CHANNEL SLOPE =  0.1275
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1200 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =       0.29
FLOW VELOCITY(FEET/SEC) =   1.94 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   9.98   Tc(MIN.) =  15.40
LONGEST FLOWPATH FROM NODE   2412.00 TO NODE   2410.00 =  1252.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2411.00 TO NODE     24.10 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.465
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4200
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4200
SUBAREA AREA(ACRES) =   10.58   SUBAREA RUNOFF(CFS) =   19.84
TOTAL AREA(ACRES) =     10.66   TOTAL RUNOFF(CFS) =   19.99
TC(MIN.) =  15.40
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =     10.66  TC(MIN.) =     15.40
PEAK FLOW RATE(CFS)   =     19.99
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR242
Page 1

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
2422	2421	2	1,075.0	1,015.0	100.0	0.42	0.33	
2421	2420	5	1,015.0	815.0	1,080.0			
2421	2420	8				0.429	8.69	
2420	24.2	4	806.0	802.0	36.0			Existing 18" CMP culvert
							9.02	Total Area

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

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                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC
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                             (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                 *
* SUBBASIN # 242                                                         *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR242.DAT
  TIME/DATE OF STUDY: 13:21 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   2422.00 TO NODE   2421.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4200
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1075.00
  DOWNSTREAM ELEVATION(FEET) =   1015.00
  ELEVATION DIFFERENCE(FEET) =     60.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.682
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.492
SUBAREA RUNOFF(CFS) =       1.18
TOTAL AREA(ACRES) =       0.33   TOTAL RUNOFF(CFS) =       1.18

****************************************************************************
FLOW PROCESS FROM NODE   2421.00 TO NODE   2420.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1015.00  DOWNSTREAM(FEET) =    815.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1080.00   CHANNEL SLOPE =  0.1852
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1526 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       1.18
FLOW VELOCITY(FEET/SEC) =   2.31 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   7.79   Tc(MIN.) =  13.48
LONGEST FLOWPATH FROM NODE   2422.00 TO NODE   2420.00 =  1180.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2421.00 TO NODE   2420.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.865
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4290
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4287
SUBAREA AREA(ACRES) =    8.69   SUBAREA RUNOFF(CFS) =   18.14
TOTAL AREA(ACRES) =      9.02   TOTAL RUNOFF(CFS) =   18.81
TC(MIN.) =  13.48

****************************************************************************
FLOW PROCESS FROM NODE   2420.00 TO NODE     24.20 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   806.00  DOWNSTREAM(FEET) =   802.00
FLOW LENGTH(FEET) =    36.00   MANNING'S N =  0.024
ASSUME FULL-FLOWING PIPELINE
PIPE-FLOW VELOCITY(FEET/SEC.) =  11.22
(PIPE FLOW VELOCITY CORRESPONDING TO NORMAL-DEPTH FLOW
 AT DEPTH = 0.94 * DIAMETER)
GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     18.81
PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =  13.53
LONGEST FLOWPATH FROM NODE   2422.00 TO NODE     24.20 =  1216.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =      9.02  TC(MIN.) =     13.53
PEAK FLOW RATE(CFS)   =     18.81
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
```

FUSCOE ENGINEERING
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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR25

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
2532	2531.8	2	1,315.0	1,300.0	75.0	0.25	0.36	
2531.8	2531.6	5	1,295.0	1,250.0	300.0			
2531.8	2531.6	8				0.25	2.59	
2531.6	2531.4	5	1,250.0	1,195.0	600.0			
2531.6	2531.4	8				0.25	6.81	
2531.4	2531	5	1,195.0	1,170.0	525.0			
2531.4	2531	8				0.25	19.66	
2531	2530	5	1,170.0	915.0	1,765.0			
2531	2530	8				0.27	74.78	
2530	2502	5	915.0	835.0	1,820.0			L=1820*ADD
2502	2502	10						Memory Bank
2506	2505.8	2	1,330.0	1,315.0	75.0	0.25	0.67	
2505.8	2505.6	5	1,315.0	1,285.0	300.0			
2505.8	2505.6	8				0.29	1.87	
2505.6	2505.4	5	1,285.0	1,220.0	600.0			
2505.6	2505.4	8				0.26	8.11	
2505.4	2505	5	1,220.0	1,105.0	815.0			
2505.4	2505	8				0.31	54.68	
2505	2504	5	1,105.0	885.0	1,775.0			
2505	2504	8				0.42	88.48	
2504	2504	1						1 of 2
2521	2520.8	2	1,400.0	1,375.0	75.0	0.35	0.26	
2520.8	2520.6	5	1,375.0	1,290.0	300.0			
2520.8	2520.6	8				0.33	3.33	
2520.6	2520.4	5	1,290.0	1,120.0	680.0			L= 680
2520.6	2520.4	8				0.34	17.84	
2520.4	2520	5	1,120.0	935.0	1,225.0			L=1225
2520.4	2520	8				0.43	53.58	
2520	2504	5	935.0	885.0	590.0			
2504	2504	1						2 of 2
2504	2502	5	885.0	835.0	1,655.0			L= 1655
2502	2502	11						Add Memory Bank
2502	2501	5	835.0	825.0	475.0			
2501	2501	1						1 of 2
2511	2510.8	2	1,180.0	1,155.0	75.0	0.38	0.14	
2510.8	2510.6	5	1,155.0	1,070.0	300.0			
2510.8	2510.6	8				0.38	1.86	
2510.6	2510.4	5	1,070.0	955.0	600.0			
2510.6	2510.4	8				0.38	10.41	
2510.4	2510	5	955.0	885.0	440.0			
2510.4	2510	8				0.38	16.1	
2510	2501	5	885.0	825.0	1,010.0			
2501	2501	1						2 of 2
2501	25.2	5	825.0	815.0	660.0			

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR25

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Friction Coeff.	Area (ac.)	Comments
2530	25.2	8				0.47	131.22	
25.2	25	5	815.0	793.0	949.0			
25	25	10						
25.07	25.06	2	1,184.0	1,162.0	84.0	0.42	0.14	
25.06	25.05	5	1,162.0	1,155.0	500.0			
25.06	25.05	8				0.42	6.15	
25.05	25.01	5	1,155.0	817.0	1,196.0			
25.05	25.01	8				0.52	23.41	
25.01	25.01	1						
25.04	25.03	2	1,300.0	1,272.0	96.0	0.46	0.09	
25.03	25.02	5	1,272.0	1,050.0	582.0			
25.02	25.02	8				0.42	5.1	
25.02	25.01	5	1,050.0	817.0	1,482.0			
25.01	25.01	8				0.42	13.52	
25.01	25.01	1						
25.01	25	5	817.0	793.0	553.0			
25	25	11						
							541.16	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2004 Advanced Engineering Software (aes)
            Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC
                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                 *
* SUBBASIN # 25                                                          *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR25.DAT
  TIME/DATE OF STUDY: 13:39 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   2532.00 TO NODE   2531.80 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1315.00
  DOWNSTREAM ELEVATION(FEET) =   1300.00
  ELEVATION DIFFERENCE(FEET) =     15.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.151
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.068
SUBAREA RUNOFF(CFS) =       0.73
TOTAL AREA(ACRES) =       0.36   TOTAL RUNOFF(CFS) =       0.73

****************************************************************************
FLOW PROCESS FROM NODE   2531.80 TO NODE   2531.60 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1295.00  DOWNSTREAM(FEET) =   1250.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.1500
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1350 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =       0.73
FLOW VELOCITY(FEET/SEC) =   2.06 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.43   Tc(MIN.) =   8.58
LONGEST FLOWPATH FROM NODE   2532.00 TO NODE   2531.60 =   375.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2531.80 TO NODE   2531.60 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.509
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
SUBAREA AREA(ACRES) =     2.59   SUBAREA RUNOFF(CFS) =     4.21
TOTAL AREA(ACRES) =       2.95   TOTAL RUNOFF(CFS) =     4.80
TC(MIN.) =   8.58

****************************************************************************
FLOW PROCESS FROM NODE   2531.60 TO NODE   2531.40 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1250.00  DOWNSTREAM(FEET) =   1195.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   600.00   CHANNEL SLOPE =  0.0917
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .0917 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       4.80
FLOW VELOCITY(FEET/SEC) =   2.86 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   3.50   Tc(MIN.) =  12.08
LONGEST FLOWPATH FROM NODE   2532.00 TO NODE   2531.40 =   975.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2531.60 TO NODE   2531.40 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.221
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
SUBAREA AREA(ACRES) =     6.81   SUBAREA RUNOFF(CFS) =     8.89
TOTAL AREA(ACRES) =       9.76   TOTAL RUNOFF(CFS) =    12.74
TC(MIN.) =  12.08
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   2531.40 TO NODE   2531.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1195.00  DOWNSTREAM(FEET) =   1170.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   525.00   CHANNEL SLOPE =  0.0476
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0476 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     12.74
  FLOW VELOCITY(FEET/SEC) =   2.85 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.07   Tc(MIN.) =  15.15
  LONGEST FLOWPATH FROM NODE   2532.00 TO NODE   2531.00 =  1500.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2531.40 TO NODE   2531.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.512
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
  SUBAREA AREA(ACRES) =   19.66   SUBAREA RUNOFF(CFS) =   22.17
  TOTAL AREA(ACRES) =     29.42   TOTAL RUNOFF(CFS) =   33.18
  TC(MIN.) =  15.15

****************************************************************************
  FLOW PROCESS FROM NODE   2531.00 TO NODE   2530.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1170.00  DOWNSTREAM(FEET) =    915.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1765.00   CHANNEL SLOPE =  0.1445
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1313 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     33.18
  FLOW VELOCITY(FEET/SEC) =   6.51 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.52   Tc(MIN.) =  19.66
  LONGEST FLOWPATH FROM NODE   2532.00 TO NODE   2530.00 =  3265.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2531.00 TO NODE   2530.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.813
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2644
  SUBAREA AREA(ACRES) =   74.78   SUBAREA RUNOFF(CFS) =   76.98
  TOTAL AREA(ACRES) =    104.20   TOTAL RUNOFF(CFS) =  105.02
  TC(MIN.) =  19.66

****************************************************************************
  FLOW PROCESS FROM NODE   2530.00 TO NODE   2502.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    915.00  DOWNSTREAM(FEET) =    835.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1820.00   CHANNEL SLOPE =  0.0440
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0440 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    105.02
  FLOW VELOCITY(FEET/SEC) =   5.53 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.48   Tc(MIN.) =  25.15
  LONGEST FLOWPATH FROM NODE   2532.00 TO NODE   2502.00 =  5085.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE   2502.00 TO NODE   2502.00 IS CODE =  10
------------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
==============================================================================

******************************************************************************
  FLOW PROCESS FROM NODE   2506.00 TO NODE   2505.80 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1330.00
  DOWNSTREAM ELEVATION(FEET) =   1315.00
  ELEVATION DIFFERENCE(FEET) =     15.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.151
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.068
  SUBAREA RUNOFF(CFS) =      1.35
  TOTAL AREA(ACRES) =      0.67   TOTAL RUNOFF(CFS) =      1.35

******************************************************************************
  FLOW PROCESS FROM NODE   2505.80 TO NODE   2505.60 IS CODE =  53
------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1315.00  DOWNSTREAM(FEET) =   1285.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.1000
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1000 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      1.35
  FLOW VELOCITY(FEET/SEC) =   1.96 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.55   Tc(MIN.) =   8.70
  LONGEST FLOWPATH FROM NODE   2506.00 TO NODE   2505.60 =   375.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE   2505.80 TO NODE   2505.60 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.449
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2794
  SUBAREA AREA(ACRES) =    1.87   SUBAREA RUNOFF(CFS) =    3.50
  TOTAL AREA(ACRES) =      2.54   TOTAL RUNOFF(CFS) =    4.58
  TC(MIN.) =   8.70
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   2505.60 TO NODE   2505.40 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1285.00  DOWNSTREAM(FEET) =   1220.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   600.00   CHANNEL SLOPE =  0.1083
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1063 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       4.58
  FLOW VELOCITY(FEET/SEC) =   3.03 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.30   Tc(MIN.) =  12.01
  LONGEST FLOWPATH FROM NODE   2506.00 TO NODE   2505.40 =   975.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2505.60 TO NODE   2505.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.241
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2646
  SUBAREA AREA(ACRES) =    8.11   SUBAREA RUNOFF(CFS) =   11.05
  TOTAL AREA(ACRES) =     10.65   TOTAL RUNOFF(CFS) =   14.77
  TC(MIN.) =  12.01

****************************************************************************
  FLOW PROCESS FROM NODE   2505.40 TO NODE   2505.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1220.00  DOWNSTREAM(FEET) =   1105.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   815.00   CHANNEL SLOPE =  0.1411
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1291 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     14.77
  FLOW VELOCITY(FEET/SEC) =   4.93 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.75   Tc(MIN.) =  14.76
  LONGEST FLOWPATH FROM NODE   2506.00 TO NODE   2505.00 =  1790.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2505.40 TO NODE   2505.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.588
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3100
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3026
  SUBAREA AREA(ACRES) =   54.68   SUBAREA RUNOFF(CFS) =   77.76
  TOTAL AREA(ACRES) =     65.33   TOTAL RUNOFF(CFS) =   90.69
  TC(MIN.) =  14.76

****************************************************************************
  FLOW PROCESS FROM NODE   2505.00 TO NODE   2504.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1105.00  DOWNSTREAM(FEET) =    885.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1775.00   CHANNEL SLOPE =  0.1239
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1176 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     90.69
  FLOW VELOCITY(FEET/SEC) =   8.62 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.43   Tc(MIN.) =  18.19
  LONGEST FLOWPATH FROM NODE   2506.00 TO NODE   2504.00 =  3565.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2505.00 TO NODE   2504.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.009
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3701
  SUBAREA AREA(ACRES) =   88.48   SUBAREA RUNOFF(CFS) =  148.97
  TOTAL AREA(ACRES) =    153.81   TOTAL RUNOFF(CFS) =  228.22
  TC(MIN.) =  18.19

****************************************************************************
  FLOW PROCESS FROM NODE   2504.00 TO NODE   2504.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  18.19
  RAINFALL INTENSITY(INCH/HR) =   4.01
  TOTAL STREAM AREA(ACRES) =   153.81
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    228.22

****************************************************************************
  FLOW PROCESS FROM NODE   2521.00 TO NODE   2520.80 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1400.00
  DOWNSTREAM ELEVATION(FEET) =   1375.00
  ELEVATION DIFFERENCE(FEET) =     25.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.427
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.747
  SUBAREA RUNOFF(CFS) =      0.80
  TOTAL AREA(ACRES) =      0.26   TOTAL RUNOFF(CFS) =      0.80

****************************************************************************
  FLOW PROCESS FROM NODE   2520.80 TO NODE   2520.60 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1375.00  DOWNSTREAM(FEET) =   1290.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.2833
  SLOPE ADJUSTMENT CURVE USED:
```

```
  EFFECTIVE SLOPE = .1908 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.80
  FLOW VELOCITY(FEET/SEC) =   2.45 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.04   Tc(MIN.) =   7.47
  LONGEST FLOWPATH FROM NODE   2521.00 TO NODE   2520.60 =   375.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2520.80 TO NODE   2520.60 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.117
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3314
  SUBAREA AREA(ACRES) =     3.33   SUBAREA RUNOFF(CFS) =    7.82
  TOTAL AREA(ACRES) =       3.59   TOTAL RUNOFF(CFS) =    8.47
  TC(MIN.) =   7.47

****************************************************************************
  FLOW PROCESS FROM NODE   2520.60 TO NODE   2520.40 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1290.00  DOWNSTREAM(FEET) =   1120.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   680.00   CHANNEL SLOPE =  0.2500
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1800 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       8.47
  FLOW VELOCITY(FEET/SEC) =   4.84 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.34   Tc(MIN.) =   9.81
  LONGEST FLOWPATH FROM NODE   2521.00 TO NODE   2520.40 =  1055.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2520.60 TO NODE   2520.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.969
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3400
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3386
  SUBAREA AREA(ACRES) =   17.84   SUBAREA RUNOFF(CFS) =   36.21
  TOTAL AREA(ACRES) =     21.43   TOTAL RUNOFF(CFS) =   43.31
  TC(MIN.) =   9.81

****************************************************************************
  FLOW PROCESS FROM NODE   2520.40 TO NODE   2520.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1120.00  DOWNSTREAM(FEET) =    935.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1225.00   CHANNEL SLOPE =  0.1510
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1355 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     43.31
  FLOW VELOCITY(FEET/SEC) =   7.23 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.82   Tc(MIN.) =  12.64
```

```
  LONGEST FLOWPATH FROM NODE   2521.00 TO NODE   2520.00 =  2280.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2520.40 TO NODE   2520.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.071
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4039
  SUBAREA AREA(ACRES) =   53.58   SUBAREA RUNOFF(CFS) =  116.83
  TOTAL AREA(ACRES) =     75.01   TOTAL RUNOFF(CFS) =  153.62
  TC(MIN.) =  12.64

****************************************************************************
  FLOW PROCESS FROM NODE   2520.00 TO NODE   2504.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    935.00  DOWNSTREAM(FEET) =    885.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   590.00   CHANNEL SLOPE =  0.0847
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0847 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    153.62
  FLOW VELOCITY(FEET/SEC) =   8.72 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.13   Tc(MIN.) =  13.76
  LONGEST FLOWPATH FROM NODE   2521.00 TO NODE   2504.00 =  2870.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2504.00 TO NODE   2504.00 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.) =  13.76
  RAINFALL INTENSITY(INCH/HR) =   4.80
  TOTAL STREAM AREA(ACRES) =    75.01
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    153.62

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1      228.22    18.19        4.009        153.81
     2      153.62    13.76        4.799         75.01

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1      326.29    13.76       4.799
     2      356.54    18.19       4.009

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    356.54   Tc(MIN.) =   18.19
  TOTAL AREA(ACRES) =    228.82
  LONGEST FLOWPATH FROM NODE   2506.00 TO NODE   2504.00 =  3565.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   2504.00 TO NODE   2502.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    885.00  DOWNSTREAM(FEET) =    835.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1655.00   CHANNEL SLOPE =  0.0302
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0302 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    356.54
  FLOW VELOCITY(FEET/SEC) =   6.89 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.00   Tc(MIN.) =  22.20
  LONGEST FLOWPATH FROM NODE   2506.00 TO NODE   2502.00 =  5220.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2502.00 TO NODE   2502.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1      356.54    22.20       3.526      228.82
  LONGEST FLOWPATH FROM NODE   2506.00 TO NODE   2502.00 =  5220.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1      105.02    25.15       3.253      104.20
  LONGEST FLOWPATH FROM NODE   2532.00 TO NODE   2502.00 =  5085.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1     449.24      22.20        3.526
     2     433.99      25.15        3.253

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    449.24   Tc(MIN.) =   22.20
  TOTAL AREA(ACRES) =    333.02

****************************************************************************
  FLOW PROCESS FROM NODE   2502.00 TO NODE   2501.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    835.00  DOWNSTREAM(FEET) =    825.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   475.00   CHANNEL SLOPE =  0.0211
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0211 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    449.24
  FLOW VELOCITY(FEET/SEC) =   6.21 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.27   Tc(MIN.) =  23.47
  LONGEST FLOWPATH FROM NODE   2506.00 TO NODE   2501.00 =  5695.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2501.00 TO NODE   2501.00 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.) =  23.47
  RAINFALL INTENSITY(INCH/HR) =   3.40
  TOTAL STREAM AREA(ACRES) =   333.02
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    449.24

******************************************************************************
  FLOW PROCESS FROM NODE   2511.00 TO NODE   2510.80 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .3800
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1180.00
  DOWNSTREAM ELEVATION(FEET) =   1155.00
  ELEVATION DIFFERENCE(FEET) =     25.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.210
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.980
  SUBAREA RUNOFF(CFS) =      0.48
  TOTAL AREA(ACRES) =      0.14   TOTAL RUNOFF(CFS) =      0.48

******************************************************************************
  FLOW PROCESS FROM NODE   2510.80 TO NODE   2510.60 IS CODE =  53
------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1155.00  DOWNSTREAM(FEET) =   1070.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.2833
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1908 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.48
  FLOW VELOCITY(FEET/SEC) =   2.45 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.04   Tc(MIN.) =   7.25
  LONGEST FLOWPATH FROM NODE   2511.00 TO NODE   2510.60 =   375.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE   2510.80 TO NODE   2510.60 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.254
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .3800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3800
  SUBAREA AREA(ACRES) =    1.86   SUBAREA RUNOFF(CFS) =    5.13
  TOTAL AREA(ACRES) =      2.00   TOTAL RUNOFF(CFS) =    5.51
  TC(MIN.) =   7.25

******************************************************************************
  FLOW PROCESS FROM NODE   2510.60 TO NODE   2510.40 IS CODE =  53
------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1070.00  DOWNSTREAM(FEET) =    955.00
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   600.00   CHANNEL SLOPE =  0.1917
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1558 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      5.51
  FLOW VELOCITY(FEET/SEC) =   3.90 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.56   Tc(MIN.) =   9.82
  LONGEST FLOWPATH FROM NODE   2511.00 TO NODE   2510.40 =   975.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2510.60 TO NODE   2510.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.968
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .3800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3800
  SUBAREA AREA(ACRES) =   10.41   SUBAREA RUNOFF(CFS) =   23.61
  TOTAL AREA(ACRES) =     12.41   TOTAL RUNOFF(CFS) =   28.14
  TC(MIN.) =   9.82

****************************************************************************
  FLOW PROCESS FROM NODE   2510.40 TO NODE   2510.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    955.00  DOWNSTREAM(FEET) =    885.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   440.00   CHANNEL SLOPE =  0.1591
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1395 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     28.14
  FLOW VELOCITY(FEET/SEC) =   6.36 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.15   Tc(MIN.) =  10.97
  LONGEST FLOWPATH FROM NODE   2511.00 TO NODE   2510.00 =  1415.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2510.40 TO NODE   2510.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.555
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .3800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3800
  SUBAREA AREA(ACRES) =   16.10   SUBAREA RUNOFF(CFS) =   33.99
  TOTAL AREA(ACRES) =     28.51   TOTAL RUNOFF(CFS) =   60.19
  TC(MIN.) =  10.97

****************************************************************************
  FLOW PROCESS FROM NODE   2510.00 TO NODE   2501.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    885.00  DOWNSTREAM(FEET) =    825.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1010.00   CHANNEL SLOPE =  0.0594
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0594 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     60.19
  FLOW VELOCITY(FEET/SEC) =   5.34 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
  TRAVEL TIME(MIN.) =   3.15   Tc(MIN.) =  14.12
  LONGEST FLOWPATH FROM NODE   2511.00 TO NODE   2501.00 =  2425.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2501.00 TO NODE   2501.00 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.) =  14.12
  RAINFALL INTENSITY(INCH/HR) =   4.72
  TOTAL STREAM AREA(ACRES) =    28.51
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     60.19

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       449.24    23.47        3.401        333.02
     2        60.19    14.12        4.720         28.51

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       330.45    14.12       4.720
     2       492.61    23.47       3.401

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    492.61   Tc(MIN.) =   23.47
  TOTAL AREA(ACRES) =    361.53
  LONGEST FLOWPATH FROM NODE   2506.00 TO NODE   2501.00 =  5695.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2501.00 TO NODE     25.20 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    825.00  DOWNSTREAM(FEET) =    815.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   660.00   CHANNEL SLOPE =  0.0152
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0152 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    492.61
  FLOW VELOCITY(FEET/SEC) =   5.43 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.02   Tc(MIN.) =  25.50
  LONGEST FLOWPATH FROM NODE   2506.00 TO NODE     25.20 =  6355.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2530.00 TO NODE     25.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.224
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .4700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3801
  SUBAREA AREA(ACRES) =  131.22   SUBAREA RUNOFF(CFS) =  198.86
  TOTAL AREA(ACRES) =    492.75   TOTAL RUNOFF(CFS) =  603.87
```

```
  TC(MIN.) =  25.50

****************************************************************************
  FLOW PROCESS FROM NODE     25.20 TO NODE     25.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    815.00  DOWNSTREAM(FEET) =    793.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   949.00   CHANNEL SLOPE =  0.0232
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0232 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    603.87
  FLOW VELOCITY(FEET/SEC) =   7.19 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.20   Tc(MIN.) =  27.70
  LONGEST FLOWPATH FROM NODE   2506.00 TO NODE     25.00 =  7304.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     25.07 TO NODE     25.06 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4200
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    84.00
  UPSTREAM ELEVATION(FEET) =   1184.00
  DOWNSTREAM ELEVATION(FEET) =   1162.00
  ELEVATION DIFFERENCE(FEET) =     22.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.207
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.983
  SUBAREA RUNOFF(CFS) =      0.53
  TOTAL AREA(ACRES) =      0.14   TOTAL RUNOFF(CFS) =      0.53

****************************************************************************
  FLOW PROCESS FROM NODE     25.06 TO NODE     25.05 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1162.00  DOWNSTREAM(FEET) =   1155.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   500.00   CHANNEL SLOPE =  0.0140
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0140 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.53
  FLOW VELOCITY(FEET/SEC) =   0.66 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  12.58   Tc(MIN.) =  17.78
  LONGEST FLOWPATH FROM NODE     25.07 TO NODE     25.05 =   584.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     25.05 TO NODE     25.05 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.068
```

```
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4200
  SUBAREA AREA(ACRES) =     6.15   SUBAREA RUNOFF(CFS) =   10.51
  TOTAL AREA(ACRES) =       6.29   TOTAL RUNOFF(CFS) =   10.75
  TC(MIN.) =  17.78

****************************************************************************
  FLOW PROCESS FROM NODE     25.05 TO NODE     25.01 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1155.00  DOWNSTREAM(FEET) =    817.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1196.00   CHANNEL SLOPE =  0.2826
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1907 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     10.75
  FLOW VELOCITY(FEET/SEC) =   5.39 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.70   Tc(MIN.) =  21.48
  LONGEST FLOWPATH FROM NODE     25.07 TO NODE     25.01 =  1780.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     25.01 TO NODE     25.01 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.601
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .5200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4988
  SUBAREA AREA(ACRES) =   23.41   SUBAREA RUNOFF(CFS) =   43.84
  TOTAL AREA(ACRES) =     29.70   TOTAL RUNOFF(CFS) =   53.35
  TC(MIN.) =  21.48

****************************************************************************
  FLOW PROCESS FROM NODE     25.01 TO NODE     25.01 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  21.48
  RAINFALL INTENSITY(INCH/HR) =   3.60
  TOTAL STREAM AREA(ACRES) =    29.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     53.35

****************************************************************************
  FLOW PROCESS FROM NODE     25.04 TO NODE     25.03 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    96.00
  UPSTREAM ELEVATION(FEET) =   1300.00
  DOWNSTREAM ELEVATION(FEET) =   1272.00
  ELEVATION DIFFERENCE(FEET) =     28.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.239
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.947
SUBAREA RUNOFF(CFS) =       0.37
TOTAL AREA(ACRES) =       0.09   TOTAL RUNOFF(CFS) =       0.37

****************************************************************************
FLOW PROCESS FROM NODE     25.03 TO NODE     25.02 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1272.00  DOWNSTREAM(FEET) =   1050.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   582.00   CHANNEL SLOPE =  0.3814
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .2108 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =       0.37
FLOW VELOCITY(FEET/SEC) =   2.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   3.77   Tc(MIN.) =   9.01
LONGEST FLOWPATH FROM NODE     25.04 TO NODE     25.02 =   678.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     25.02 TO NODE     25.02 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.306
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4200
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4207
SUBAREA AREA(ACRES) =     5.10   SUBAREA RUNOFF(CFS) =   13.51
TOTAL AREA(ACRES) =       5.19   TOTAL RUNOFF(CFS) =   13.77
TC(MIN.) =   9.01

****************************************************************************
FLOW PROCESS FROM NODE     25.02 TO NODE     25.01 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1050.00  DOWNSTREAM(FEET) =    817.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1482.00   CHANNEL SLOPE =  0.1572
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1386 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =      13.77
FLOW VELOCITY(FEET/SEC) =   4.99 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   4.95   Tc(MIN.) =  13.96
LONGEST FLOWPATH FROM NODE     25.04 TO NODE     25.01 =  2160.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     25.01 TO NODE     25.01 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.755
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4200
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4202
SUBAREA AREA(ACRES) =    13.52   SUBAREA RUNOFF(CFS) =   27.00
TOTAL AREA(ACRES) =      18.71   TOTAL RUNOFF(CFS) =   37.39
TC(MIN.) =  13.96
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     25.01 TO NODE     25.01 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.) =  13.96
  RAINFALL INTENSITY(INCH/HR) =   4.76
  TOTAL STREAM AREA(ACRES) =    18.71
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     37.39

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       53.35    21.48        3.601         29.70
     2       37.39    13.96        4.755         18.71

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       72.06    13.96       4.755
     2       81.67    21.48       3.601

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     81.67   Tc(MIN.) =   21.48
  TOTAL AREA(ACRES) =     48.41
  LONGEST FLOWPATH FROM NODE     25.04 TO NODE     25.01 =  2160.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     25.01 TO NODE     25.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    817.00  DOWNSTREAM(FEET) =    793.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   553.00   CHANNEL SLOPE =  0.0434
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0434 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     81.67
  FLOW VELOCITY(FEET/SEC) =   5.05 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.82   Tc(MIN.) =  23.30
  LONGEST FLOWPATH FROM NODE     25.04 TO NODE     25.00 =  2713.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       81.67    23.30       3.417        48.41
  LONGEST FLOWPATH FROM NODE     25.04 TO NODE     25.00 =  2713.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
```

```
    1      603.87    27.70        3.057      492.75
LONGEST FLOWPATH FROM NODE   2506.00 TO NODE     25.00 =  7304.00 FEET.

** PEAK FLOW RATE TABLE **
STREAM    RUNOFF       Tc      INTENSITY
NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
    1     589.78      23.30        3.417
    2     676.93      27.70        3.057

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =    676.93   Tc(MIN.) =   27.70
TOTAL AREA(ACRES) =    541.16
================================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)      =    541.16  TC(MIN.) =     27.70
PEAK FLOW RATE(CFS)    =    676.93
================================================================================
================================================================================
END OF RATIONAL METHOD ANALYSIS
```

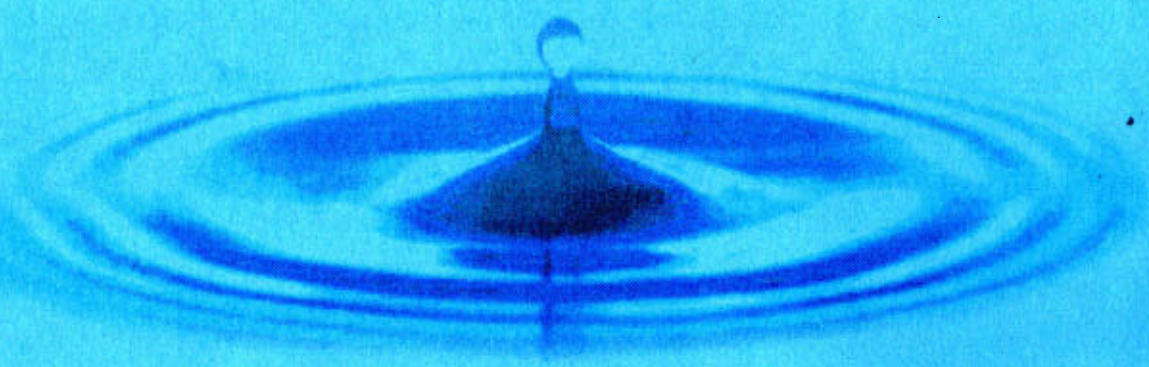
APPENDIX A

AES - 2005

Rational Method Hydrology

Existing Condition

BASIN C



FUSCOE
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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR26
Page 1

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
2604	2603.8	2	1,410.0	1,395.0	75.0	0.421	1.18	
2603.8	2603.6	5	1,395.0	1,365.0	300.0			
2603.8	2603.6	8				0.447	3.09	
2603.6	2603.4	5	1,365.0	1,325.0	600.0			
2603.6	2603.4	8				0.323	14.67	
2603.4	2603	5	1,325.0	1,230.0	794.0			
2603.4	2603	8				0.329	44.85	
2603	2602	5	1,230.0	1,175.0	1,365.0			
2603	2602	8				0.255	41.75	
2602	2601	5	1,175.0	1,135.0	1,135.0			
2602	2601	8				0.25	36.58	
2601	26	5	1,135.0	970.0	1,405.0			
2601	26	8				0.38	32.13	
							174.25	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                        2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2004 Advanced Engineering Software (aes)
            Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC
                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************** DESCRIPTION OF STUDY **************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                  *
* SUBBASIN # 26                                                           *
* 2469.01A - OCTOBER 2006                                                 *
 **************************************************************************

  FILE NAME: MERR26.DAT
  TIME/DATE OF STUDY: 13:32 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   2604.00 TO NODE   2603.80 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4210
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1410.00
  DOWNSTREAM ELEVATION(FEET) =   1395.00
  ELEVATION DIFFERENCE(FEET) =     15.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.913
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) =      4.58
TOTAL AREA(ACRES) =      1.18   TOTAL RUNOFF(CFS) =      4.58

****************************************************************************
FLOW PROCESS FROM NODE   2603.80 TO NODE   2603.60 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1395.00  DOWNSTREAM(FEET) =   1365.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.1000
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1000 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =      4.58
FLOW VELOCITY(FEET/SEC) =   2.94 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.70   Tc(MIN.) =   6.61
LONGEST FLOWPATH FROM NODE   2604.00 TO NODE   2603.60 =   375.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2603.80 TO NODE   2603.60 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.699
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4470
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4398
SUBAREA AREA(ACRES) =     3.09   SUBAREA RUNOFF(CFS) =   10.63
TOTAL AREA(ACRES) =       4.27   TOTAL RUNOFF(CFS) =   14.46
TC(MIN.) =   6.61

****************************************************************************
FLOW PROCESS FROM NODE   2603.60 TO NODE   2603.40 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1365.00  DOWNSTREAM(FEET) =   1325.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   600.00   CHANNEL SLOPE =  0.0667
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .0667 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =     14.46
FLOW VELOCITY(FEET/SEC) =   3.52 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.84   Tc(MIN.) =   9.46
LONGEST FLOWPATH FROM NODE   2604.00 TO NODE   2603.40 =   975.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2603.60 TO NODE   2603.40 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.114
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3230
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3493
SUBAREA AREA(ACRES) =    14.67   SUBAREA RUNOFF(CFS) =   28.97
TOTAL AREA(ACRES) =      18.94   TOTAL RUNOFF(CFS) =   40.45
TC(MIN.) =   9.46
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   2603.40 TO NODE   2603.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1325.00  DOWNSTREAM(FEET) =   1230.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   794.00   CHANNEL SLOPE =  0.1196
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1147 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     40.45
  FLOW VELOCITY(FEET/SEC) =   6.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.03   Tc(MIN.) =  11.49
  LONGEST FLOWPATH FROM NODE   2604.00 TO NODE   2603.00 =  1769.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2603.40 TO NODE   2603.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.392
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3290
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3350
  SUBAREA AREA(ACRES) =   44.85   SUBAREA RUNOFF(CFS) =   79.56
  TOTAL AREA(ACRES) =     63.79   TOTAL RUNOFF(CFS) =  115.23
  TC(MIN.) =  11.49

****************************************************************************
  FLOW PROCESS FROM NODE   2603.00 TO NODE   2602.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1230.00  DOWNSTREAM(FEET) =   1175.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1365.00   CHANNEL SLOPE =  0.0403
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0403 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    115.23
  FLOW VELOCITY(FEET/SEC) =   5.46 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.17   Tc(MIN.) =  15.66
  LONGEST FLOWPATH FROM NODE   2604.00 TO NODE   2602.00 =  3134.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2603.00 TO NODE   2602.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.416
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2550
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3034
  SUBAREA AREA(ACRES) =   41.75   SUBAREA RUNOFF(CFS) =   47.02
  TOTAL AREA(ACRES) =    105.54   TOTAL RUNOFF(CFS) =  141.41
  TC(MIN.) =  15.66

****************************************************************************
  FLOW PROCESS FROM NODE   2602.00 TO NODE   2601.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1175.00  DOWNSTREAM(FEET) =   1135.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1135.00   CHANNEL SLOPE =  0.0352
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0352 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    141.41
  FLOW VELOCITY(FEET/SEC) =   5.47 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.46   Tc(MIN.) =  19.12
  LONGEST FLOWPATH FROM NODE   2604.00 TO NODE   2601.00 =  4269.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2602.00 TO NODE   2601.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.883
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2896
  SUBAREA AREA(ACRES) =   36.58   SUBAREA RUNOFF(CFS) =   35.51
  TOTAL AREA(ACRES) =    142.12   TOTAL RUNOFF(CFS) =  159.83
  TC(MIN.) =  19.12

****************************************************************************
  FLOW PROCESS FROM NODE   2601.00 TO NODE     26.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1135.00  DOWNSTREAM(FEET) =    970.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1405.00   CHANNEL SLOPE =  0.1174
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1131 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    159.83
  FLOW VELOCITY(FEET/SEC) =  10.20 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.30   Tc(MIN.) =  21.41
  LONGEST FLOWPATH FROM NODE   2604.00 TO NODE     26.00 =  5674.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2601.00 TO NODE     26.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.609
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .3800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3063
  SUBAREA AREA(ACRES) =   32.13   SUBAREA RUNOFF(CFS) =   44.06
  TOTAL AREA(ACRES) =    174.25   TOTAL RUNOFF(CFS) =  192.62
  TC(MIN.) =  21.41
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =    174.25  TC(MIN.) =     21.41
  PEAK FLOW RATE(CFS)    =    192.62
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR27
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Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
2775	2774	2	1,540.0	1,520.0	75.0	0.35	0.55	
2774	2773	5	1,520.0	1,480.0	300.0			
2774	2773	8				0.35	2.97	
2773	2772	5	1,480.0	1,415.0	600.0			
2773	2772	8				0.35	10.84	
2772	2771	5	1,415.0	1,300.0	587.0			
2772	2771	8				0.34	11.52	
2771	2771	1						1 of 3
2782	2781	2	1,595.0	1,565.0	75.0	0.35	0.22	
2781	2780	5	1,565.0	1,375.0	783.7			
2781	2780	8				0.34	4.37	
2780	2771	5	1,375.0	1,300.0	515.9			
2780	2771	8				0.28	2.61	
2771	2771	1						2 of 3
2792	2791	2	1,405.0	1,400.0	75.0	0.35	0.52	
2791	2790	5	1,400.0	1,350.0	300.0			
2791	2790	8				0.28	2.06	
2790	2771	5	1,350.0	1,300.0	425.0			
2790	2771	8				0.25	3.49	
2771	2771	1						3 of 3
2771	2770	5	1,300.0	1,135.0	1,408.4			
2771	2770	8				0.30	28.14	
2770	2761	5	1,135.0	1,040.0	670.0			
2770	2761	8				0.25	8.96	
2761	2761	1						1 of 2
2765	2764	2	1,445.0	1,435.0	75.0	0.25	0.14	
2764	2763	5	1,435.0	1,395.0	300.0			
2764	2763	8				0.25	1.76	
2763	2762	5	1,395.0	1,305.0	585.0			
2763	2762	8				0.25	5.55	
2762	2761	5	1,305.0	1,040.0	1,335.0			
2762	2761	8				0.25	16.86	
2761	2761	1						2 of 2
2761	2760	5	1,040.0	970.0	1,200.0			
2761	2760	8				0.28	21.22	
2760	2740	5	970.0	930.0	930.0			
2760	2740	8				0.29	16.81	
2740	2740	1						1 of 2
2752	2751	2	1,155.0	1,140.0	75.0	0.25	0.16	
2751	2750	5	1,140.0	1,035.0	440.0			
2751	2750	8				0.25	14.39	
2750	2740	5	1,035.0	930.0	990.0			
2750	2740	8				0.26	14.22	
2740	2740	1						2 of 2

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2469.01A

Run Name:
MERR27
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Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Friction Coeff.	Area (ac.)	Comments
2740	27	5	930.0	920.0	385.0			
2740	27	8				0.33	3.57	
27	27	10						Bank 1
2722	2721	2	1,300.0	1,295.0	75.0	0.25	0.31	
2721	2720	5	1,295.0	1,230.0	430.0			
2721	2720	8				0.25	6.42	
2720	2710	5	1,230.0	1,170.0	650.0			
2720	2710	8				0.25	18.32	
2710	2710	1						
2732	2731	2	1,450.0	1,445.0	90.0	0.25	0.35	
2731	2730	5	1,445.0	1,390.0	305.0			
2731	2730	8				0.25	1.97	
2730	2710	5	1,390.0	1,170.0	820.0			
2730	2710	8				0.25	8.79	
2710	2710	1						
2710	2710.5	5	1,170.0	1,105.0	600.0			
2710	2710.5	8				0.25	10.99	
2710.5	27	5	1,105.0	920.0	1,420.0			
2710.5	27	8				0.26	18.2	
27	27	11						Add to Bank 1
							236.28	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2004 Advanced Engineering Software (aes)
            Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

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                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                 *
* SUBBASIN # 27                                                          *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR27.DAT
  TIME/DATE OF STUDY: 16:30 10/02/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   2775.00 TO NODE   2774.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1540.00
  DOWNSTREAM ELEVATION(FEET) =   1520.00
  ELEVATION DIFFERENCE(FEET) =     20.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.427
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.747
SUBAREA RUNOFF(CFS) =       1.68
TOTAL AREA(ACRES) =       0.55   TOTAL RUNOFF(CFS) =       1.68

****************************************************************************
FLOW PROCESS FROM NODE   2774.00 TO NODE   2773.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1520.00  DOWNSTREAM(FEET) =   1480.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.1333
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1239 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       1.68
FLOW VELOCITY(FEET/SEC) =   2.34 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.13   Tc(MIN.) =   7.56
LONGEST FLOWPATH FROM NODE   2775.00 TO NODE   2773.00 =   375.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2774.00 TO NODE   2773.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.063
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
SUBAREA AREA(ACRES) =     2.97   SUBAREA RUNOFF(CFS) =     7.34
TOTAL AREA(ACRES) =       3.52   TOTAL RUNOFF(CFS) =     8.70
TC(MIN.) =   7.56

****************************************************************************
FLOW PROCESS FROM NODE   2773.00 TO NODE   2772.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1480.00  DOWNSTREAM(FEET) =   1415.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   600.00   CHANNEL SLOPE =  0.1083
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1063 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       8.70
FLOW VELOCITY(FEET/SEC) =   3.75 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.67   Tc(MIN.) =  10.23
LONGEST FLOWPATH FROM NODE   2775.00 TO NODE   2772.00 =   975.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2773.00 TO NODE   2772.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.813
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
SUBAREA AREA(ACRES) =    10.84   SUBAREA RUNOFF(CFS) =    22.05
TOTAL AREA(ACRES) =      14.36   TOTAL RUNOFF(CFS) =    29.22
TC(MIN.) =  10.23

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

```
  FLOW PROCESS FROM NODE   2772.00 TO NODE   2771.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1415.00  DOWNSTREAM(FEET) =   1300.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   587.00   CHANNEL SLOPE =  0.1959
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1580 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     29.22
  FLOW VELOCITY(FEET/SEC) =   6.85 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.43   Tc(MIN.) =  11.65
  LONGEST FLOWPATH FROM NODE   2775.00 TO NODE   2771.00 =  1562.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2772.00 TO NODE   2771.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.343
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3400
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3455
  SUBAREA AREA(ACRES) =   11.52   SUBAREA RUNOFF(CFS) =   20.93
  TOTAL AREA(ACRES) =     25.88   TOTAL RUNOFF(CFS) =   47.78
  TC(MIN.) =  11.65

****************************************************************************
  FLOW PROCESS FROM NODE   2771.00 TO NODE   2771.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  11.65
  RAINFALL INTENSITY(INCH/HR) =   5.34
  TOTAL STREAM AREA(ACRES) =    25.88
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     47.78

****************************************************************************
  FLOW PROCESS FROM NODE   2782.00 TO NODE   2781.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1595.00
  DOWNSTREAM ELEVATION(FEET) =   1565.00
  ELEVATION DIFFERENCE(FEET) =     30.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.427
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.747
  SUBAREA RUNOFF(CFS) =      0.67
  TOTAL AREA(ACRES) =      0.22   TOTAL RUNOFF(CFS) =      0.67

****************************************************************************
  FLOW PROCESS FROM NODE   2781.00 TO NODE   2780.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1565.00  DOWNSTREAM(FEET) =   1375.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   783.70   CHANNEL SLOPE =  0.2424
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1775 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.67
  FLOW VELOCITY(FEET/SEC) =   2.36 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.54   Tc(MIN.) =  10.96
  LONGEST FLOWPATH FROM NODE   2782.00 TO NODE   2780.00 =   858.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2781.00 TO NODE   2780.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.557
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3400
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3405
  SUBAREA AREA(ACRES) =    4.37   SUBAREA RUNOFF(CFS) =    8.26
  TOTAL AREA(ACRES) =      4.59   TOTAL RUNOFF(CFS) =    8.69
  TC(MIN.) =  10.96

****************************************************************************
  FLOW PROCESS FROM NODE   2780.00 TO NODE   2771.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1375.00  DOWNSTREAM(FEET) =   1300.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   515.90   CHANNEL SLOPE =  0.1454
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1319 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      8.69
  FLOW VELOCITY(FEET/SEC) =   4.18 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.06   Tc(MIN.) =  13.02
  LONGEST FLOWPATH FROM NODE   2782.00 TO NODE   2771.00 =  1374.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2780.00 TO NODE   2771.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.974
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3186
  SUBAREA AREA(ACRES) =    2.61   SUBAREA RUNOFF(CFS) =    3.63
  TOTAL AREA(ACRES) =      7.20   TOTAL RUNOFF(CFS) =   11.41
  TC(MIN.) =  13.02

****************************************************************************
  FLOW PROCESS FROM NODE   2771.00 TO NODE   2771.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  13.02
  RAINFALL INTENSITY(INCH/HR) =   4.97
```

```
  TOTAL STREAM AREA(ACRES) =      7.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      11.41

****************************************************************************
  FLOW PROCESS FROM NODE   2792.00 TO NODE   2791.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1405.00
  DOWNSTREAM ELEVATION(FEET) =   1400.00
  ELEVATION DIFFERENCE(FEET) =      5.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.212
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.017
  SUBAREA RUNOFF(CFS) =      1.46
  TOTAL AREA(ACRES) =      0.52   TOTAL RUNOFF(CFS) =      1.46

****************************************************************************
  FLOW PROCESS FROM NODE   2791.00 TO NODE   2790.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1400.00  DOWNSTREAM(FEET) =   1350.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.1667
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1433 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      1.46
  FLOW VELOCITY(FEET/SEC) =   2.40 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.08   Tc(MIN.) =   8.29
  LONGEST FLOWPATH FROM NODE   2792.00 TO NODE   2790.00 =   375.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2791.00 TO NODE   2790.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.654
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2941
  SUBAREA AREA(ACRES) =    2.06   SUBAREA RUNOFF(CFS) =    3.84
  TOTAL AREA(ACRES) =      2.58   TOTAL RUNOFF(CFS) =    5.05
  TC(MIN.) =   8.29

****************************************************************************
  FLOW PROCESS FROM NODE   2790.00 TO NODE   2771.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1350.00  DOWNSTREAM(FEET) =   1300.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   425.00   CHANNEL SLOPE =  0.1176
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1132 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      5.05
  FLOW VELOCITY(FEET/SEC) =   3.23 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.19   Tc(MIN.) =  10.48
  LONGEST FLOWPATH FROM NODE   2792.00 TO NODE   2771.00 =   800.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   2790.00 TO NODE   2771.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.720
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2687
  SUBAREA AREA(ACRES) =     3.49   SUBAREA RUNOFF(CFS) =    4.99
  TOTAL AREA(ACRES) =       6.07   TOTAL RUNOFF(CFS) =    9.33
  TC(MIN.) =  10.48

****************************************************************************
  FLOW PROCESS FROM NODE   2771.00 TO NODE   2771.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =  10.48
  RAINFALL INTENSITY(INCH/HR) =   5.72
  TOTAL STREAM AREA(ACRES) =     6.07
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.33

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       47.78    11.65        5.343         25.88
     2       11.41    13.02        4.974          7.20
     3        9.33    10.48        5.720          6.07

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       61.50    10.48       5.720
     2       66.70    11.65       5.343
     3       64.00    13.02       4.974

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     66.70   Tc(MIN.) =   11.65
  TOTAL AREA(ACRES) =     39.15
  LONGEST FLOWPATH FROM NODE   2775.00 TO NODE   2771.00 =  1562.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2771.00 TO NODE   2770.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1300.00  DOWNSTREAM(FEET) =   1135.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1408.40   CHANNEL SLOPE =  0.1172
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1129 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     66.70
  FLOW VELOCITY(FEET/SEC) =   7.62 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.08   Tc(MIN.) =  14.73
```

```
  LONGEST FLOWPATH FROM NODE   2775.00 TO NODE   2770.00 =  2970.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2771.00 TO NODE   2770.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.593
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3167
  SUBAREA AREA(ACRES) =   28.14   SUBAREA RUNOFF(CFS) =   38.77
  TOTAL AREA(ACRES) =     67.29   TOTAL RUNOFF(CFS) =   97.87
  TC(MIN.) =  14.73

****************************************************************************
  FLOW PROCESS FROM NODE   2770.00 TO NODE   2761.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1135.00  DOWNSTREAM(FEET) =   1040.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   670.00   CHANNEL SLOPE =  0.1418
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1295 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     97.87
  FLOW VELOCITY(FEET/SEC) =   9.27 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.20   Tc(MIN.) =  15.94
  LONGEST FLOWPATH FROM NODE   2775.00 TO NODE   2761.00 =  3640.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2770.00 TO NODE   2761.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.366
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3088
  SUBAREA AREA(ACRES) =    8.96   SUBAREA RUNOFF(CFS) =    9.78
  TOTAL AREA(ACRES) =     76.25   TOTAL RUNOFF(CFS) =  102.81
  TC(MIN.) =  15.94

****************************************************************************
  FLOW PROCESS FROM NODE   2761.00 TO NODE   2761.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  15.94
  RAINFALL INTENSITY(INCH/HR) =   4.37
  TOTAL STREAM AREA(ACRES) =    76.25
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    102.81

****************************************************************************
  FLOW PROCESS FROM NODE   2765.00 TO NODE   2764.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
```

```
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1445.00
  DOWNSTREAM ELEVATION(FEET) =   1435.00
  ELEVATION DIFFERENCE(FEET) =     10.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.151
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.068
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.14   TOTAL RUNOFF(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE   2764.00 TO NODE   2763.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1435.00  DOWNSTREAM(FEET) =   1395.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.1333
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1239 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.28
  FLOW VELOCITY(FEET/SEC) =   1.97 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.54   Tc(MIN.) =   8.69
  LONGEST FLOWPATH FROM NODE   2765.00 TO NODE   2763.00 =   375.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2764.00 TO NODE   2763.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.457
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
  SUBAREA AREA(ACRES) =    1.76   SUBAREA RUNOFF(CFS) =    2.84
  TOTAL AREA(ACRES) =      1.90   TOTAL RUNOFF(CFS) =    3.07
  TC(MIN.) =   8.69

****************************************************************************
  FLOW PROCESS FROM NODE   2763.00 TO NODE   2762.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1395.00  DOWNSTREAM(FEET) =   1305.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   585.00   CHANNEL SLOPE =  0.1538
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1369 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      3.07
  FLOW VELOCITY(FEET/SEC) =   3.01 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.24   Tc(MIN.) =  11.93
  LONGEST FLOWPATH FROM NODE   2765.00 TO NODE   2762.00 =   960.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2763.00 TO NODE   2762.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.264
```

```
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
  SUBAREA AREA(ACRES) =     5.55   SUBAREA RUNOFF(CFS) =     7.30
  TOTAL AREA(ACRES) =       7.45   TOTAL RUNOFF(CFS) =     9.80
  TC(MIN.) =  11.93

****************************************************************************
  FLOW PROCESS FROM NODE   2762.00 TO NODE   2761.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1305.00  DOWNSTREAM(FEET) =   1040.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1335.00   CHANNEL SLOPE =  0.1985
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1593 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       9.80
  FLOW VELOCITY(FEET/SEC) =   4.78 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.66   Tc(MIN.) =  16.58
  LONGEST FLOWPATH FROM NODE   2765.00 TO NODE   2761.00 =  2295.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2762.00 TO NODE   2761.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.256
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
  SUBAREA AREA(ACRES) =    16.86   SUBAREA RUNOFF(CFS) =    17.94
  TOTAL AREA(ACRES) =      24.31   TOTAL RUNOFF(CFS) =    25.86
  TC(MIN.) =  16.58

****************************************************************************
  FLOW PROCESS FROM NODE   2761.00 TO NODE   2761.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  16.58
  RAINFALL INTENSITY(INCH/HR) =   4.26
  TOTAL STREAM AREA(ACRES) =    24.31
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     25.86

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1      102.81    15.94        4.366         76.25
     2       25.86    16.58        4.256         24.31

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1      127.67    15.94        4.366
```

```
     2       126.08     16.58        4.256

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    127.67   Tc(MIN.) =   15.94
  TOTAL AREA(ACRES) =    100.56
  LONGEST FLOWPATH FROM NODE   2775.00 TO NODE   2761.00 =  3640.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2761.00 TO NODE   5760.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1040.00  DOWNSTREAM(FEET) =    970.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1200.00   CHANNEL SLOPE =  0.0583
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0583 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    127.67
  FLOW VELOCITY(FEET/SEC) =   6.80 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.94   Tc(MIN.) =  18.88
  LONGEST FLOWPATH FROM NODE   2775.00 TO NODE   5760.00 =  4840.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2761.00 TO NODE   2760.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.914
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2921
  SUBAREA AREA(ACRES) =   21.22   SUBAREA RUNOFF(CFS) =   23.26
  TOTAL AREA(ACRES) =    121.78   TOTAL RUNOFF(CFS) =  139.22
  TC(MIN.) =  18.88

****************************************************************************
  FLOW PROCESS FROM NODE   2760.00 TO NODE   2740.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    970.00  DOWNSTREAM(FEET) =    930.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   930.00   CHANNEL SLOPE =  0.0430
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0430 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    139.22
  FLOW VELOCITY(FEET/SEC) =   6.01 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.58   Tc(MIN.) =  21.46
  LONGEST FLOWPATH FROM NODE   2775.00 TO NODE   2740.00 =  5770.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2760.00 TO NODE   2740.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.604
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2918
  SUBAREA AREA(ACRES) =   16.81   SUBAREA RUNOFF(CFS) =   17.57
  TOTAL AREA(ACRES) =    138.59   TOTAL RUNOFF(CFS) =  145.75
```

```
  TC(MIN.) =  21.46

****************************************************************************
  FLOW PROCESS FROM NODE   2740.00 TO NODE   2740.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  21.46
  RAINFALL INTENSITY(INCH/HR) =   3.60
  TOTAL STREAM AREA(ACRES) =   138.59
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    145.75

****************************************************************************
  FLOW PROCESS FROM NODE   2752.00 TO NODE   2751.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1155.00
  DOWNSTREAM ELEVATION(FEET) =   1140.00
  ELEVATION DIFFERENCE(FEET) =     15.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.151
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.068
  SUBAREA RUNOFF(CFS) =      0.32
  TOTAL AREA(ACRES) =      0.16   TOTAL RUNOFF(CFS) =      0.32

****************************************************************************
  FLOW PROCESS FROM NODE   2751.00 TO NODE   2750.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1140.00  DOWNSTREAM(FEET) =   1035.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   440.00   CHANNEL SLOPE =  0.2386
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1762 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.32
  FLOW VELOCITY(FEET/SEC) =   2.35 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.12   Tc(MIN.) =   9.27
  LONGEST FLOWPATH FROM NODE   2752.00 TO NODE   2750.00 =   515.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2751.00 TO NODE   2750.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.193
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
  SUBAREA AREA(ACRES) =   14.39   SUBAREA RUNOFF(CFS) =   22.28
  TOTAL AREA(ACRES) =     14.55   TOTAL RUNOFF(CFS) =   22.53
  TC(MIN.) =   9.27

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

```
  FLOW PROCESS FROM NODE   2750.00 TO NODE   2740.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1035.00  DOWNSTREAM(FEET) =    930.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   990.00   CHANNEL SLOPE =  0.1061
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1045 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     22.53
  FLOW VELOCITY(FEET/SEC) =   5.11 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.23   Tc(MIN.) =  12.50
  LONGEST FLOWPATH FROM NODE   2752.00 TO NODE   2740.00 =  1505.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2750.00 TO NODE   2740.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.107
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2549
  SUBAREA AREA(ACRES) =   14.22   SUBAREA RUNOFF(CFS) =   18.88
  TOTAL AREA(ACRES) =     28.77   TOTAL RUNOFF(CFS) =   37.46
  TC(MIN.) =  12.50

****************************************************************************
  FLOW PROCESS FROM NODE   2740.00 TO NODE   2740.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  12.50
  RAINFALL INTENSITY(INCH/HR) =   5.11
  TOTAL STREAM AREA(ACRES) =    28.77
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     37.46

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       145.75    21.46        3.604        138.59
     2        37.46    12.50        5.107         28.77

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       140.31    12.50       5.107
     2       172.18    21.46       3.604

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    172.18   Tc(MIN.) =   21.46
  TOTAL AREA(ACRES) =    167.36
  LONGEST FLOWPATH FROM NODE   2775.00 TO NODE   2740.00 =  5770.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2740.00 TO NODE     27.00 IS CODE =  53
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    930.00  DOWNSTREAM(FEET) =    920.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   385.00   CHANNEL SLOPE =  0.0260
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0260 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    172.18
  FLOW VELOCITY(FEET/SEC) =   5.01 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.28   Tc(MIN.) =  22.74
  LONGEST FLOWPATH FROM NODE   2775.00 TO NODE     27.00 =  6155.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2740.00 TO NODE     27.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.471
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2864
  SUBAREA AREA(ACRES) =    3.57   SUBAREA RUNOFF(CFS) =    4.09
  TOTAL AREA(ACRES) =    170.93   TOTAL RUNOFF(CFS) =  172.18
  TC(MIN.) =  22.74
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   2722.00 TO NODE   2721.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1300.00
  DOWNSTREAM ELEVATION(FEET) =   1295.00
  ELEVATION DIFFERENCE(FEET) =      5.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.041
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.395
  SUBAREA RUNOFF(CFS) =      0.57
  TOTAL AREA(ACRES) =      0.31   TOTAL RUNOFF(CFS) =      0.57

****************************************************************************
  FLOW PROCESS FROM NODE   2721.00 TO NODE   2720.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1295.00  DOWNSTREAM(FEET) =   1230.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   430.00   CHANNEL SLOPE =  0.1512
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1356 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.57
```

```
  FLOW VELOCITY(FEET/SEC) =   2.06 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.48   Tc(MIN.) =  10.52
  LONGEST FLOWPATH FROM NODE   2722.00 TO NODE   2720.00 =   505.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2721.00 TO NODE   2720.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.709
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
  SUBAREA AREA(ACRES) =    6.42   SUBAREA RUNOFF(CFS) =    9.16
  TOTAL AREA(ACRES) =      6.73   TOTAL RUNOFF(CFS) =    9.60
  TC(MIN.) =  10.52

****************************************************************************
  FLOW PROCESS FROM NODE   2720.00 TO NODE   2710.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1230.00  DOWNSTREAM(FEET) =   1170.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   650.00   CHANNEL SLOPE =  0.0923
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0923 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      9.60
  FLOW VELOCITY(FEET/SEC) =   3.61 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.00   Tc(MIN.) =  13.51
  LONGEST FLOWPATH FROM NODE   2722.00 TO NODE   2710.00 =  1155.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2720.00 TO NODE   2710.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.856
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
  SUBAREA AREA(ACRES) =   18.32   SUBAREA RUNOFF(CFS) =   22.24
  TOTAL AREA(ACRES) =     25.05   TOTAL RUNOFF(CFS) =   30.41
  TC(MIN.) =  13.51

****************************************************************************
  FLOW PROCESS FROM NODE   2710.00 TO NODE   2710.00 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.) =  13.51
  RAINFALL INTENSITY(INCH/HR) =   4.86
  TOTAL STREAM AREA(ACRES) =    25.05
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     30.41

****************************************************************************
  FLOW PROCESS FROM NODE   2732.00 TO NODE   2731.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
==============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =   1450.00
  DOWNSTREAM ELEVATION(FEET) =   1445.00
  ELEVATION DIFFERENCE(FEET) =      5.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.196
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.705
  SUBAREA RUNOFF(CFS) =      0.59
  TOTAL AREA(ACRES) =      0.35   TOTAL RUNOFF(CFS) =      0.59

******************************************************************************
  FLOW PROCESS FROM NODE   2731.00 TO NODE   2730.00 IS CODE =  53
------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1445.00  DOWNSTREAM(FEET) =   1390.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   305.00   CHANNEL SLOPE =  0.1803
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1502 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.59
  FLOW VELOCITY(FEET/SEC) =   2.17 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.34   Tc(MIN.) =  10.54
  LONGEST FLOWPATH FROM NODE   2732.00 TO NODE   2730.00 =   395.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE   2731.00 TO NODE   2730.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.701
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
  SUBAREA AREA(ACRES) =    1.97   SUBAREA RUNOFF(CFS) =    2.81
  TOTAL AREA(ACRES) =      2.32   TOTAL RUNOFF(CFS) =    3.31
  TC(MIN.) =  10.54

******************************************************************************
  FLOW PROCESS FROM NODE   2730.00 TO NODE   2710.00 IS CODE =  53
------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1390.00  DOWNSTREAM(FEET) =   1170.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   820.00   CHANNEL SLOPE =  0.2683
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1861 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      3.31
  FLOW VELOCITY(FEET/SEC) =   3.60 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.80   Tc(MIN.) =  14.34
  LONGEST FLOWPATH FROM NODE   2732.00 TO NODE   2710.00 =  1215.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE   2730.00 TO NODE   2710.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.674
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
SUBAREA AREA(ACRES) =    8.79   SUBAREA RUNOFF(CFS) =   10.27
TOTAL AREA(ACRES) =     11.11   TOTAL RUNOFF(CFS) =   12.98
TC(MIN.) =  14.34

****************************************************************************
FLOW PROCESS FROM NODE   2710.00 TO NODE   2710.00 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.) =  14.34
RAINFALL INTENSITY(INCH/HR) =   4.67
TOTAL STREAM AREA(ACRES) =    11.11
PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.98

** CONFLUENCE DATA **
STREAM     RUNOFF      Tc      INTENSITY      AREA
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1       30.41    13.51        4.856         25.05
    2       12.98    14.34        4.674         11.11

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

** PEAK FLOW RATE TABLE **
STREAM     RUNOFF      Tc      INTENSITY
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
    1       42.65    13.51       4.856
    2       42.26    14.34       4.674

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     42.65   Tc(MIN.) =   13.51
TOTAL AREA(ACRES) =     36.16
LONGEST FLOWPATH FROM NODE   2732.00 TO NODE   2710.00 =  1215.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2710.00 TO NODE   2710.50 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1170.00  DOWNSTREAM(FEET) =   1105.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   600.00   CHANNEL SLOPE =  0.1083
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1063 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =     42.65
FLOW VELOCITY(FEET/SEC) =   6.37 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.57   Tc(MIN.) =  15.08
LONGEST FLOWPATH FROM NODE   2732.00 TO NODE   2710.50 =  1815.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2710.00 TO NODE   2710.50 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.524
```

```
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
  SUBAREA AREA(ACRES) =   10.99   SUBAREA RUNOFF(CFS) =   12.43
  TOTAL AREA(ACRES) =     47.15   TOTAL RUNOFF(CFS) =   53.32
  TC(MIN.) =  15.08

****************************************************************************
  FLOW PROCESS FROM NODE   2710.50 TO NODE     27.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1105.00  DOWNSTREAM(FEET) =    920.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1420.00   CHANNEL SLOPE =  0.1303
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1219 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     53.32
  FLOW VELOCITY(FEET/SEC) =   7.35 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.22   Tc(MIN.) =  18.30
  LONGEST FLOWPATH FROM NODE   2732.00 TO NODE     27.00 =  3235.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2710.50 TO NODE     27.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.993
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2528
  SUBAREA AREA(ACRES) =   18.20   SUBAREA RUNOFF(CFS) =   18.89
  TOTAL AREA(ACRES) =     65.35   TOTAL RUNOFF(CFS) =   65.96
  TC(MIN.) =  18.30

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1       65.96    18.30       3.993       65.35
  LONGEST FLOWPATH FROM NODE   2732.00 TO NODE     27.00 =  3235.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1      172.18    22.74       3.471      170.93
  LONGEST FLOWPATH FROM NODE   2775.00 TO NODE     27.00 =  6155.40 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1     204.56      18.30        3.993
     2     229.53      22.74        3.471

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    229.53   Tc(MIN.) =   22.74
```

```
  TOTAL AREA(ACRES) =    236.28
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =    236.28  TC(MIN.) =     22.74
  PEAK FLOW RATE(CFS)    =    229.53
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

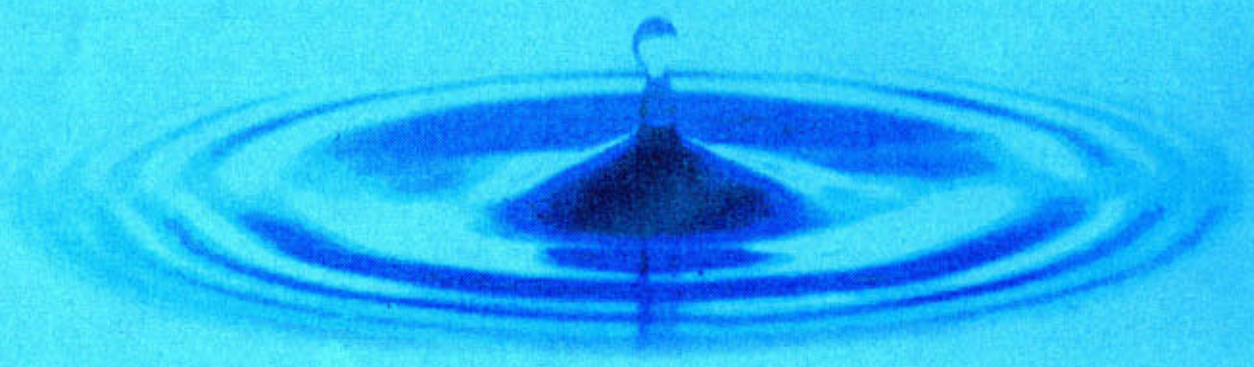
APPENDIX A

AES - 2005

Rational Method Hydrology

Existing Condition

BASIN D



FUSCOE
ENGINEERING
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www.fuscoe.com

Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR28

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
2823	2822	2	1,702.0	1,695.0	100.0	0.35	0.33	
2822	2821	5	1,695.0	1,430.0	517.0			
2822	2821	8				0.35	3.06	
2821	2820	5	1,430.0	1,265.0	669.0			
2821	2820	8				0.338	11.46	
2820	2811	5	1,265.0	1,145.0	650.0			
2820	2811	8				0.27	8.25	
2812	2811	8				0.319	9.5	
2811	2810	5	1,145.0	1,045.0	611.0			
2811	2810	8				0.25	9.27	
2810	28	5	1,045.0	975.0	671.0			
2810	28	8				0.289	11.8	
28	28	1						1 of 2
2807	2806	2	1,738.0	1,705.0	106.0	0.35	0.28	
2806	2805	5	1,705.0	1,500.0	455.0			
2806	2805	8				0.35	3.49	
2805	2804	5	1,500.0	1,200.0	1,117.0			
2805	2804	8				0.325	16.91	
2804	2803	5	1,200.0	1,073.0	885.0			
2804	2803	8				0.25	11.28	
2803	2801	5	1,073.0	985.0	558.0			
2803	2801	8				0.281	5.72	
2802	2801	8				0.286	16.01	
2801	28	5	985.0	975.0	360.0			
28	28	1						2 of 2
							107.36	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                        2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2004 Advanced Engineering Software (aes)
            Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC
                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                            (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                 *
* SUBBASIN # 28                                                          *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR28.DAT
  TIME/DATE OF STUDY: 13:52 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   2823.00 TO NODE   2822.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1702.00
  DOWNSTREAM ELEVATION(FEET) =   1695.00
  ELEVATION DIFFERENCE(FEET) =      7.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.058
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.383
```

```
  SUBAREA RUNOFF(CFS) =       0.85
  TOTAL AREA(ACRES) =       0.33   TOTAL RUNOFF(CFS) =       0.85

****************************************************************************
  FLOW PROCESS FROM NODE   2822.00 TO NODE   2821.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1695.00  DOWNSTREAM(FEET) =   1430.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   517.00   CHANNEL SLOPE =  0.5126
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2256 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.85
  FLOW VELOCITY(FEET/SEC) =   2.66 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.24   Tc(MIN.) =  10.30
  LONGEST FLOWPATH FROM NODE   2823.00 TO NODE   2821.00 =   617.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2822.00 TO NODE   2821.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.787
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =     3.06   SUBAREA RUNOFF(CFS) =     6.20
  TOTAL AREA(ACRES) =       3.39   TOTAL RUNOFF(CFS) =     6.87
  TC(MIN.) =  10.30

****************************************************************************
  FLOW PROCESS FROM NODE   2821.00 TO NODE   2820.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1430.00  DOWNSTREAM(FEET) =   1265.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   669.00   CHANNEL SLOPE =  0.2466
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1789 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       6.87
  FLOW VELOCITY(FEET/SEC) =   4.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.48   Tc(MIN.) =  12.78
  LONGEST FLOWPATH FROM NODE   2823.00 TO NODE   2820.00 =  1286.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2821.00 TO NODE   2820.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.035
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3380
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3407
  SUBAREA AREA(ACRES) =    11.46   SUBAREA RUNOFF(CFS) =    19.50
  TOTAL AREA(ACRES) =      14.85   TOTAL RUNOFF(CFS) =    25.48
  TC(MIN.) =  12.78

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

```
  FLOW PROCESS FROM NODE   2820.00 TO NODE   2811.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1265.00  DOWNSTREAM(FEET) =   1145.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   650.00   CHANNEL SLOPE =  0.1846
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1523 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     25.48
  FLOW VELOCITY(FEET/SEC) =   6.42 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.69   Tc(MIN.) =  14.46
  LONGEST FLOWPATH FROM NODE   2823.00 TO NODE   2811.00 =  1936.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2820.00 TO NODE   2811.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.648
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3155
  SUBAREA AREA(ACRES) =    8.25   SUBAREA RUNOFF(CFS) =   10.35
  TOTAL AREA(ACRES) =     23.10   TOTAL RUNOFF(CFS) =   33.87
  TC(MIN.) =  14.46

****************************************************************************
  FLOW PROCESS FROM NODE   2812.00 TO NODE   2811.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.648
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3190
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3165
  SUBAREA AREA(ACRES) =    9.50   SUBAREA RUNOFF(CFS) =   14.09
  TOTAL AREA(ACRES) =     32.60   TOTAL RUNOFF(CFS) =   47.96
  TC(MIN.) =  14.46

****************************************************************************
  FLOW PROCESS FROM NODE   2811.00 TO NODE   2810.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1145.00  DOWNSTREAM(FEET) =   1045.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   611.00   CHANNEL SLOPE =  0.1637
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1418 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     47.96
  FLOW VELOCITY(FEET/SEC) =   7.65 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.33   Tc(MIN.) =  15.79
  LONGEST FLOWPATH FROM NODE   2823.00 TO NODE   2810.00 =  2547.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2811.00 TO NODE   2810.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.392
```

```
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3018
  SUBAREA AREA(ACRES) =     9.27   SUBAREA RUNOFF(CFS) =   10.18
  TOTAL AREA(ACRES) =      41.87   TOTAL RUNOFF(CFS) =   55.49
  TC(MIN.) =  15.79

****************************************************************************
  FLOW PROCESS FROM NODE   2810.00 TO NODE     28.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1045.00  DOWNSTREAM(FEET) =    975.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   671.00   CHANNEL SLOPE =  0.1043
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1032 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     55.49
  FLOW VELOCITY(FEET/SEC) =   6.85 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.63   Tc(MIN.) =  17.42
  LONGEST FLOWPATH FROM NODE   2823.00 TO NODE     28.00 =  3218.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2810.00 TO NODE     28.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.122
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2890
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2990
  SUBAREA AREA(ACRES) =    11.80   SUBAREA RUNOFF(CFS) =   14.06
  TOTAL AREA(ACRES) =      53.67   TOTAL RUNOFF(CFS) =   66.14
  TC(MIN.) =  17.42

****************************************************************************
  FLOW PROCESS FROM NODE     28.00 TO NODE     28.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  17.42
  RAINFALL INTENSITY(INCH/HR) =   4.12
  TOTAL STREAM AREA(ACRES) =    53.67
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     66.14

****************************************************************************
  FLOW PROCESS FROM NODE   2807.00 TO NODE   2806.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   106.00
  UPSTREAM ELEVATION(FEET) =   1738.00
  DOWNSTREAM ELEVATION(FEET) =   1705.00
  ELEVATION DIFFERENCE(FEET) =     33.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
```

```
THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
(Reference: Table 3-1B of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
SUBAREA RUNOFF(CFS) =      0.78
TOTAL AREA(ACRES) =      0.28   TOTAL RUNOFF(CFS) =      0.78

****************************************************************************
FLOW PROCESS FROM NODE   2806.00 TO NODE   2805.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1705.00  DOWNSTREAM(FEET) =   1500.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   455.00   CHANNEL SLOPE =  0.4505
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .2201 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =      0.78
FLOW VELOCITY(FEET/SEC) =   2.63 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.89   Tc(MIN.) =   9.15
LONGEST FLOWPATH FROM NODE   2807.00 TO NODE   2805.00 =   561.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2806.00 TO NODE   2805.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.243
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
SUBAREA AREA(ACRES) =    3.49   SUBAREA RUNOFF(CFS) =    7.63
TOTAL AREA(ACRES) =      3.77   TOTAL RUNOFF(CFS) =    8.24
TC(MIN.) =   9.15

****************************************************************************
FLOW PROCESS FROM NODE   2805.00 TO NODE   2804.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1500.00  DOWNSTREAM(FEET) =   1200.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1117.00   CHANNEL SLOPE =  0.2686
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1862 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =      8.24
FLOW VELOCITY(FEET/SEC) =   4.88 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   3.82   Tc(MIN.) =  12.97
LONGEST FLOWPATH FROM NODE   2807.00 TO NODE   2804.00 =  1678.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2805.00 TO NODE   2804.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.986
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3250
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3296
SUBAREA AREA(ACRES) =   16.91   SUBAREA RUNOFF(CFS) =   27.40
```

```
  TOTAL AREA(ACRES) =      20.68   TOTAL RUNOFF(CFS) =   33.98
  TC(MIN.) =  12.97

****************************************************************************
  FLOW PROCESS FROM NODE   2804.00 TO NODE   2803.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1200.00  DOWNSTREAM(FEET) =   1073.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   885.00   CHANNEL SLOPE =  0.1435
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1307 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      33.98
  FLOW VELOCITY(FEET/SEC) =   6.55 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.25   Tc(MIN.) =  15.22
  LONGEST FLOWPATH FROM NODE   2807.00 TO NODE   2803.00 =  2563.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2804.00 TO NODE   2803.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.497
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3015
  SUBAREA AREA(ACRES) =   11.28   SUBAREA RUNOFF(CFS) =   12.68
  TOTAL AREA(ACRES) =     31.96   TOTAL RUNOFF(CFS) =   43.33
  TC(MIN.) =  15.22

****************************************************************************
  FLOW PROCESS FROM NODE     28.03 TO NODE   2801.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1073.00  DOWNSTREAM(FEET) =    985.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   558.00   CHANNEL SLOPE =  0.1577
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1389 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      43.33
  FLOW VELOCITY(FEET/SEC) =   7.32 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.27   Tc(MIN.) =  16.49
  LONGEST FLOWPATH FROM NODE   2807.00 TO NODE   2801.00 =  3121.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2803.00 TO NODE   2801.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.270
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2810
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2984
  SUBAREA AREA(ACRES) =    5.72   SUBAREA RUNOFF(CFS) =    6.86
  TOTAL AREA(ACRES) =     37.68   TOTAL RUNOFF(CFS) =   48.01
  TC(MIN.) =  16.49

****************************************************************************
  FLOW PROCESS FROM NODE   2802.00 TO NODE   2801.00 IS CODE =  81
```

```
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.270
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2860
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2947
  SUBAREA AREA(ACRES) =   16.01   SUBAREA RUNOFF(CFS) =   19.55
  TOTAL AREA(ACRES) =     53.69   TOTAL RUNOFF(CFS) =   67.57
  TC(MIN.) =  16.49

****************************************************************************
  FLOW PROCESS FROM NODE   2801.00 TO NODE     28.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    985.00  DOWNSTREAM(FEET) =    975.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   360.00   CHANNEL SLOPE =  0.0278
  CHANNEL FLOW THRU SUBAREA(CFS) =     67.57
  FLOW VELOCITY(FEET/SEC) =   7.04 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.85   Tc(MIN.) =  17.35
  LONGEST FLOWPATH FROM NODE   2807.00 TO NODE     28.00 =  3481.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     28.00 TO NODE     28.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  17.35
  RAINFALL INTENSITY(INCH/HR) =   4.13
  TOTAL STREAM AREA(ACRES) =    53.69
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     67.57

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       66.14    17.42        4.122         53.67
     2       67.57    17.35        4.134         53.69

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1      133.40    17.35       4.134
     2      133.51    17.42       4.122

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    133.51   Tc(MIN.) =   17.42
  TOTAL AREA(ACRES) =    107.36
  LONGEST FLOWPATH FROM NODE   2807.00 TO NODE     28.00 =  3481.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =    107.36  TC(MIN.) =     17.42
  PEAK FLOW RATE(CFS)    =    133.51
============================================================================
============================================================================
```

END OF RATIONAL METHOD ANALYSIS

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Job Name: Merriam Mountains - Proposed Hydrology

Date: October 2006

Job #: 2469.01A

Run Name: MERR29

Page 1

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
2927	2926	2	1,603.0	1,570.0	100.0	0.35	0.19	
2926	2925	5	1,570.0	1,470.0	307.0			
2926	2925	8				0.35	1.15	
2925	2924	5	1,470.0	1,390.0	520.0			
2925	2924	8				0.35	6.88	
2924	2922	5	1,390.0	1,370.0	361.0			
2923	2922	8				0.348	9.3	
2922	2921	5	1,370.0	1,300.0	1,235.0			
2922	2921	8				0.429	29.57	
2921	2920	5	1,300.0	893.0	1,300.0			
2921	2920	8				0.44	15.07	
2920	29	5	893.0	800.0	335.0			
2920	29	8				0.46	27.04	
29	29	1						1 of 2
2915	2914	2	1,550.0	1,460.0	90.0	0.35	1.38	
2914	2913	5	1,460.0	1,400.0	400.0			
2914	2913	8				0.35	5.2	
2913	2912	5	1,400.0	1,290.0	600.0			
2913	2912	8				0.35	5.12	
2912	2911	5	1,290.0	1,025.0	1,175.0			
2912	2911	8				0.433	19.17	
2911	2910	5	1,025.0	835.0	830.0			
2911	2910	8				0.425	23.79	
2910	29	5	835.0	800.0	455.0			2 of 2
29	29	1						
							143.86	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2004 Advanced Engineering Software (aes)
            Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

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                             (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                 *
* SUBBASIN # 29                                                          *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR29.DAT
  TIME/DATE OF STUDY: 13:20 10/10/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   2927.00 TO NODE   2926.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1603.00
  DOWNSTREAM ELEVATION(FEET) =   1570.00
  ELEVATION DIFFERENCE(FEET) =     33.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
SUBAREA RUNOFF(CFS) =       0.53
TOTAL AREA(ACRES) =       0.19   TOTAL RUNOFF(CFS) =       0.53

****************************************************************************
FLOW PROCESS FROM NODE   2926.00 TO NODE   2925.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1570.00  DOWNSTREAM(FEET) =   1470.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   307.00   CHANNEL SLOPE =  0.3257
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .2010 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =       0.53
FLOW VELOCITY(FEET/SEC) =   2.51 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.04   Tc(MIN.) =   8.30
LONGEST FLOWPATH FROM NODE   2927.00 TO NODE   2925.00 =   407.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2926.00 TO NODE   2925.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.648
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
SUBAREA AREA(ACRES) =     1.15   SUBAREA RUNOFF(CFS) =     2.68
TOTAL AREA(ACRES) =       1.34   TOTAL RUNOFF(CFS) =    3.12
TC(MIN.) =   8.30

****************************************************************************
FLOW PROCESS FROM NODE   2925.00 TO NODE   2924.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1470.00  DOWNSTREAM(FEET) =   1390.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   520.00   CHANNEL SLOPE =  0.1538
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1369 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       3.12
FLOW VELOCITY(FEET/SEC) =   3.03 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.86   Tc(MIN.) =  11.17
LONGEST FLOWPATH FROM NODE   2927.00 TO NODE   2924.00 =   927.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2925.00 TO NODE   2924.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.491
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
SUBAREA AREA(ACRES) =     6.88   SUBAREA RUNOFF(CFS) =   13.22
TOTAL AREA(ACRES) =       8.22   TOTAL RUNOFF(CFS) =   15.80
TC(MIN.) =  11.17
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   2924.00 TO NODE   2922.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1390.00  DOWNSTREAM(FEET) =   1370.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   361.00   CHANNEL SLOPE =  0.0554
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0554 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     15.80
  FLOW VELOCITY(FEET/SEC) =   3.30 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.82   Tc(MIN.) =  12.99
  LONGEST FLOWPATH FROM NODE   2927.00 TO NODE   2922.00 =  1288.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2923.00 TO NODE   2922.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.982
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3480
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3489
  SUBAREA AREA(ACRES) =    9.30   SUBAREA RUNOFF(CFS) =   16.12
  TOTAL AREA(ACRES) =     17.52   TOTAL RUNOFF(CFS) =   30.46
  TC(MIN.) =  12.99

****************************************************************************
  FLOW PROCESS FROM NODE   2922.00 TO NODE   2921.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1370.00  DOWNSTREAM(FEET) =   1300.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1235.00   CHANNEL SLOPE =  0.0567
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0567 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     30.46
  FLOW VELOCITY(FEET/SEC) =   4.16 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.95   Tc(MIN.) =  17.94
  LONGEST FLOWPATH FROM NODE   2927.00 TO NODE   2921.00 =  2523.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2922.00 TO NODE   2921.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.045
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4290
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3992
  SUBAREA AREA(ACRES) =   29.57   SUBAREA RUNOFF(CFS) =   51.32
  TOTAL AREA(ACRES) =     47.09   TOTAL RUNOFF(CFS) =   76.05
  TC(MIN.) =  17.94

****************************************************************************
  FLOW PROCESS FROM NODE   2921.00 TO NODE   2920.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1300.00  DOWNSTREAM(FEET) =    893.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1300.00   CHANNEL SLOPE =  0.3131
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1983 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     76.05
  FLOW VELOCITY(FEET/SEC) =  10.55 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.05   Tc(MIN.) =  19.99
  LONGEST FLOWPATH FROM NODE   2927.00 TO NODE   2920.00 =  3823.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2921.00 TO NODE   2920.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.772
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4400
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4091
  SUBAREA AREA(ACRES) =   15.07   SUBAREA RUNOFF(CFS) =   25.01
  TOTAL AREA(ACRES) =     62.16   TOTAL RUNOFF(CFS) =   95.92
  TC(MIN.) =  19.99

****************************************************************************
  FLOW PROCESS FROM NODE   2920.00 TO NODE     29.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    893.00  DOWNSTREAM(FEET) =    800.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   335.00   CHANNEL SLOPE =  0.2776
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1892 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     95.92
  FLOW VELOCITY(FEET/SEC) =  11.13 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.50   Tc(MIN.) =  20.49
  LONGEST FLOWPATH FROM NODE   2927.00 TO NODE     29.00 =  4158.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2920.00 TO NODE     29.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.712
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4245
  SUBAREA AREA(ACRES) =   27.04   SUBAREA RUNOFF(CFS) =   46.17
  TOTAL AREA(ACRES) =     89.20   TOTAL RUNOFF(CFS) =  140.58
  TC(MIN.) =  20.49

****************************************************************************
  FLOW PROCESS FROM NODE     29.00 TO NODE     29.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  20.49
  RAINFALL INTENSITY(INCH/HR) =   3.71
  TOTAL STREAM AREA(ACRES) =    89.20
```

```
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    140.58

****************************************************************************
  FLOW PROCESS FROM NODE   2915.00 TO NODE   2914.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =   1550.00
  DOWNSTREAM ELEVATION(FEET) =   1460.00
  ELEVATION DIFFERENCE(FEET) =     90.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.945
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.247
  SUBAREA RUNOFF(CFS) =      3.98
  TOTAL AREA(ACRES) =      1.38   TOTAL RUNOFF(CFS) =      3.98

****************************************************************************
  FLOW PROCESS FROM NODE   2914.00 TO NODE   2913.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1460.00  DOWNSTREAM(FEET) =   1400.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   400.00   CHANNEL SLOPE =  0.1500
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1350 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      3.98
  FLOW VELOCITY(FEET/SEC) =   3.26 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.04   Tc(MIN.) =   7.99
  LONGEST FLOWPATH FROM NODE   2915.00 TO NODE   2913.00 =   490.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2914.00 TO NODE   2913.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.816
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    5.20   SUBAREA RUNOFF(CFS) =   12.40
  TOTAL AREA(ACRES) =      6.58   TOTAL RUNOFF(CFS) =   15.70
  TC(MIN.) =   7.99

****************************************************************************
  FLOW PROCESS FROM NODE   2913.00 TO NODE   2912.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1400.00  DOWNSTREAM(FEET) =   1290.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   600.00   CHANNEL SLOPE =  0.1833
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1517 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     15.70
  FLOW VELOCITY(FEET/SEC) =   5.46 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.83   Tc(MIN.) =   9.82
  LONGEST FLOWPATH FROM NODE   2915.00 TO NODE   2912.00 =  1090.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   2913.00 TO NODE   2912.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.965
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    5.12   SUBAREA RUNOFF(CFS) =   10.69
  TOTAL AREA(ACRES) =     11.70   TOTAL RUNOFF(CFS) =   24.43
  TC(MIN.) =   9.82

****************************************************************************
  FLOW PROCESS FROM NODE   2912.00 TO NODE   2911.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1290.00  DOWNSTREAM(FEET) =   1025.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1175.00   CHANNEL SLOPE =  0.2255
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1718 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     24.43
  FLOW VELOCITY(FEET/SEC) =   6.73 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.91   Tc(MIN.) =  12.73
  LONGEST FLOWPATH FROM NODE   2915.00 TO NODE   2911.00 =  2265.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2912.00 TO NODE   2911.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.046
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4330
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4015
  SUBAREA AREA(ACRES) =   19.17   SUBAREA RUNOFF(CFS) =   41.89
  TOTAL AREA(ACRES) =     30.87   TOTAL RUNOFF(CFS) =   62.55
  TC(MIN.) =  12.73

****************************************************************************
  FLOW PROCESS FROM NODE   2911.00 TO NODE   2910.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1025.00  DOWNSTREAM(FEET) =    835.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   830.00   CHANNEL SLOPE =  0.2289
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1730 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     62.55
  FLOW VELOCITY(FEET/SEC) =   9.23 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.50   Tc(MIN.) =  14.23
  LONGEST FLOWPATH FROM NODE   2915.00 TO NODE   2910.00 =  3095.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2911.00 TO NODE   2910.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.697
 *USER SPECIFIED(SUBAREA):
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4250
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.4118
 SUBAREA AREA(ACRES) =   23.79   SUBAREA RUNOFF(CFS) =   47.49
 TOTAL AREA(ACRES) =     54.66   TOTAL RUNOFF(CFS) =  105.70
 TC(MIN.) =  14.23

******************************************************************************
 FLOW PROCESS FROM NODE   2910.00 TO NODE     29.00 IS CODE =  52
------------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    835.00  DOWNSTREAM(FEET) =    800.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   455.00   CHANNEL SLOPE =  0.0769
 CHANNEL FLOW THRU SUBAREA(CFS) =    105.70
 FLOW VELOCITY(FEET/SEC) =  13.39 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.57   Tc(MIN.) =  14.80
 LONGEST FLOWPATH FROM NODE   2915.00 TO NODE     29.00 =  3550.00 FEET.

******************************************************************************
 FLOW PROCESS FROM NODE     29.00 TO NODE     29.00 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.) =  14.80
 RAINFALL INTENSITY(INCH/HR) =   4.58
 TOTAL STREAM AREA(ACRES) =    54.66
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    105.70

 ** CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY      AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1       140.58    20.49        3.712        89.20
    2       105.70    14.80        4.580        54.66

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
    1       207.21    14.80       4.580
    2       226.26    20.49       3.712

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    226.26   Tc(MIN.) =   20.49
 TOTAL AREA(ACRES) =    143.86
 LONGEST FLOWPATH FROM NODE   2927.00 TO NODE     29.00 =  4158.00 FEET.
==============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =    143.86  TC(MIN.) =     20.49
 PEAK FLOW RATE(CFS)    =    226.26
==============================================================================
==============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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Job Name: Merriam Mountains - Proposed Hydrology

Date: October 2006

Job #: 2469.01A

Run Name: MERR30

Page 1

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
3006	3005	2	1,615.0	1,580.0	76.1	0.35	0.17	
3005	3004	5	1,580.0	1,360.0	465.9			
3005	3004	8				0.35	2.06	
3004	3003	5	1,360.0	1,210.0	558.5			
3004	3003	8				0.40	9.02	
3003	3002	5	1,210.0	1,080.0	596.6			
3003	3002	8				0.40	21.04	
3002	3001	5	1,080.0	870.0	870.8			
3002	3001	8				0.40	21.39	
3001	30	5	870.0	665.0	1,720.8			
3001	30	8				0.40	54.15	
							107.83	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2004 Advanced Engineering Software (aes)
            Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

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                             (858) 554-1500

 ************************** DESCRIPTION OF STUDY **************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                  *
* SUBBASIN # 30                                                           *
* 2469.01A - OCTOBER 2006                                                 *
 ***************************************************************************

  FILE NAME: MERR30.DAT
  TIME/DATE OF STUDY: 10:33 10/06/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   3006.00 TO NODE   3005.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    76.06
  UPSTREAM ELEVATION(FEET) =   1615.00
  DOWNSTREAM ELEVATION(FEET) =   1580.00
  ELEVATION DIFFERENCE(FEET) =     35.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.465
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.707
SUBAREA RUNOFF(CFS) =       0.52
TOTAL AREA(ACRES) =       0.17   TOTAL RUNOFF(CFS) =       0.52

****************************************************************************
FLOW PROCESS FROM NODE   3005.00 TO NODE   3004.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1580.00  DOWNSTREAM(FEET) =   1360.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   465.90   CHANNEL SLOPE =  0.4722
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .2222 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =       0.52
FLOW VELOCITY(FEET/SEC) =   2.64 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.94   Tc(MIN.) =   8.41
LONGEST FLOWPATH FROM NODE   3006.00 TO NODE   3004.00 =   541.96 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   3005.00 TO NODE   3004.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.596
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
SUBAREA AREA(ACRES) =     2.06   SUBAREA RUNOFF(CFS) =     4.76
TOTAL AREA(ACRES) =       2.23   TOTAL RUNOFF(CFS) =     5.15
TC(MIN.) =   8.41

****************************************************************************
FLOW PROCESS FROM NODE   3004.00 TO NODE   3003.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1360.00  DOWNSTREAM(FEET) =   1210.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   558.50   CHANNEL SLOPE =  0.2686
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1862 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       5.15
FLOW VELOCITY(FEET/SEC) =   4.17 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.23   Tc(MIN.) =  10.64
LONGEST FLOWPATH FROM NODE   3006.00 TO NODE   3003.00 =  1100.46 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   3004.00 TO NODE   3003.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.666
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4000
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3901
SUBAREA AREA(ACRES) =     9.02   SUBAREA RUNOFF(CFS) =    20.44
TOTAL AREA(ACRES) =      11.25   TOTAL RUNOFF(CFS) =    24.87
TC(MIN.) =  10.64
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   3003.00 TO NODE   3002.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1210.00  DOWNSTREAM(FEET) =   1080.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   596.60   CHANNEL SLOPE =  0.2179
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1690 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     24.87
  FLOW VELOCITY(FEET/SEC) =   6.71 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.48   Tc(MIN.) =  12.12
  LONGEST FLOWPATH FROM NODE   3006.00 TO NODE   3002.00 =  1697.06 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3003.00 TO NODE   3002.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.209
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3965
  SUBAREA AREA(ACRES) =   21.04   SUBAREA RUNOFF(CFS) =   43.84
  TOTAL AREA(ACRES) =     32.29   TOTAL RUNOFF(CFS) =   66.70
  TC(MIN.) =  12.12

****************************************************************************
  FLOW PROCESS FROM NODE   3002.00 TO NODE   2001.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1080.00  DOWNSTREAM(FEET) =    870.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   870.80   CHANNEL SLOPE =  0.2412
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1771 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     66.70
  FLOW VELOCITY(FEET/SEC) =   9.54 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.52   Tc(MIN.) =  13.64
  LONGEST FLOWPATH FROM NODE   3006.00 TO NODE   2001.00 =  2567.86 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3002.00 TO NODE   3001.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.827
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3979
  SUBAREA AREA(ACRES) =   21.39   SUBAREA RUNOFF(CFS) =   41.30
  TOTAL AREA(ACRES) =     53.68   TOTAL RUNOFF(CFS) =  103.10
  TC(MIN.) =  13.64

****************************************************************************
  FLOW PROCESS FROM NODE   3001.00 TO NODE     30.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    870.00  DOWNSTREAM(FEET) =    665.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1720.80   CHANNEL SLOPE =  0.1191
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1143 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    103.10
  FLOW VELOCITY(FEET/SEC) =   8.87 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.23   Tc(MIN.) =  16.88
  LONGEST FLOWPATH FROM NODE   3006.00 TO NODE     30.00 =  4288.66 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3001.00 TO NODE     30.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.208
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3990
  SUBAREA AREA(ACRES) =   54.15   SUBAREA RUNOFF(CFS) =   91.14
  TOTAL AREA(ACRES) =    107.83   TOTAL RUNOFF(CFS) =  181.02
  TC(MIN.) =  16.88
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =    107.83  TC(MIN.) =     16.88
  PEAK FLOW RATE(CFS)    =    181.02
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR31
Page 1

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
3103	3102	2	1,335.0	1,300.0	82.0	0.35	0.47	
3102	3101	5	1,300.0	1,035.0	594.0			
3102	3101	8				0.46	5.56	
3101	31	5	1,035.0	650.0	1,825.0			
3101	31	8				0.46	31.91	
							37.94	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2004 Advanced Engineering Software (aes)
            Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC
                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                 *
* SUBBASIN # 31                                                          *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR31.DAT
  TIME/DATE OF STUDY: 13:56 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   3103.00 TO NODE   3102.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    82.00
  UPSTREAM ELEVATION(FEET) =   1335.00
  DOWNSTREAM ELEVATION(FEET) =   1300.00
  ELEVATION DIFFERENCE(FEET) =     35.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.675
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.499
SUBAREA RUNOFF(CFS) =       1.40
TOTAL AREA(ACRES) =       0.47   TOTAL RUNOFF(CFS) =       1.40

****************************************************************************
FLOW PROCESS FROM NODE   3102.00 TO NODE   3101.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1300.00  DOWNSTREAM(FEET) =   1035.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   594.00   CHANNEL SLOPE =  0.4461
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .2195 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       1.40
FLOW VELOCITY(FEET/SEC) =   2.93 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   3.37   Tc(MIN.) =   9.05
LONGEST FLOWPATH FROM NODE   3103.00 TO NODE   3101.00 =   676.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   3102.00 TO NODE   3101.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.290
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4514
SUBAREA AREA(ACRES) =     5.56   SUBAREA RUNOFF(CFS) =   16.09
TOTAL AREA(ACRES) =       6.03   TOTAL RUNOFF(CFS) =   17.12
TC(MIN.) =   9.05

****************************************************************************
FLOW PROCESS FROM NODE   3101.00 TO NODE     31.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1035.00  DOWNSTREAM(FEET) =    650.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1825.00   CHANNEL SLOPE =  0.2110
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1655 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =      17.12
FLOW VELOCITY(FEET/SEC) =   5.87 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   5.19   Tc(MIN.) =  14.23
LONGEST FLOWPATH FROM NODE   3103.00 TO NODE     31.00 =  2501.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   3101.00 TO NODE     31.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.696
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4586
SUBAREA AREA(ACRES) =   31.91   SUBAREA RUNOFF(CFS) =   68.93
TOTAL AREA(ACRES) =     37.94   TOTAL RUNOFF(CFS) =   81.71
TC(MIN.) =  14.23
============================================================================
END OF STUDY SUMMARY:
```

```
  TOTAL AREA(ACRES)      =     37.94  TC(MIN.) =     14.23
  PEAK FLOW RATE(CFS)    =     81.71
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

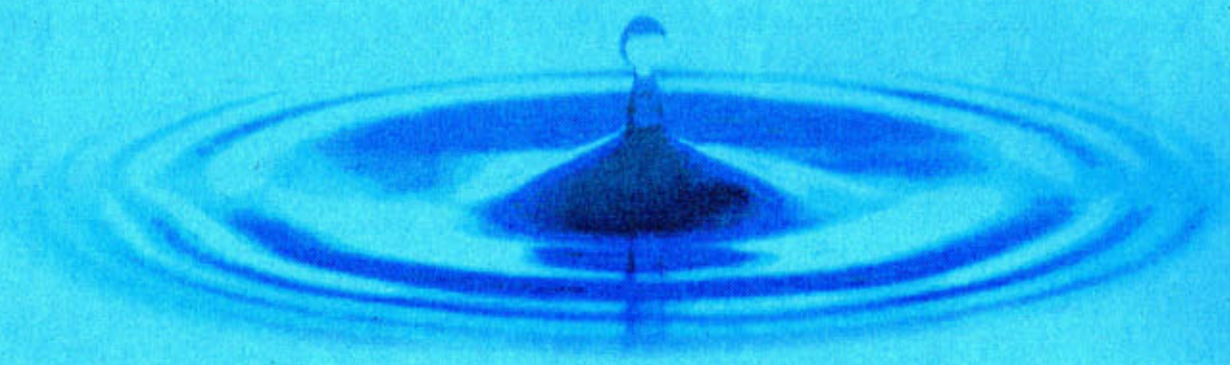
APPENDIX A

AES - 2005

Rational Method Hydrology

Existing Condition

BASIN E



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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR32
Page 1

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
3215	3214	2	1,450.0	1,445.0	75.0	0.35	0.25	
3214	3213	5	1,445.0	1,415.0	300.0			
3214	3213	8				0.35	15.25	
3213	3212	5	1,415.0	1,360.0	600.0			
3213	3212	8				0.35	12.04	
3212	3209	5	1,343.0	1,237.0	606.5			
3212	3209	8				0.35	11.05	
3209	3209	1						1 of 2
3211	3210	2	1,612.0	1,580.0	136.8	0.35	0.2	
3210	3209	5	1,580.0	1,237.0	1,282.0			
3210	3209	8				0.35	9.72	
3209	3209	1						2 of 2
3209	3208	5	1,237.0	1,020.0	807.7			
3209	3208	8				0.35	12.33	
3208	3204	5	1,020.0	931.0	1,048.9			
3208	3204	8				0.46	13.59	
3204	3204	1						1 of 2
3207	3206	2	1,347.0	1,335.0	93.0	0.35	0.29	
3206	3205	5	1,335.0	1,063.0	1,106.8			
3206	3205	8				0.35	15.11	
3205	3204	5	1,063.0	831.0	830.9			
3205	3204	8				0.46	12.79	
3204	3204	1						2 of 2
3204	3203	5	831.0	759.0	426.8			
3204	3203	8				0.46	5.34	
3203	32	5	759.0	724.0	430.0			
3203	32	8				0.46	14.09	
32	32	1						1 of 2
3202	3201	2	993.0	968.0	113.0	0.46	0.27	
3201	32	5	968.0	724.0	1,301.8			
3201	32	8				0.46	13.92	
32	32	1						2 of 2
							136.24	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
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             Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC.
                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                 *
* SUBBASIN # 32                                                          *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR32.DAT
  TIME/DATE OF STUDY: 13:52 10/10/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   3215.00 TO NODE   3214.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1450.00
  DOWNSTREAM ELEVATION(FEET) =   1445.00
  ELEVATION DIFFERENCE(FEET) =      5.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.212
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.017
```

```
  SUBAREA RUNOFF(CFS) =       0.70
  TOTAL AREA(ACRES) =       0.25   TOTAL RUNOFF(CFS) =       0.70

****************************************************************************
  FLOW PROCESS FROM NODE   3214.00 TO NODE   3213.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1445.00  DOWNSTREAM(FEET) =   1415.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.1000
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1000 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.70
  FLOW VELOCITY(FEET/SEC) =   1.77 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.82   Tc(MIN.) =   9.04
  LONGEST FLOWPATH FROM NODE   3203.00 TO NODE   3202.60 =   375.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3214.00 TO NODE   3213.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.296
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   15.25   SUBAREA RUNOFF(CFS) =   33.60
  TOTAL AREA(ACRES) =     15.50   TOTAL RUNOFF(CFS) =   34.15
  TC(MIN.) =   9.04

****************************************************************************
  FLOW PROCESS FROM NODE   3213.00 TO NODE   3212.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1415.00  DOWNSTREAM(FEET) =   1360.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   600.00   CHANNEL SLOPE =  0.0917
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0917 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     34.15
  FLOW VELOCITY(FEET/SEC) =   5.49 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.82   Tc(MIN.) =  10.86
  LONGEST FLOWPATH FROM NODE   3203.00 TO NODE   3202.40 =   975.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3213.00 TO NODE   3212.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.593
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   12.04   SUBAREA RUNOFF(CFS) =   23.57
  TOTAL AREA(ACRES) =     27.54   TOTAL RUNOFF(CFS) =   53.91
  TC(MIN.) =  10.86

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

```
  FLOW PROCESS FROM NODE   3212.00 TO NODE   3209.00 IS CODE =  53
----------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
======================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1343.00  DOWNSTREAM(FEET) =   1237.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   606.50   CHANNEL SLOPE =  0.1748
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1474 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     53.91
  FLOW VELOCITY(FEET/SEC) =   8.11 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.25   Tc(MIN.) =  12.10
  LONGEST FLOWPATH FROM NODE   3203.00 TO NODE   3209.00 =  1581.50 FEET.

**********************************************************************
  FLOW PROCESS FROM NODE   3212.00 TO NODE   3209.00 IS CODE =  81
----------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.214
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   11.05   SUBAREA RUNOFF(CFS) =   20.17
  TOTAL AREA(ACRES) =     38.59   TOTAL RUNOFF(CFS) =   70.43
  TC(MIN.) =  12.10

**********************************************************************
  FLOW PROCESS FROM NODE   3209.00 TO NODE   3209.00 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.) =  12.10
  RAINFALL INTENSITY(INCH/HR) =   5.21
  TOTAL STREAM AREA(ACRES) =    38.59
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     70.43

**********************************************************************
  FLOW PROCESS FROM NODE   3211.00 TO NODE   3210.00 IS CODE =  21
----------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   136.80
  UPSTREAM ELEVATION(FEET) =   1612.00
  DOWNSTREAM ELEVATION(FEET) =   1580.00
  ELEVATION DIFFERENCE(FEET) =     32.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      0.56
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.56

**********************************************************************
  FLOW PROCESS FROM NODE   3210.00 TO NODE   3209.00 IS CODE =  53
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1580.00  DOWNSTREAM(FEET) =   1237.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1282.00   CHANNEL SLOPE =  0.2676
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1859 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.56
  FLOW VELOCITY(FEET/SEC) =   2.41 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   8.85   Tc(MIN.) =  15.12
  LONGEST FLOWPATH FROM NODE   3211.00 TO NODE   3209.00 =  1418.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3210.00 TO NODE   3209.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.517
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =     9.72   SUBAREA RUNOFF(CFS) =   15.37
  TOTAL AREA(ACRES) =       9.92   TOTAL RUNOFF(CFS) =   15.68
  TC(MIN.) =  15.12

****************************************************************************
  FLOW PROCESS FROM NODE   3209.00 TO NODE   3209.00 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.) =  15.12
  RAINFALL INTENSITY(INCH/HR) =   4.52
  TOTAL STREAM AREA(ACRES) =     9.92
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.68

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       70.43    12.10        5.214         38.59
     2       15.68    15.12        4.517          9.92

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       82.98    12.10       5.214
     2       76.70    15.12       4.517

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     82.98   Tc(MIN.) =   12.10
  TOTAL AREA(ACRES) =     48.51
  LONGEST FLOWPATH FROM NODE   3203.00 TO NODE   3209.00 =  1581.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3209.00 TO NODE   2508.00 IS CODE =  53
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1237.00  DOWNSTREAM(FEET) =   1020.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   807.70   CHANNEL SLOPE =  0.2687
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1862 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     82.98
  FLOW VELOCITY(FEET/SEC) =  10.53 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.28   Tc(MIN.) =  13.38
  LONGEST FLOWPATH FROM NODE   3203.00 TO NODE   2508.00 =  2389.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3209.00 TO NODE   3208.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.887
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   12.33   SUBAREA RUNOFF(CFS) =   21.09
  TOTAL AREA(ACRES) =     60.84   TOTAL RUNOFF(CFS) =  104.07
  TC(MIN.) =  13.38

****************************************************************************
  FLOW PROCESS FROM NODE   3208.00 TO NODE   3204.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1020.00  DOWNSTREAM(FEET) =    831.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1048.90   CHANNEL SLOPE =  0.1802
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1501 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    104.07
  FLOW VELOCITY(FEET/SEC) =  10.19 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.72   Tc(MIN.) =  15.10
  LONGEST FLOWPATH FROM NODE   3203.00 TO NODE   3204.00 =  3438.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3208.00 TO NODE   3204.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.521
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3701
  SUBAREA AREA(ACRES) =   13.59   SUBAREA RUNOFF(CFS) =   28.26
  TOTAL AREA(ACRES) =     74.43   TOTAL RUNOFF(CFS) =  124.54
  TC(MIN.) =  15.10

****************************************************************************
  FLOW PROCESS FROM NODE   3204.00 TO NODE   3204.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
```

```
  TIME OF CONCENTRATION(MIN.) =  15.10
  RAINFALL INTENSITY(INCH/HR) =   4.52
  TOTAL STREAM AREA(ACRES) =    74.43
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    124.54

****************************************************************************
  FLOW PROCESS FROM NODE   3207.00 TO NODE   3206.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    93.00
  UPSTREAM ELEVATION(FEET) =   1347.00
  DOWNSTREAM ELEVATION(FEET) =   1335.00
  ELEVATION DIFFERENCE(FEET) =     12.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.043
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.161
  SUBAREA RUNOFF(CFS) =      0.83
  TOTAL AREA(ACRES) =      0.29   TOTAL RUNOFF(CFS) =      0.83

****************************************************************************
  FLOW PROCESS FROM NODE   3206.00 TO NODE   3205.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1335.00  DOWNSTREAM(FEET) =   1063.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1106.80   CHANNEL SLOPE =  0.2458
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1786 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.83
  FLOW VELOCITY(FEET/SEC) =   2.37 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.79   Tc(MIN.) =  13.84
  LONGEST FLOWPATH FROM NODE   3207.00 TO NODE   3205.00 =  1199.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3206.00 TO NODE   3205.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.782
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   15.11   SUBAREA RUNOFF(CFS) =   25.29
  TOTAL AREA(ACRES) =     15.40   TOTAL RUNOFF(CFS) =   25.78
  TC(MIN.) =  13.84

****************************************************************************
  FLOW PROCESS FROM NODE   3205.00 TO NODE   3204.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1063.00  DOWNSTREAM(FEET) =    831.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   830.90   CHANNEL SLOPE =  0.2792
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1897 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
  CHANNEL FLOW THRU SUBAREA(CFS) =      25.78
  FLOW VELOCITY(FEET/SEC) =   7.20 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.92   Tc(MIN.) =  15.76
  LONGEST FLOWPATH FROM NODE   3207.00 TO NODE   3204.00 =  2030.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3205.00 TO NODE   3204.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.397
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3999
  SUBAREA AREA(ACRES) =   12.79   SUBAREA RUNOFF(CFS) =   25.87
  TOTAL AREA(ACRES) =     28.19   TOTAL RUNOFF(CFS) =   49.57
  TC(MIN.) =  15.76

****************************************************************************
  FLOW PROCESS FROM NODE   3204.00 TO NODE   3204.00 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.) =  15.76
  RAINFALL INTENSITY(INCH/HR) =   4.40
  TOTAL STREAM AREA(ACRES) =    28.19
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     49.57

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       124.54    15.10        4.521         74.43
     2        49.57    15.76        4.397         28.19

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       172.02    15.10       4.521
     2       170.70    15.76       4.397

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    172.02   Tc(MIN.) =   15.10
  TOTAL AREA(ACRES) =    102.62
  LONGEST FLOWPATH FROM NODE   3203.00 TO NODE   3204.00 =  3438.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3204.00 TO NODE   3203.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    831.00  DOWNSTREAM(FEET) =    759.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   426.80   CHANNEL SLOPE =  0.1687
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1443 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    172.02
```

```
  FLOW VELOCITY(FEET/SEC) =  11.81 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.60   Tc(MIN.) =  15.70
  LONGEST FLOWPATH FROM NODE   3203.00 TO NODE   3203.00 =  3864.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3204.00 TO NODE   3203.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.409
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3823
  SUBAREA AREA(ACRES) =    5.34   SUBAREA RUNOFF(CFS) =   10.83
  TOTAL AREA(ACRES) =    107.96   TOTAL RUNOFF(CFS) =  181.97
  TC(MIN.) =  15.70

****************************************************************************
  FLOW PROCESS FROM NODE   3203.00 TO NODE     32.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    759.00  DOWNSTREAM(FEET) =    724.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   430.00   CHANNEL SLOPE =  0.0814
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0814 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    181.97
  FLOW VELOCITY(FEET/SEC) =   9.04 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.79   Tc(MIN.) =  16.49
  LONGEST FLOWPATH FROM NODE   3203.00 TO NODE     32.00 =  4294.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3203.00 TO NODE     32.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.271
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3913
  SUBAREA AREA(ACRES) =   14.09   SUBAREA RUNOFF(CFS) =   27.68
  TOTAL AREA(ACRES) =    122.05   TOTAL RUNOFF(CFS) =  203.95
  TC(MIN.) =  16.49

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  16.49
  RAINFALL INTENSITY(INCH/HR) =   4.27
  TOTAL STREAM AREA(ACRES) =   122.05
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    203.95

****************************************************************************
  FLOW PROCESS FROM NODE   3202.00 TO NODE   3201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
==============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4600
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   113.00
  UPSTREAM ELEVATION(FEET) =    993.00
  DOWNSTREAM ELEVATION(FEET) =    968.00
  ELEVATION DIFFERENCE(FEET) =     25.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.348
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.830
  SUBAREA RUNOFF(CFS) =      1.10
  TOTAL AREA(ACRES) =      0.27   TOTAL RUNOFF(CFS) =      1.10

******************************************************************************
  FLOW PROCESS FROM NODE   3201.00 TO NODE     32.00 IS CODE =  53
------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    968.00  DOWNSTREAM(FEET) =    724.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1301.84   CHANNEL SLOPE =  0.1874
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1537 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      1.10
  FLOW VELOCITY(FEET/SEC) =   2.26 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   9.58   Tc(MIN.) =  14.93
  LONGEST FLOWPATH FROM NODE   3202.00 TO NODE     32.00 =  1414.84 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE   3201.00 TO NODE     32.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.554
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4600
  SUBAREA AREA(ACRES) =   13.92   SUBAREA RUNOFF(CFS) =   29.16
  TOTAL AREA(ACRES) =     14.19   TOTAL RUNOFF(CFS) =   29.72
  TC(MIN.) =  14.93

******************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 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.) =  14.93
  RAINFALL INTENSITY(INCH/HR) =   4.55
  TOTAL STREAM AREA(ACRES) =    14.19
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     29.72

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1      203.95    16.49        4.271        122.05
```

```
    2        29.72     14.93         4.554          14.19

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc       INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       221.01    14.93       4.554
     2       231.83    16.49       4.271

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    231.83   Tc(MIN.) =   16.49
  TOTAL AREA(ACRES) =    136.24
  LONGEST FLOWPATH FROM NODE   3203.00 TO NODE     32.00 =  4294.90 FEET.
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =    136.24  TC(MIN.) =     16.49
  PEAK FLOW RATE(CFS)    =    231.83
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR33

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
3302	3301.8	2	1,155.0	1,065.0	75.0	0.35	0.54	
3301.8	3301.6	5	1,065.0	945.0	375.0			
3301.8	3301.6	8				0.35	2.73	
3301.6	3301	5	945.0	810.0	415.0			
3301.6	3301	8				0.46	5.97	
3301	33	5	810.0	725.0	925.0			
3301	33	8				0.46	26.36	
							35.6	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
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             Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

                    FUSCOE ENGINEERING - SAN DIEGO, INC
                      6390 GREENWICH DRIVE, SUITE 170
                        SAN DIEGO, CALIFORNIA 92122
                              (858) 554-1500

 ************************** DESCRIPTION OF STUDY **************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                  *
* SUBBASIN # 33                                                           *
* 2469.01A - OCTOBER 2006                                                 *
 ***************************************************************************

  FILE NAME: MERR33.DAT
  TIME/DATE OF STUDY: 14:00 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   3302.00 TO NODE   3301.80 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1155.00
  DOWNSTREAM ELEVATION(FEET) =   1065.00
  ELEVATION DIFFERENCE(FEET) =     90.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.427
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.747
SUBAREA RUNOFF(CFS) =       1.65
TOTAL AREA(ACRES) =       0.54   TOTAL RUNOFF(CFS) =       1.65

****************************************************************************
FLOW PROCESS FROM NODE   3301.80 TO NODE   3301.60 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1065.00  DOWNSTREAM(FEET) =    945.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   375.00   CHANNEL SLOPE =  0.3200
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .2000 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       1.65
FLOW VELOCITY(FEET/SEC) =   2.96 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.11   Tc(MIN.) =   7.54
LONGEST FLOWPATH FROM NODE   3302.00 TO NODE   3301.60 =   450.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   3301.80 TO NODE   3301.60 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.076
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
SUBAREA AREA(ACRES) =     2.73   SUBAREA RUNOFF(CFS) =     6.76
TOTAL AREA(ACRES) =       3.27   TOTAL RUNOFF(CFS) =     8.10
TC(MIN.) =   7.54

****************************************************************************
FLOW PROCESS FROM NODE   3301.60 TO NODE   3301.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    945.00  DOWNSTREAM(FEET) =    810.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   415.00   CHANNEL SLOPE =  0.3253
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .2009 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       8.10
FLOW VELOCITY(FEET/SEC) =   5.04 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.37   Tc(MIN.) =   8.91
LONGEST FLOWPATH FROM NODE   3302.00 TO NODE   3301.00 =   865.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   3301.60 TO NODE   3301.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.352
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4211
SUBAREA AREA(ACRES) =     5.97   SUBAREA RUNOFF(CFS) =    17.44
TOTAL AREA(ACRES) =       9.24   TOTAL RUNOFF(CFS) =    24.72
TC(MIN.) =   8.91

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

```
  FLOW PROCESS FROM NODE   3301.00 TO NODE     33.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    810.00  DOWNSTREAM(FEET) =    725.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   925.00   CHANNEL SLOPE =  0.0919
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0919 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     24.72
  FLOW VELOCITY(FEET/SEC) =   4.94 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.12   Tc(MIN.) =  12.03
  LONGEST FLOWPATH FROM NODE   3302.00 TO NODE     33.00 =  1790.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3301.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.234
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4499
  SUBAREA AREA(ACRES) =   26.36   SUBAREA RUNOFF(CFS) =   63.46
  TOTAL AREA(ACRES) =     35.60   TOTAL RUNOFF(CFS) =   83.83
  TC(MIN.) =  12.03
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     35.60  TC(MIN.) =     12.03
  PEAK FLOW RATE(CFS)   =     83.83
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR34
Page 1

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
3403	3402.8	2	1,575.0	1,520.0	75.0	0.35	0.29	
3402.8	3402.6	5	1,520.0	1,440.0	250.0			
3402.8	3402.6	8				0.35	1.3	
3402.6	3402	5	1,440.0	1,330.0	655.0			
3402.6	3402	8				0.35	14.27	
3402	3401	5	1,330.0	890.0	1,965.0			
3402	3401	8				0.35	71.31	
3401	34	5	890.0	805.0	525.0			
3401	34	8				0.46	10.38	
							97.55	Total Area

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

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            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
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            Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC
                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************** DESCRIPTION OF STUDY **************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                  *
* SUBBASIN # 34                                                           *
* 2469.01A - OCTOBER 2006                                                 *
 ***************************************************************************

  FILE NAME: MERR34.DAT
  TIME/DATE OF STUDY: 14:01 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   3403.00 TO NODE   3402.80 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1575.00
  DOWNSTREAM ELEVATION(FEET) =   1520.00
  ELEVATION DIFFERENCE(FEET) =     55.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.427
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.747
SUBAREA RUNOFF(CFS) =       0.89
TOTAL AREA(ACRES) =       0.29   TOTAL RUNOFF(CFS) =       0.89

****************************************************************************
FLOW PROCESS FROM NODE   3402.80 TO NODE   3402.60 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1520.00  DOWNSTREAM(FEET) =   1440.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   250.00   CHANNEL SLOPE =  0.3200
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .2000 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =       0.89
FLOW VELOCITY(FEET/SEC) =   2.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.66   Tc(MIN.) =   7.09
LONGEST FLOWPATH FROM NODE   3403.00 TO NODE   3402.60 =   325.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   3402.80 TO NODE   3402.60 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.361
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
SUBAREA AREA(ACRES) =     1.30   SUBAREA RUNOFF(CFS) =     3.35
TOTAL AREA(ACRES) =       1.59   TOTAL RUNOFF(CFS) =     4.10
TC(MIN.) =   7.09

****************************************************************************
FLOW PROCESS FROM NODE   3402.60 TO NODE   3402.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1440.00  DOWNSTREAM(FEET) =   1330.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   655.00   CHANNEL SLOPE =  0.1679
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1440 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       4.10
FLOW VELOCITY(FEET/SEC) =   3.40 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   3.21   Tc(MIN.) =  10.30
LONGEST FLOWPATH FROM NODE   3403.00 TO NODE   3402.00 =   980.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   3402.60 TO NODE   3402.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.785
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
SUBAREA AREA(ACRES) =    14.27   SUBAREA RUNOFF(CFS) =    28.89
TOTAL AREA(ACRES) =      15.86   TOTAL RUNOFF(CFS) =    32.11
TC(MIN.) =  10.30
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   3402.00 TO NODE   3401.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1330.00  DOWNSTREAM(FEET) =    890.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1965.00   CHANNEL SLOPE =  0.2239
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1713 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     32.11
  FLOW VELOCITY(FEET/SEC) =   7.36 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.45   Tc(MIN.) =  14.75
  LONGEST FLOWPATH FROM NODE   3403.00 TO NODE   3401.00 =  2945.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3402.00 TO NODE   3401.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.589
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   71.31   SUBAREA RUNOFF(CFS) =  114.53
  TOTAL AREA(ACRES) =     87.17   TOTAL RUNOFF(CFS) =  140.00
  TC(MIN.) =  14.75

****************************************************************************
  FLOW PROCESS FROM NODE   3401.00 TO NODE     34.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    890.00  DOWNSTREAM(FEET) =    805.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   525.00   CHANNEL SLOPE =  0.1619
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1410 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    140.00
  FLOW VELOCITY(FEET/SEC) =  10.90 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.80   Tc(MIN.) =  15.56
  LONGEST FLOWPATH FROM NODE   3403.00 TO NODE     34.00 =  3470.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3401.00 TO NODE     34.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.435
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3617
  SUBAREA AREA(ACRES) =   10.38   SUBAREA RUNOFF(CFS) =   21.17
  TOTAL AREA(ACRES) =     97.55   TOTAL RUNOFF(CFS) =  156.47
  TC(MIN.) =  15.56
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =     97.55  TC(MIN.) =     15.56
  PEAK FLOW RATE(CFS)    =    156.47
============================================================================
============================================================================
```

END OF RATIONAL METHOD ANALYSIS

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www.fuscoe.com

Job Name:
Merriam Mountains - Existing Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR35
Page 1

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
3502	3501.8	2	1,150.0	1,085.0	75.0	0.35	0.43	
3501.8	3501.6	5	1,085.0	1,035.0	300.0			
3501.8	3501.6	8				0.35	2.65	
3501.6	3501	5	1,035.0	905.0	540.0			
3501.6	3501	8				0.46	6.62	
3501	35	5	905.0	810.0	1,300.0			
3501	35	8				0.425	37.33	
							47.03	Total Area

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

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            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
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         (c) Copyright 1982-2004 Advanced Engineering Software (aes)
             Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC
                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                            (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - EXISTING HYDROLOGY                                 *
* SUBBASIN # 35                                                          *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR35.DAT
  TIME/DATE OF STUDY: 14:02 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   3502.00 TO NODE   3501.80 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1150.00
  DOWNSTREAM ELEVATION(FEET) =   1085.00
  ELEVATION DIFFERENCE(FEET) =     65.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.427
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.747
SUBAREA RUNOFF(CFS) =      1.32
TOTAL AREA(ACRES) =      0.43   TOTAL RUNOFF(CFS) =      1.32

****************************************************************************
FLOW PROCESS FROM NODE   3501.80 TO NODE   3501.60 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1085.00  DOWNSTREAM(FEET) =   1035.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.1667
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1433 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =      1.32
FLOW VELOCITY(FEET/SEC) =   2.32 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.15   Tc(MIN.) =   7.58
LONGEST FLOWPATH FROM NODE   3502.00 TO NODE   3501.60 =   375.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   3501.80 TO NODE   3501.60 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.052
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
SUBAREA AREA(ACRES) =     2.65   SUBAREA RUNOFF(CFS) =     6.54
TOTAL AREA(ACRES) =       3.08   TOTAL RUNOFF(CFS) =     7.60
TC(MIN.) =   7.58

****************************************************************************
FLOW PROCESS FROM NODE   3501.60 TO NODE   3501.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1035.00  DOWNSTREAM(FEET) =    905.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   540.00   CHANNEL SLOPE =  0.2407
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1769 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =      7.60
FLOW VELOCITY(FEET/SEC) =   4.63 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.94   Tc(MIN.) =   9.52
LONGEST FLOWPATH FROM NODE   3502.00 TO NODE   3501.00 =   915.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   3501.60 TO NODE   3501.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.086
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4600
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4251
SUBAREA AREA(ACRES) =     6.62   SUBAREA RUNOFF(CFS) =    18.53
TOTAL AREA(ACRES) =       9.70   TOTAL RUNOFF(CFS) =    25.09
TC(MIN.) =   9.52

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

```
  FLOW PROCESS FROM NODE   3501.00 TO NODE     35.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    905.00  DOWNSTREAM(FEET) =    810.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1300.00   CHANNEL SLOPE =  0.0731
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0731 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     25.09
  FLOW VELOCITY(FEET/SEC) =   4.43 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.89   Tc(MIN.) =  14.42
  LONGEST FLOWPATH FROM NODE   3502.00 TO NODE     35.00 =  2215.00 FEET.

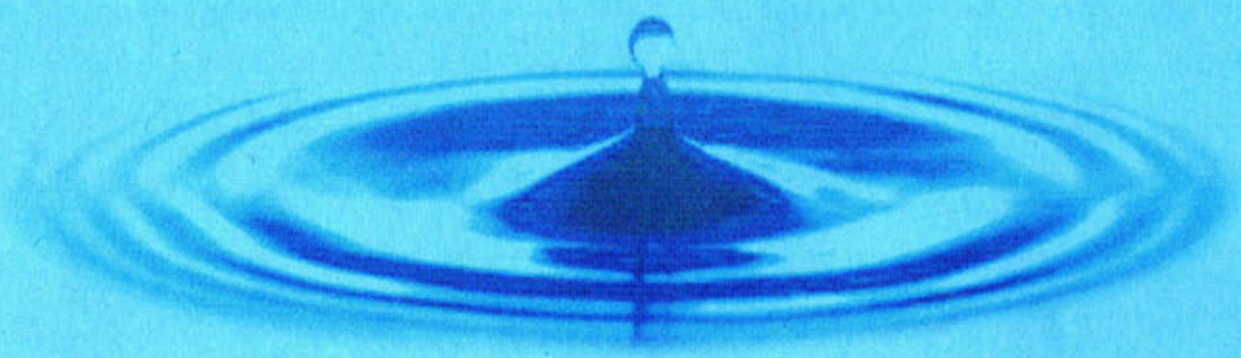
****************************************************************************
  FLOW PROCESS FROM NODE   3501.00 TO NODE     35.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.657
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .4250
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4250
  SUBAREA AREA(ACRES) =   37.33   SUBAREA RUNOFF(CFS) =   73.89
  TOTAL AREA(ACRES) =     47.03   TOTAL RUNOFF(CFS) =   93.10
  TC(MIN.) =  14.42
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =     47.03  TC(MIN.) =     14.42
  PEAK FLOW RATE(CFS)    =     93.10
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

APPENDIX A

AES – 2005
Rational Method Hydrology

Proposed Condition

BASIN A



FUSCOE
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www.fuscoe.com

Job Name:
Merriam Mountains - Proposed Hydrology

Job #:
2469.01A

Date:
October 2006

Run Name:
MER01-PD
Page 1

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Land Use	Runoff Coeff.	Area (ac.)	Comments
114	113	2	1,225.0	1,205.0	80.0		0.45	0.32	Initial Runoff
113	112	5	1,205.0	1,127.0	292.0				Channel Flow
113	112	8					0.45	2.16	Add Area
112	111	5	1,127.0	1,024.0	685.0				
112	111	8					0.40	7.71	
111	110	5	1,024.0	795.0	908.0				
111	110	8					0.27	9.01	
110	103	5	795.0	700.0	570.0				
110	103	8					0.77	6.24	
103	103	1							1 of 2
108	107	2	1,150.0	1,115.0	110.0		0.35	0.23	
107	106	5	1,115.0	810.0	1,017.0				
107	106	8					0.31	9.24	
106	104	3	810.0	770.0	250.0				
105	104	8					0.27	6.68	
104	103	5	770.0	700.0	575.0				
104	103	8					0.77	8.26	
103	103	1							2 of 2
103	101	5	700.0	585.0	663.0				
103	101	8					0.25	8.59	
102	101	8					0.25	6.06	
101	100	5	585.0	570.0	220.0				
101	100	8					0.25	7.37	
100	100	7							DET OUT Q = 84.06
100	1	4	555.4	504.8	561.0				EX. 48" CSP Caltrans
									Storm Drain
								71.87	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2004 Advanced Engineering Software (aes)
            Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC.
                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                            (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - PROPOSED HYDROLOGY                                 *
* SUBBASIN # 1 - WITH DETENTION ROUTING                                  *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MER01-PD.DAT
  TIME/DATE OF STUDY: 10:24 09/29/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    113.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    80.00
  UPSTREAM ELEVATION(FEET) =   1225.00
  DOWNSTREAM ELEVATION(FEET) =   1205.00
  ELEVATION DIFFERENCE(FEET) =     20.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.858
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) =      1.33
TOTAL AREA(ACRES) =      0.32   TOTAL RUNOFF(CFS) =      1.33

****************************************************************************
FLOW PROCESS FROM NODE    113.00 TO NODE    112.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1205.00  DOWNSTREAM(FEET) =   1127.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   292.00   CHANNEL SLOPE =  0.2671
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1857 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =      1.33
FLOW VELOCITY(FEET/SEC) =   2.65 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.83   Tc(MIN.) =   6.69
LONGEST FLOWPATH FROM NODE    114.00 TO NODE    112.00 =   372.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    113.00 TO NODE    112.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.641
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4500
SUBAREA AREA(ACRES) =    2.16   SUBAREA RUNOFF(CFS) =    7.43
TOTAL AREA(ACRES) =      2.48   TOTAL RUNOFF(CFS) =    8.53
TC(MIN.) =   6.69

****************************************************************************
FLOW PROCESS FROM NODE    112.00 TO NODE    111.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1127.00  DOWNSTREAM(FEET) =   1024.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   685.00   CHANNEL SLOPE =  0.1504
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1352 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =      8.53
FLOW VELOCITY(FEET/SEC) =   4.20 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.72   Tc(MIN.) =   9.41
LONGEST FLOWPATH FROM NODE    114.00 TO NODE    111.00 =  1057.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    112.00 TO NODE    111.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.134
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4000
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4122
SUBAREA AREA(ACRES) =    7.71   SUBAREA RUNOFF(CFS) =   18.92
TOTAL AREA(ACRES) =     10.19   TOTAL RUNOFF(CFS) =   25.76
TC(MIN.) =   9.41
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    110.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1024.00  DOWNSTREAM(FEET) =    795.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   908.00   CHANNEL SLOPE =  0.2522
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1807 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     25.76
  FLOW VELOCITY(FEET/SEC) =   7.02 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.15   Tc(MIN.) =  11.56
  LONGEST FLOWPATH FROM NODE    114.00 TO NODE    110.00 =  1965.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    110.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.370
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3455
  SUBAREA AREA(ACRES) =    9.01   SUBAREA RUNOFF(CFS) =   13.06
  TOTAL AREA(ACRES) =     19.20   TOTAL RUNOFF(CFS) =   35.62
  TC(MIN.) =  11.56

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    103.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    795.00  DOWNSTREAM(FEET) =    700.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   570.00   CHANNEL SLOPE =  0.1667
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1433 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     35.62
  FLOW VELOCITY(FEET/SEC) =   6.97 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.36   Tc(MIN.) =  12.93
  LONGEST FLOWPATH FROM NODE    114.00 TO NODE    103.00 =  2535.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.997
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .7700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4496
  SUBAREA AREA(ACRES) =    6.24   SUBAREA RUNOFF(CFS) =   24.01
  TOTAL AREA(ACRES) =     25.44   TOTAL RUNOFF(CFS) =   57.16
  TC(MIN.) =  12.93

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
```

```
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  12.93
  RAINFALL INTENSITY(INCH/HR) =   5.00
  TOTAL STREAM AREA(ACRES) =    25.44
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     57.16

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    107.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   110.00
  UPSTREAM ELEVATION(FEET) =   1150.00
  DOWNSTREAM ELEVATION(FEET) =   1115.00
  ELEVATION DIFFERENCE(FEET) =     35.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      0.64
  TOTAL AREA(ACRES) =      0.23   TOTAL RUNOFF(CFS) =      0.64

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    106.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1115.00  DOWNSTREAM(FEET) =    810.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1017.00   CHANNEL SLOPE =  0.2999
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1950 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.64
  FLOW VELOCITY(FEET/SEC) =   2.47 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.85   Tc(MIN.) =  13.12
  LONGEST FLOWPATH FROM NODE    108.00 TO NODE    106.00 =  1127.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    106.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.949
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3100
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3110
  SUBAREA AREA(ACRES) =    9.24   SUBAREA RUNOFF(CFS) =   14.18
  TOTAL AREA(ACRES) =      9.47   TOTAL RUNOFF(CFS) =   14.58
  TC(MIN.) =  13.12

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    104.00 IS CODE =  37
----------------------------------------------------------------------------
  >>>>>COMPUTE CULVERT TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED CULVERT SIZE<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   810.00  DOWNSTREAM(FEET) =   770.00
  FLOW LENGTH(FEET) =   250.00   MANNING'S N =  0.014
  Notes:
    1. Reference: "Hydraulic Charts for the Selection of
       Highway Culverts", Hydraulic Engineering Circular No. 5,
       December 1965, Federal Highway Administration.
    2. INLET control for all Culvert Analysis.
    3. Headwater depth is ASSUMED to be 3 FEET above the culvert soffit.
  ESTIMATED CONCRETE PIPE CULVERT DIAMETER(FEET) =   1.50
  NUMBER OF BARREL(S) =   1
  CULVERT-FLOW VELOCITY(FEET/SEC.) =   8.25
  CULVERT-FLOW(CFS) =     14.58
  CULVERT-FLOW TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =  13.63
  LONGEST FLOWPATH FROM NODE    108.00 TO NODE    104.00 =  1377.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    104.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.830
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2940
  SUBAREA AREA(ACRES) =    6.68   SUBAREA RUNOFF(CFS) =    8.71
  TOTAL AREA(ACRES) =     16.15   TOTAL RUNOFF(CFS) =   22.94
  TC(MIN.) =  13.63

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    103.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    770.00  DOWNSTREAM(FEET) =    700.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   575.00   CHANNEL SLOPE =  0.1217
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1162 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     22.94
  FLOW VELOCITY(FEET/SEC) =   5.42 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.77   Tc(MIN.) =  15.40
  LONGEST FLOWPATH FROM NODE    108.00 TO NODE    103.00 =  1952.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.464
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .7700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4551
  SUBAREA AREA(ACRES) =    8.26   SUBAREA RUNOFF(CFS) =   28.39
  TOTAL AREA(ACRES) =     24.41   TOTAL RUNOFF(CFS) =   49.59
  TC(MIN.) =  15.40

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  15.40
  RAINFALL INTENSITY(INCH/HR) =   4.46
  TOTAL STREAM AREA(ACRES) =    24.41
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     49.59

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       57.16    12.93        4.997        25.44
     2       49.59    15.40        4.464        24.41

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       98.80    12.93       4.997
     2      100.66    15.40       4.464

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    100.66   Tc(MIN.) =   15.40
  TOTAL AREA(ACRES) =     49.85
  LONGEST FLOWPATH FROM NODE    114.00 TO NODE    103.00 =  2535.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    101.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    700.00  DOWNSTREAM(FEET) =    585.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   663.00   CHANNEL SLOPE =  0.1735
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1467 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    100.66
  FLOW VELOCITY(FEET/SEC) =   9.96 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.11   Tc(MIN.) =  16.50
  LONGEST FLOWPATH FROM NODE    114.00 TO NODE    101.00 =  3198.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    101.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.269
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4225
  SUBAREA AREA(ACRES) =    8.59   SUBAREA RUNOFF(CFS) =    9.17
  TOTAL AREA(ACRES) =     58.44   TOTAL RUNOFF(CFS) =  105.41
  TC(MIN.) =  16.50

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    101.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.269
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4063
SUBAREA AREA(ACRES) =    6.06   SUBAREA RUNOFF(CFS) =    6.47
TOTAL AREA(ACRES) =     64.50   TOTAL RUNOFF(CFS) =  111.87
TC(MIN.) =  16.50

****************************************************************************
FLOW PROCESS FROM NODE    101.00 TO NODE    100.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    585.00  DOWNSTREAM(FEET) =    570.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   220.00   CHANNEL SLOPE =  0.0682
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .0682 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =    111.87
FLOW VELOCITY(FEET/SEC) =   7.03 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   0.52   Tc(MIN.) =  17.03
LONGEST FLOWPATH FROM NODE    114.00 TO NODE    100.00 =  3418.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    101.00 TO NODE    100.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.184
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3903
SUBAREA AREA(ACRES) =    7.37   SUBAREA RUNOFF(CFS) =    7.71
TOTAL AREA(ACRES) =     71.87   TOTAL RUNOFF(CFS) =  117.36
TC(MIN.) =  17.03

****************************************************************************
FLOW PROCESS FROM NODE    100.00 TO NODE    100.00 IS CODE =   7
----------------------------------------------------------------------------
>>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
USER-SPECIFIED VALUES ARE AS FOLLOWS:
TC(MIN) =  17.55   RAIN INTENSITY(INCH/HOUR) =  4.10
TOTAL AREA(ACRES) =    71.87   TOTAL RUNOFF(CFS) =     84.06

****************************************************************************
FLOW PROCESS FROM NODE    100.00 TO NODE      1.00 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   555.40  DOWNSTREAM(FEET) =   504.80
FLOW LENGTH(FEET) =   561.00   MANNING'S N =  0.024
DEPTH OF FLOW IN  48.0 INCH PIPE IS  20.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  16.42
GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     84.06
PIPE TRAVEL TIME(MIN.) =   0.57    Tc(MIN.) =  18.12
LONGEST FLOWPATH FROM NODE    114.00 TO NODE      1.00 =  3979.00 FEET.
============================================================================
END OF STUDY SUMMARY:
```

```
  TOTAL AREA(ACRES)      =     71.87  TC(MIN.) =     18.12
  PEAK FLOW RATE(CFS)    =     84.06
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Proposed Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR02-p
Page 1

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Friction Coeff.	Area (ac.)	Comments
202	201.5	2	765.0	740.0	75.0	0.25	0.27	Initial Runnoff
201.5	201	5	740.0	600.0	300.0			Channel Flow
201.5	201	8				0.49	4.18	Add Area
201	200	5	600.0	590.0	280.0			
201	200	8				0.28	8.71	
200	2	4	574.4	515.4	480.0			30" CSP Caltrans Pipe
							13.16	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
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            Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

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                       SAN DIEGO, CALIFORNIA 92122
                            (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - PROPOSED HYDROLOGY                                 *
* SUBBASIN # 2                                                           *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR02-P.DAT
  TIME/DATE OF STUDY: 14:43 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    201.50 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    765.00
  DOWNSTREAM ELEVATION(FEET) =    740.00
  ELEVATION DIFFERENCE(FEET) =     25.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.151
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.068
SUBAREA RUNOFF(CFS) =       0.54
TOTAL AREA(ACRES) =       0.27   TOTAL RUNOFF(CFS) =       0.54

****************************************************************************
FLOW PROCESS FROM NODE    201.50 TO NODE    201.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    740.00  DOWNSTREAM(FEET) =    600.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.4667
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .2217 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =       0.54
FLOW VELOCITY(FEET/SEC) =   2.64 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.90   Tc(MIN.) =   8.05
LONGEST FLOWPATH FROM NODE    202.00 TO NODE    201.00 =   375.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    201.50 TO NODE    201.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.784
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4900
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4754
SUBAREA AREA(ACRES) =     4.18   SUBAREA RUNOFF(CFS) =   13.90
TOTAL AREA(ACRES) =       4.45   TOTAL RUNOFF(CFS) =   14.35
TC(MIN.) =   8.05

****************************************************************************
FLOW PROCESS FROM NODE    201.00 TO NODE    200.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    600.00  DOWNSTREAM(FEET) =    590.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.0357
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .0357 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =      14.35
FLOW VELOCITY(FEET/SEC) =   2.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.82   Tc(MIN.) =   9.86
LONGEST FLOWPATH FROM NODE    202.00 TO NODE    200.00 =   655.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    201.00 TO NODE    200.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.950
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2800
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3461
SUBAREA AREA(ACRES) =     8.71   SUBAREA RUNOFF(CFS) =   14.51
TOTAL AREA(ACRES) =      13.16   TOTAL RUNOFF(CFS) =   27.10
TC(MIN.) =   9.86
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     200.00 TO NODE      2.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   574.40  DOWNSTREAM(FEET) =   515.40
  FLOW LENGTH(FEET) =   480.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  12.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.89
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     27.10
  PIPE TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =  10.44
  LONGEST FLOWPATH FROM NODE    202.00 TO NODE      2.00 =  1135.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =     13.16  TC(MIN.) =     10.44
  PEAK FLOW RATE(CFS)    =     27.10
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name: Merriam Mountains - Proposed Hydrology
Date: October 2006
Job #: 2469.01A
Run Name: MERR03-p
Page 1

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
350.2	350.1	2	1,385.0	1,373.0	55.0	0.35	0.05	
350.1	350	5	1,373.0	888.0	1,718.1			
350.1	350	8				0.27	19.21	
350	350	1						1 of 2, con 1
351.4	351.3	2	1,585.0	1,538.0	85.0	0.35	0.08	
351.3	351.2	5	1,538.0	1,190.0	1,021.0			
351.3	351.2	8				0.35	8.07	
351.2	351.1	5	1,190.0	1,005.0	817.0			
351.2	351.1	8				0.30	17.76	
351.1	350	5	1,005.0	888.0	495.0			
351.1	350	8				0.25	5.68	
350	350	1						2 of 2, con 2
350	340	5	888.0	851.0	395.0			
350	340	8				0.25	11.88	
340	330	5	851.0	814.0	545.0			
340	330	8				0.25	6.57	
330	330	1						1 of 3, con 2
331.2	331.1	2	1,622.0	1,585.0	87.0	0.35	0.16	
331.1	330	5	1,585.0	814.0	2,844.0			
331.1	330	8				0.31	42.74	
330	330	1						2 of 3, con 2
332.3	332.2	2	1,375.0	1,368.0	96.8	0.35	0.06	
332.2	332.2	5	1,368.0	980.0	1,350.1			
332.2	332.2	8				0.35	17.65	
332.1	330	5	980.0	814.0	1,361.0			
332.1	330	8				0.35	13.94	
330	330	1						3 of 3, con 2
330	320	5	814.0	600.0	871.0			
330	320	8				0.28	38.87	
320	310	4	600.0	537.0	500.0			Ex. 84" SSPP Caltrans
320	310	8				0.29	16.93	Weighted C Factor
310	3	4	537.0	522.0	630.0			Ex. 84" SSPP Caltrans
								Storm Drain System
							199.65	Total Area

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

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            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
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 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - PROPOSED HYDROLOGY                                 *
* SUBBASIN # 3                                                           *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR03-P.DAT
  TIME/DATE OF STUDY: 13:40 10/02/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE    350.20 TO NODE    350.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    55.00
  UPSTREAM ELEVATION(FEET) =   1385.00
  DOWNSTREAM ELEVATION(FEET) =   1373.00
  ELEVATION DIFFERENCE(FEET) =     12.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.647
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) =      0.16
TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
FLOW PROCESS FROM NODE    350.10 TO NODE    350.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1373.00  DOWNSTREAM(FEET) =    888.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1718.10   CHANNEL SLOPE =  0.2823
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1906 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =      0.16
FLOW VELOCITY(FEET/SEC) =   2.44 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =  11.71   Tc(MIN.) =  16.36
LONGEST FLOWPATH FROM NODE    350.20 TO NODE    350.00 =  1773.10 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    350.00 TO NODE    350.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.293
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2700
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.2702
SUBAREA AREA(ACRES) =   19.21   SUBAREA RUNOFF(CFS) =   22.27
TOTAL AREA(ACRES) =     19.26   TOTAL RUNOFF(CFS) =   22.34
TC(MIN.) =  16.36

****************************************************************************
FLOW PROCESS FROM NODE    350.00 TO NODE    350.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =  16.36
RAINFALL INTENSITY(INCH/HR) =   4.29
TOTAL STREAM AREA(ACRES) =    19.26
PEAK FLOW RATE(CFS) AT CONFLUENCE =     22.34

****************************************************************************
FLOW PROCESS FROM NODE    351.40 TO NODE    351.30 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) =   0
INITIAL SUBAREA FLOW-LENGTH(FEET) =    85.00
UPSTREAM ELEVATION(FEET) =   1585.00
DOWNSTREAM ELEVATION(FEET) =   1538.00
ELEVATION DIFFERENCE(FEET) =     47.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.778
WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.401
SUBAREA RUNOFF(CFS) =      0.24
```

```
  TOTAL AREA(ACRES) =       0.08   TOTAL RUNOFF(CFS) =       0.24

****************************************************************************
  FLOW PROCESS FROM NODE    351.30 TO NODE    351.20 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1538.00  DOWNSTREAM(FEET) =   1190.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1021.00   CHANNEL SLOPE =  0.3408
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2036 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.24
  FLOW VELOCITY(FEET/SEC) =   2.53 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.73   Tc(MIN.) =  12.51
  LONGEST FLOWPATH FROM NODE    351.40 TO NODE    351.20 =  1106.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    351.20 TO NODE    351.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.104
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =     8.07   SUBAREA RUNOFF(CFS) =   14.42
  TOTAL AREA(ACRES) =       8.15   TOTAL RUNOFF(CFS) =   14.56
  TC(MIN.) =  12.51

****************************************************************************
  FLOW PROCESS FROM NODE    351.20 TO NODE    351.10 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1190.00  DOWNSTREAM(FEET) =   1005.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   817.00   CHANNEL SLOPE =  0.2264
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1721 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      14.56
  FLOW VELOCITY(FEET/SEC) =   5.67 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.40   Tc(MIN.) =  14.91
  LONGEST FLOWPATH FROM NODE    351.40 TO NODE    351.10 =  1923.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    351.10 TO NODE    351.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.557
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3157
  SUBAREA AREA(ACRES) =    17.76   SUBAREA RUNOFF(CFS) =   24.28
  TOTAL AREA(ACRES) =      25.91   TOTAL RUNOFF(CFS) =   37.28
  TC(MIN.) =  14.91

****************************************************************************
  FLOW PROCESS FROM NODE    351.10 TO NODE    350.00 IS CODE =  53
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1005.00  DOWNSTREAM(FEET) =    888.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   495.00   CHANNEL SLOPE =  0.2364
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1755 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     37.28
  FLOW VELOCITY(FEET/SEC) =   7.83 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.05   Tc(MIN.) =  15.97
  LONGEST FLOWPATH FROM NODE    351.40 TO NODE    350.00 =  2418.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    350.00 TO NODE    350.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.361
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3039
  SUBAREA AREA(ACRES) =    5.68   SUBAREA RUNOFF(CFS) =    6.19
  TOTAL AREA(ACRES) =     31.59   TOTAL RUNOFF(CFS) =   41.86
  TC(MIN.) =  15.97

****************************************************************************
  FLOW PROCESS FROM NODE    350.00 TO NODE    350.00 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.) =  15.97
  RAINFALL INTENSITY(INCH/HR) =   4.36
  TOTAL STREAM AREA(ACRES) =    31.59
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     41.86

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       22.34    16.36        4.293         19.26
     2       41.86    15.97        4.361         31.59

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       63.67    15.97       4.361
     2       63.55    16.36       4.293

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     63.67   Tc(MIN.) =   15.97
  TOTAL AREA(ACRES) =     50.85
  LONGEST FLOWPATH FROM NODE    351.40 TO NODE    350.00 =  2418.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    350.00 TO NODE    340.00 IS CODE =  53
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    888.00  DOWNSTREAM(FEET) =    851.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   395.00   CHANNEL SLOPE =  0.0937
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0937 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     63.67
  FLOW VELOCITY(FEET/SEC) =   6.83 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.96   Tc(MIN.) =  16.93
  LONGEST FLOWPATH FROM NODE    351.40 TO NODE    340.00 =  2813.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.199
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2834
  SUBAREA AREA(ACRES) =   11.88   SUBAREA RUNOFF(CFS) =   12.47
  TOTAL AREA(ACRES) =     62.73   TOTAL RUNOFF(CFS) =   74.64
  TC(MIN.) =  16.93

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    330.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    851.00  DOWNSTREAM(FEET) =    814.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   545.00   CHANNEL SLOPE =  0.0679
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0679 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     74.64
  FLOW VELOCITY(FEET/SEC) =   6.13 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.48   Tc(MIN.) =  18.41
  LONGEST FLOWPATH FROM NODE    351.40 TO NODE    330.00 =  3358.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    330.00 TO NODE    330.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.978
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2802
  SUBAREA AREA(ACRES) =    6.57   SUBAREA RUNOFF(CFS) =    6.53
  TOTAL AREA(ACRES) =     69.30   TOTAL RUNOFF(CFS) =   77.24
  TC(MIN.) =  18.41

****************************************************************************
  FLOW PROCESS FROM NODE    330.00 TO NODE    330.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  18.41
```

```
  RAINFALL INTENSITY(INCH/HR) =   3.98
  TOTAL STREAM AREA(ACRES) =    69.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     77.24

****************************************************************************
  FLOW PROCESS FROM NODE    331.20 TO NODE    331.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    87.00
  UPSTREAM ELEVATION(FEET) =   1622.00
  DOWNSTREAM ELEVATION(FEET) =   1585.00
  ELEVATION DIFFERENCE(FEET) =     37.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.845
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.338
  SUBAREA RUNOFF(CFS) =      0.47
  TOTAL AREA(ACRES) =      0.16   TOTAL RUNOFF(CFS) =      0.47

****************************************************************************
  FLOW PROCESS FROM NODE    331.10 TO NODE    330.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1585.00  DOWNSTREAM(FEET) =    814.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2844.00   CHANNEL SLOPE =  0.2711
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1870 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.47
  FLOW VELOCITY(FEET/SEC) =   2.42 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  19.57   Tc(MIN.) =  25.42
  LONGEST FLOWPATH FROM NODE    331.20 TO NODE    330.00 =  2931.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    330.00 TO NODE    330.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.231
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3100
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3101
  SUBAREA AREA(ACRES) =   42.74   SUBAREA RUNOFF(CFS) =   42.81
  TOTAL AREA(ACRES) =     42.90   TOTAL RUNOFF(CFS) =   42.99
  TC(MIN.) =  25.42

****************************************************************************
  FLOW PROCESS FROM NODE    330.00 TO NODE    330.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  25.42
  RAINFALL INTENSITY(INCH/HR) =   3.23
  TOTAL STREAM AREA(ACRES) =    42.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     42.99
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    332.30 TO NODE    332.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    96.80
  UPSTREAM ELEVATION(FEET) =   1375.00
  DOWNSTREAM ELEVATION(FEET) =   1368.00
  ELEVATION DIFFERENCE(FEET) =      7.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.869
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.514
  SUBAREA RUNOFF(CFS) =      0.16
  TOTAL AREA(ACRES) =      0.06   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
  FLOW PROCESS FROM NODE    332.20 TO NODE    332.10 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1368.00  DOWNSTREAM(FEET) =    980.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1273.00   CHANNEL SLOPE =  0.3048
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1962 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.16
  FLOW VELOCITY(FEET/SEC) =   2.48 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   8.55   Tc(MIN.) =  15.42
  LONGEST FLOWPATH FROM NODE    332.30 TO NODE    332.10 =  1369.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    332.10 TO NODE    332.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.459
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    17.65   SUBAREA RUNOFF(CFS) =   27.55
  TOTAL AREA(ACRES) =      17.71   TOTAL RUNOFF(CFS) =   27.64
  TC(MIN.) =  15.42

****************************************************************************
  FLOW PROCESS FROM NODE    332.10 TO NODE    330.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    980.00  DOWNSTREAM(FEET) =    814.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1361.00   CHANNEL SLOPE =  0.1220
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1163 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     27.64
  FLOW VELOCITY(FEET/SEC) =   5.77 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.93   Tc(MIN.) =  19.35
  LONGEST FLOWPATH FROM NODE    332.30 TO NODE    330.00 =  2730.80 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    330.00 TO NODE    330.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.852
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   13.94   SUBAREA RUNOFF(CFS) =   18.79
  TOTAL AREA(ACRES) =     31.65   TOTAL RUNOFF(CFS) =   42.67
  TC(MIN.) =  19.35

****************************************************************************
  FLOW PROCESS FROM NODE    330.00 TO NODE    330.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =  19.35
  RAINFALL INTENSITY(INCH/HR) =   3.85
  TOTAL STREAM AREA(ACRES) =    31.65
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     42.67

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       77.24    18.41        3.978         69.30
     2       42.99    25.42        3.231         42.90
     3       42.67    19.35        3.852         31.65

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1      148.97    18.41       3.978
     2      150.20    19.35       3.852
     3      141.52    25.42       3.231

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    150.20   Tc(MIN.) =   19.35
  TOTAL AREA(ACRES) =    143.85
  LONGEST FLOWPATH FROM NODE    351.40 TO NODE    330.00 =  3358.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    330.00 TO NODE    320.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    814.00  DOWNSTREAM(FEET) =    600.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   871.00   CHANNEL SLOPE =  0.2457
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1786 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    150.20
  FLOW VELOCITY(FEET/SEC) =  12.56 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.16   Tc(MIN.) =  20.51
  LONGEST FLOWPATH FROM NODE    351.40 TO NODE    320.00 =  4229.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     320.00 TO NODE     320.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.710
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2993
  SUBAREA AREA(ACRES) =    38.87   SUBAREA RUNOFF(CFS) =   40.38
  TOTAL AREA(ACRES) =     182.72   TOTAL RUNOFF(CFS) =  202.89
  TC(MIN.) =  20.51

****************************************************************************
  FLOW PROCESS FROM NODE     320.00 TO NODE     310.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   600.00  DOWNSTREAM(FEET) =   537.00
  FLOW LENGTH(FEET) =   500.00   MANNING'S N =  0.015
  DEPTH OF FLOW IN  84.0 INCH PIPE IS  18.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  31.75
  GIVEN PIPE DIAMETER(INCH) =  84.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    202.89
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =  20.77
  LONGEST FLOWPATH FROM NODE     351.40 TO NODE     310.00 =  4729.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     310.00 TO NODE     310.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.680
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2985
  SUBAREA AREA(ACRES) =    16.93   SUBAREA RUNOFF(CFS) =   18.07
  TOTAL AREA(ACRES) =     199.65   TOTAL RUNOFF(CFS) =  219.30
  TC(MIN.) =  20.77

****************************************************************************
  FLOW PROCESS FROM NODE     310.00 TO NODE       3.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   537.00  DOWNSTREAM(FEET) =   522.00
  FLOW LENGTH(FEET) =   630.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  84.0 INCH PIPE IS  27.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.84
  GIVEN PIPE DIAMETER(INCH) =  84.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    219.30
  PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =  21.30
  LONGEST FLOWPATH FROM NODE     351.40 TO NODE       3.00 =  5359.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =    199.65  TC(MIN.) =     21.30
  PEAK FLOW RATE(CFS)    =    219.30
============================================================================
```

==========

END OF RATIONAL METHOD ANALYSIS

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Job Name:
Merriam Mountains - Proposed Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR04-P

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
402	401.8	2	980.0	950.0	110.0	0.25	0.14	Initial Runoff
401.8	401.6	5	950.0	685.0	674.0			Channel Flow
401.8	401.6	8				0.25	3.46	Add Area
401.6	401	5	685.0	585.0	512.0			
401.6	401	8				0.25	8.04	
401	4	4	585.0	515.0	545.0			Ex. 30" CPS Caltrans
								Storm Drain System
							11.64	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
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                          Analysis prepared by:

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 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - PROPOSED HYDROLOGY                                 *
* SUBBASIN # 4                                                           *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR04-P.DAT
  TIME/DATE OF STUDY: 14:44 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    401.80 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   110.00
  UPSTREAM ELEVATION(FEET) =    980.00
  DOWNSTREAM ELEVATION(FEET) =    950.00
  ELEVATION DIFFERENCE(FEET) =     30.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.102
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
```

```
THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
(Reference: Table 3-1B of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.353
SUBAREA RUNOFF(CFS) =      0.26
TOTAL AREA(ACRES) =      0.14   TOTAL RUNOFF(CFS) =      0.26

****************************************************************************
FLOW PROCESS FROM NODE    401.80 TO NODE    401.60 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    950.00  DOWNSTREAM(FEET) =    685.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   674.00   CHANNEL SLOPE =  0.3932
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .2128 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =      0.26
FLOW VELOCITY(FEET/SEC) =   2.58 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   4.35   Tc(MIN.) =  11.45
LONGEST FLOWPATH FROM NODE    402.00 TO NODE    401.60 =   784.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    401.80 TO NODE    401.60 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.404
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
SUBAREA AREA(ACRES) =     3.46   SUBAREA RUNOFF(CFS) =     4.67
TOTAL AREA(ACRES) =       3.60   TOTAL RUNOFF(CFS) =     4.86
TC(MIN.) =  11.45

****************************************************************************
FLOW PROCESS FROM NODE    401.60 TO NODE    401.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    685.00  DOWNSTREAM(FEET) =    585.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   512.00   CHANNEL SLOPE =  0.1953
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1577 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =      4.86
FLOW VELOCITY(FEET/SEC) =   3.77 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.27   Tc(MIN.) =  13.72
LONGEST FLOWPATH FROM NODE    402.00 TO NODE    401.00 =  1296.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    401.60 TO NODE    401.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.810
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
SUBAREA AREA(ACRES) =     8.04   SUBAREA RUNOFF(CFS) =     9.67
```

```
  TOTAL AREA(ACRES) =     11.64   TOTAL RUNOFF(CFS) =   14.00
  TC(MIN.) =  13.72

****************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE      4.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   585.00  DOWNSTREAM(FEET) =   515.00
  FLOW LENGTH(FEET) =   545.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS   6.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.15
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     14.00
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =  14.22
  LONGEST FLOWPATH FROM NODE    402.00 TO NODE      4.00 =  1841.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     11.64  TC(MIN.) =     14.22
  PEAK FLOW RATE(CFS)   =     14.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Proposed Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR05-P

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
510.3	510.2	2	1,210.0	1,180.0	110.0	0.25	0.11	Initial Runoff
510.2	510.1	5	1,180.0	860.0	1,145.0			Channel Flow
510.2	510.1	8				0.25	10.24	Add Area
510.1	510	5	860.0	670.0	787.0			
510.1	510	8				0.25	9.05	
510	5.2	4	670.0	610.0	175.0			EX. 30" CSP Caltrans
5.2	5.1	4	610.0	575.0	225.0			Ex. 36" CSP
5.1	5.1	1						1 of 2
5.5	5.4	2	680.0	610.0	185.0	0.25	0.54	Runoff to 24" CSP/RCP
5.4	5.3	4	610.0	580.0	225.0			First segment 24" pipe
5.3	5.1	4	580.0	575.0	520.0			Second segment 24" pipe
5.1	5.1	1						2 of 2
5.1	5	4	575.0	550.0	100.0			36" CSP
5	5	1						1 of 1
504	503.8	2	1,460.0	1,440.0	75.0	0.35	0.21	Initial Runoff
503.8	503.6	5	1,440.0	1,380.0	300.0			Channel Flow
503.8	503.6	8				0.35	2.05	Add Area
503.6	503	5	1,380.0	965.0	1,225.0			
503.6	503	8				0.31	11.86	Weighted C Factor
503	502	5	965.0	665.0	1,635.0			
503	502	8				0.26	29.85	Weighted C Factor
502	501	5	665.0	625.0	540.0			
502	501.5	8				0.25	4.98	
501.5	501	4	625.0	575.0	400.0			Ex. 36" CSP Caltrans
501	5	4	575.0	550.0	110.0			Ex. 42" CSP Caltrans
5	5	1						2 of 2
							68.89	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
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             Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                              Analysis prepared by:

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                         SAN DIEGO, CALIFORNIA 92122
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 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - PROPOSED HYDROLOGY                                 *
* SUBBASIN # 5                                                           *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR05-P.DAT
  TIME/DATE OF STUDY: 12:08 10/16/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE    510.30 TO NODE    510.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   110.00
  UPSTREAM ELEVATION(FEET) =   1210.00
  DOWNSTREAM ELEVATION(FEET) =   1180.00
  ELEVATION DIFFERENCE(FEET) =     30.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.102
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
```

```
THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
(Reference: Table 3-1B of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.353
SUBAREA RUNOFF(CFS) =      0.20
TOTAL AREA(ACRES) =      0.11   TOTAL RUNOFF(CFS) =      0.20

****************************************************************************
FLOW PROCESS FROM NODE    510.20 TO NODE    510.10 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1180.00  DOWNSTREAM(FEET) =    860.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1145.00   CHANNEL SLOPE =  0.2795
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1898 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =      0.20
FLOW VELOCITY(FEET/SEC) =   2.44 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   7.82   Tc(MIN.) =  14.92
LONGEST FLOWPATH FROM NODE    510.30 TO NODE    510.10 =  1255.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    510.20 TO NODE    510.10 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.555
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
SUBAREA AREA(ACRES) =   10.24   SUBAREA RUNOFF(CFS) =   11.66
TOTAL AREA(ACRES) =     10.35   TOTAL RUNOFF(CFS) =   11.79
TC(MIN.) =  14.92

****************************************************************************
FLOW PROCESS FROM NODE    510.10 TO NODE    510.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    860.00  DOWNSTREAM(FEET) =    670.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   787.00   CHANNEL SLOPE =  0.2414
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1771 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =     11.79
FLOW VELOCITY(FEET/SEC) =   5.36 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.45   Tc(MIN.) =  17.37
LONGEST FLOWPATH FROM NODE    510.30 TO NODE    510.00 =  2042.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    510.10 TO NODE    510.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.130
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
SUBAREA AREA(ACRES) =    9.05   SUBAREA RUNOFF(CFS) =    9.34
```

```
  TOTAL AREA(ACRES) =     19.40   TOTAL RUNOFF(CFS) =   20.03
  TC(MIN.) =  17.37

****************************************************************************
  FLOW PROCESS FROM NODE    510.00 TO NODE      5.20 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   670.00  DOWNSTREAM(FEET) =   610.00
  FLOW LENGTH(FEET) =   175.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  30.0 INCH PIPE IS   8.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.50
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     20.03
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =  17.53
  LONGEST FLOWPATH FROM NODE    510.30 TO NODE      5.20 =  2217.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.20 TO NODE      5.10 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   610.00  DOWNSTREAM(FEET) =   575.00
  FLOW LENGTH(FEET) =   225.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  36.0 INCH PIPE IS   9.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.71
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     20.03
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =  17.80
  LONGEST FLOWPATH FROM NODE    510.30 TO NODE      5.10 =  2442.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.10 TO NODE      5.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  17.80
  RAINFALL INTENSITY(INCH/HR) =   4.07
  TOTAL STREAM AREA(ACRES) =    19.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     20.03

****************************************************************************
  FLOW PROCESS FROM NODE      5.50 TO NODE      5.40 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   185.00
  UPSTREAM ELEVATION(FEET) =    680.00
  DOWNSTREAM ELEVATION(FEET) =    610.00
  ELEVATION DIFFERENCE(FEET) =     70.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.102
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.353
```

```
  SUBAREA RUNOFF(CFS) =       0.99
  TOTAL AREA(ACRES) =       0.54   TOTAL RUNOFF(CFS) =       0.99

****************************************************************************
  FLOW PROCESS FROM NODE       5.40 TO NODE       5.30 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   610.00  DOWNSTREAM(FEET) =   580.00
  FLOW LENGTH(FEET) =   225.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   2.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.62
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.99
  PIPE TRAVEL TIME(MIN.) =   0.67    Tc(MIN.) =   7.77
  LONGEST FLOWPATH FROM NODE       5.50 TO NODE       5.30 =   410.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE       5.30 TO NODE       5.10 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   580.00  DOWNSTREAM(FEET) =   575.00
  FLOW LENGTH(FEET) =   520.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   3.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.43
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.99
  PIPE TRAVEL TIME(MIN.) =   2.53    Tc(MIN.) =  10.30
  LONGEST FLOWPATH FROM NODE       5.50 TO NODE       5.10 =   930.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE       5.10 TO NODE       5.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  10.30
  RAINFALL INTENSITY(INCH/HR) =   5.79
  TOTAL STREAM AREA(ACRES) =     0.54
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.99

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       20.03    17.80        4.065         19.40
     2        0.99    10.30        5.787          0.54

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       12.58    10.30       5.787
     2       20.73    17.80       4.065

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     20.73   Tc(MIN.) =   17.80
```

```
  TOTAL AREA(ACRES) =      19.94
  LONGEST FLOWPATH FROM NODE     510.30 TO NODE      5.10 =  2442.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.10 TO NODE      5.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   575.00  DOWNSTREAM(FEET) =   550.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  36.0 INCH PIPE IS   8.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.39
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      20.73
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =  17.90
  LONGEST FLOWPATH FROM NODE     510.30 TO NODE      5.00 =  2542.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  17.90
  RAINFALL INTENSITY(INCH/HR) =   4.05
  TOTAL STREAM AREA(ACRES) =    19.94
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     20.73

****************************************************************************
  FLOW PROCESS FROM NODE    504.00 TO NODE    503.80 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1460.00
  DOWNSTREAM ELEVATION(FEET) =   1440.00
  ELEVATION DIFFERENCE(FEET) =     20.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.427
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.747
  SUBAREA RUNOFF(CFS) =      0.64
  TOTAL AREA(ACRES) =      0.21   TOTAL RUNOFF(CFS) =      0.64

****************************************************************************
  FLOW PROCESS FROM NODE    503.80 TO NODE    503.60 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1440.00  DOWNSTREAM(FEET) =   1380.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.2000
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1600 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.64
  FLOW VELOCITY(FEET/SEC) =   2.24 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.23   Tc(MIN.) =   7.66
  LONGEST FLOWPATH FROM NODE    504.00 TO NODE    503.60 =   375.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    203.80 TO NODE    503.60 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.004
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    2.05   SUBAREA RUNOFF(CFS) =    5.03
  TOTAL AREA(ACRES) =      2.26   TOTAL RUNOFF(CFS) =    5.54
  TC(MIN.) =   7.66

****************************************************************************
  FLOW PROCESS FROM NODE    503.60 TO NODE    503.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1380.00  DOWNSTREAM(FEET) =    965.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1225.00   CHANNEL SLOPE =  0.3388
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2033 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      5.54
  FLOW VELOCITY(FEET/SEC) =   4.47 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.57   Tc(MIN.) =  12.23
  LONGEST FLOWPATH FROM NODE    504.00 TO NODE    503.00 =  1600.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    503.60 TO NODE    503.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.179
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3100
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3164
  SUBAREA AREA(ACRES) =   11.86   SUBAREA RUNOFF(CFS) =   19.04
  TOTAL AREA(ACRES) =     14.12   TOTAL RUNOFF(CFS) =   23.14
  TC(MIN.) =  12.23

****************************************************************************
  FLOW PROCESS FROM NODE    503.00 TO NODE    502.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    965.00  DOWNSTREAM(FEET) =    665.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1635.00   CHANNEL SLOPE =  0.1835
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1517 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     23.14
  FLOW VELOCITY(FEET/SEC) =   6.21 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.39   Tc(MIN.) =  16.62
  LONGEST FLOWPATH FROM NODE    504.00 TO NODE    502.00 =  3235.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    503.00 TO NODE    502.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.249
 *USER SPECIFIED(SUBAREA):
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2600
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.2781
 SUBAREA AREA(ACRES) =   29.85   SUBAREA RUNOFF(CFS) =   32.98
 TOTAL AREA(ACRES) =     43.97   TOTAL RUNOFF(CFS) =   51.96
 TC(MIN.) =  16.62

******************************************************************************
 FLOW PROCESS FROM NODE    502.00 TO NODE    501.00 IS CODE =  53
------------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    665.00  DOWNSTREAM(FEET) =    625.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   540.00   CHANNEL SLOPE =  0.0741
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0741 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =     51.96
 FLOW VELOCITY(FEET/SEC) =   5.68 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.58   Tc(MIN.) =  18.20
 LONGEST FLOWPATH FROM NODE    504.00 TO NODE    501.00 =  3775.00 FEET.

******************************************************************************
 FLOW PROCESS FROM NODE    502.00 TO NODE    501.50 IS CODE =  81
------------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.007
 *USER SPECIFIED(SUBAREA):
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.2753
 SUBAREA AREA(ACRES) =    4.98   SUBAREA RUNOFF(CFS) =    4.99
 TOTAL AREA(ACRES) =     48.95   TOTAL RUNOFF(CFS) =   53.99
 TC(MIN.) =  18.20

******************************************************************************
 FLOW PROCESS FROM NODE    501.50 TO NODE    501.00 IS CODE =  41
------------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   625.00  DOWNSTREAM(FEET) =   575.00
 FLOW LENGTH(FEET) =   400.00   MANNING'S N =  0.024
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  16.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.65
 GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     53.99
 PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =  18.61
 LONGEST FLOWPATH FROM NODE    504.00 TO NODE    501.00 =  4175.00 FEET.

******************************************************************************
 FLOW PROCESS FROM NODE    501.00 TO NODE      5.00 IS CODE =  41
------------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   575.00  DOWNSTREAM(FEET) =   550.00
 FLOW LENGTH(FEET) =   110.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS   9.8 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  31.73
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     53.99
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =  18.66
  LONGEST FLOWPATH FROM NODE    504.00 TO NODE      5.00 =  4285.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  18.66
  RAINFALL INTENSITY(INCH/HR) =   3.94
  TOTAL STREAM AREA(ACRES) =    48.95
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     53.99

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       20.73    17.90        4.050         19.94
     2       53.99    18.66        3.943         48.95

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       72.52    17.90       4.050
     2       74.17    18.66       3.943

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     74.17   Tc(MIN.) =   18.66
  TOTAL AREA(ACRES) =     68.89
  LONGEST FLOWPATH FROM NODE    504.00 TO NODE      5.00 =  4285.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     68.89  TC(MIN.) =     18.66
  PEAK FLOW RATE(CFS)   =     74.17
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Proposed Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR06-P

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
602	601.5	2	725.0	680.0	76.0	0.30	0.22	
601.5	601	5	680.0	625.0	223.0			
601.5	601	8				0.30	2.23	
601	6	4	625.0	600.0	360.0			EX. 24" Caltrans
								Storm Drain
							2.45	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2004 Advanced Engineering Software (aes)
            Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC
                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - PROPOSED HYDROLOGY                                 *
* SUBBASIN # 6                                                           *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR06-P.DAT
  TIME/DATE OF STUDY: 14:47 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE    602.00 TO NODE    601.50 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    76.00
  UPSTREAM ELEVATION(FEET) =    725.00
  DOWNSTREAM ELEVATION(FEET) =    680.00
  ELEVATION DIFFERENCE(FEET) =     45.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.827
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.354
SUBAREA RUNOFF(CFS) =      0.55
TOTAL AREA(ACRES) =      0.22   TOTAL RUNOFF(CFS) =      0.55

****************************************************************************
FLOW PROCESS FROM NODE    601.50 TO NODE    601.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    680.00  DOWNSTREAM(FEET) =    625.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   223.00   CHANNEL SLOPE =  0.2466
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1789 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =      0.55
FLOW VELOCITY(FEET/SEC) =   2.37 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.57   Tc(MIN.) =   7.40
LONGEST FLOWPATH FROM NODE    602.00 TO NODE    601.00 =   299.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    601.50 TO NODE    601.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.163
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3000
SUBAREA AREA(ACRES) =    2.23   SUBAREA RUNOFF(CFS) =    4.79
TOTAL AREA(ACRES) =      2.45   TOTAL RUNOFF(CFS) =    5.27
TC(MIN.) =   7.40

****************************************************************************
FLOW PROCESS FROM NODE    601.00 TO NODE      6.00 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   625.00  DOWNSTREAM(FEET) =   600.00
FLOW LENGTH(FEET) =   360.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  24.0 INCH PIPE IS   5.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  11.26
GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      5.27
PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =   7.93
LONGEST FLOWPATH FROM NODE    602.00 TO NODE      6.00 =   659.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =      2.45  TC(MIN.) =      7.93
PEAK FLOW RATE(CFS)   =      5.27
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
```

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Job Name: Merriam Mountains - Proposed Hydrology

Date: October 2006

Job #: 2469.01A

Run Name: MERR07-P

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
702	701.5	2	770.0	735.0	84.0	0.29	0.14	
701.5	701	5	735.0	625.0	347.0			
701.5	701	8				0.28	1.96	
701	7	4	625.0	580.0	375.0			EX. 24" CSP Caltrans
								Storm Drain
							2.1	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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                        2003,1985,1981 HYDROLOGY MANUAL
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            Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC
                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - PROPOSED HYDROLOGY                                 *
* SUBBASIN # 7                                                           *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR07-P.DAT
  TIME/DATE OF STUDY: 14:49 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  =====  ====== =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE    702.00 TO NODE    701.50 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2900
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    84.00
  UPSTREAM ELEVATION(FEET) =    770.00
  DOWNSTREAM ELEVATION(FEET) =    735.00
  ELEVATION DIFFERENCE(FEET) =     35.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.203
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.024
SUBAREA RUNOFF(CFS) =       0.33
TOTAL AREA(ACRES) =       0.14   TOTAL RUNOFF(CFS) =       0.33

****************************************************************************
FLOW PROCESS FROM NODE    701.50 TO NODE    701.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    735.00  DOWNSTREAM(FEET) =    625.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   347.00   CHANNEL SLOPE =  0.3170
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1993 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =       0.33
FLOW VELOCITY(FEET/SEC) =   2.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.31   Tc(MIN.) =   8.52
LONGEST FLOWPATH FROM NODE    702.00 TO NODE    701.00 =   431.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    701.50 TO NODE    701.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.541
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2800
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.2807
SUBAREA AREA(ACRES) =    1.96   SUBAREA RUNOFF(CFS) =    3.59
TOTAL AREA(ACRES) =      2.10   TOTAL RUNOFF(CFS) =    3.86
TC(MIN.) =   8.52

****************************************************************************
FLOW PROCESS FROM NODE    701.00 TO NODE      7.00 IS CODE =  41
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   625.00  DOWNSTREAM(FEET) =   580.00
FLOW LENGTH(FEET) =   375.00   MANNING'S N =  0.024
DEPTH OF FLOW IN  24.0 INCH PIPE IS   5.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   8.09
GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      3.86
PIPE TRAVEL TIME(MIN.) =   0.77    Tc(MIN.) =   9.29
LONGEST FLOWPATH FROM NODE    702.00 TO NODE      7.00 =   806.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =      2.10  TC(MIN.) =      9.29
PEAK FLOW RATE(CFS)   =      3.86
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Proposed Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR08-P

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
804	803	2	900.0	825.0	120.0	0.25	0.28	
803	802	5	825.0	660.0	518.0			
803	802	8				0.25	5.69	
802	801	5	660.0	590.0	395.0			
802	801	8				0.28	5.7	
801	8	4	590.0	560.0	425.0			EX. 30" CSP Caltrans
								Storm Drain
							11.67	Total Area

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

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                          Analysis prepared by:

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                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - PROPOSED HYDROLOGY                                 *
* SUBBASIN # 8                                                           *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR08-P.DAT
  TIME/DATE OF STUDY: 14:50 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ==================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE    804.00 TO NODE    803.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   120.00
  UPSTREAM ELEVATION(FEET) =    900.00
  DOWNSTREAM ELEVATION(FEET) =    825.00
  ELEVATION DIFFERENCE(FEET) =     75.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.102
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
```

```
          THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.353
  SUBAREA RUNOFF(CFS) =      0.51
  TOTAL AREA(ACRES) =      0.28   TOTAL RUNOFF(CFS) =      0.51

****************************************************************************
  FLOW PROCESS FROM NODE    803.00 TO NODE    802.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    825.00  DOWNSTREAM(FEET) =    660.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   518.00   CHANNEL SLOPE =  0.3185
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1996 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.51
  FLOW VELOCITY(FEET/SEC) =   2.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.45   Tc(MIN.) =  10.55
  LONGEST FLOWPATH FROM NODE    804.00 TO NODE    802.00 =   638.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    803.00 TO NODE    802.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.696
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
  SUBAREA AREA(ACRES) =    5.69   SUBAREA RUNOFF(CFS) =    8.10
  TOTAL AREA(ACRES) =      5.97   TOTAL RUNOFF(CFS) =    8.50
  TC(MIN.) =  10.55

****************************************************************************
  FLOW PROCESS FROM NODE    802.00 TO NODE    801.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    660.00  DOWNSTREAM(FEET) =    590.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   395.00   CHANNEL SLOPE =  0.1772
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1486 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      8.50
  FLOW VELOCITY(FEET/SEC) =   4.40 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.50   Tc(MIN.) =  12.05
  LONGEST FLOWPATH FROM NODE    804.00 TO NODE    801.00 =  1033.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    802.00 TO NODE    801.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.229
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2647
  SUBAREA AREA(ACRES) =    5.70   SUBAREA RUNOFF(CFS) =    8.35
```

```
  TOTAL AREA(ACRES) =     11.67   TOTAL RUNOFF(CFS) =   16.15
  TC(MIN.) =  12.05

****************************************************************************
  FLOW PROCESS FROM NODE    801.00 TO NODE      8.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   590.00  DOWNSTREAM(FEET) =   560.00
  FLOW LENGTH(FEET) =   425.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS   8.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.30
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     16.15
  PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =  12.51
  LONGEST FLOWPATH FROM NODE    804.00 TO NODE      8.00 =  1458.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     11.67  TC(MIN.) =     12.51
  PEAK FLOW RATE(CFS)   =     16.15
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Proposed Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR09-P

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
903	902.8	2	1,015.0	985.0	75.0	0.25	0.15	
902.8	902.6	5	985.0	905.0	300.0			
902.8	902.6	8				0.25	0.58	
902.6	902.4	5	905.0	705.0	658.0			
902.6	902.4	8				0.25	6.61	
902.4	902	5	705.0	645.0	277.0			
902.4	902	8				0.26	3.86	
902	901	5	645.0	580.0	540.0			
902	901	8				0.27	14.64	
901	9	4	580.0	560.0	555.0			EX. 42" CSP Caltrans
								Storm Drain
							25.84	Total Area

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

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                          Analysis prepared by:

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                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - PROPOSED HYDROLOGY                                 *
* SUBBASIN # 9                                                           *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR09-P.DAT
  TIME/DATE OF STUDY: 14:52 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ==================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE    903.00 TO NODE    902.80 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1015.00
  DOWNSTREAM ELEVATION(FEET) =    985.00
  ELEVATION DIFFERENCE(FEET) =     30.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.151
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.068
SUBAREA RUNOFF(CFS) =      0.30
TOTAL AREA(ACRES) =      0.15   TOTAL RUNOFF(CFS) =      0.30

****************************************************************************
FLOW PROCESS FROM NODE    902.80 TO NODE    902.60 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    985.00  DOWNSTREAM(FEET) =    905.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.2667
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1856 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =      0.30
FLOW VELOCITY(FEET/SEC) =   2.41 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.07   Tc(MIN.) =   8.22
LONGEST FLOWPATH FROM NODE    903.00 TO NODE    902.60 =   375.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    902.80 TO NODE    902.60 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.690
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
SUBAREA AREA(ACRES) =    0.58   SUBAREA RUNOFF(CFS) =    0.97
TOTAL AREA(ACRES) =      0.73   TOTAL RUNOFF(CFS) =    1.22
TC(MIN.) =   8.22

****************************************************************************
FLOW PROCESS FROM NODE    902.60 TO NODE    902.40 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    905.00  DOWNSTREAM(FEET) =    705.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   658.00   CHANNEL SLOPE =  0.3040
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1960 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =      1.22
FLOW VELOCITY(FEET/SEC) =   2.65 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   4.14   Tc(MIN.) =  12.36
LONGEST FLOWPATH FROM NODE    903.00 TO NODE    902.40 =  1033.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    902.60 TO NODE    902.40 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.143
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.2500
SUBAREA AREA(ACRES) =    6.61   SUBAREA RUNOFF(CFS) =    8.50
TOTAL AREA(ACRES) =      7.34   TOTAL RUNOFF(CFS) =    9.44
TC(MIN.) =  12.36
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    902.40 TO NODE    902.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    705.00  DOWNSTREAM(FEET) =    645.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   277.00   CHANNEL SLOPE =  0.2166
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1683 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      9.44
  FLOW VELOCITY(FEET/SEC) =   4.85 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.95   Tc(MIN.) =  13.31
  LONGEST FLOWPATH FROM NODE    903.00 TO NODE    902.00 =  1310.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    902.40 TO NODE    902.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.903
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2534
  SUBAREA AREA(ACRES) =    3.86   SUBAREA RUNOFF(CFS) =    4.92
  TOTAL AREA(ACRES) =     11.20   TOTAL RUNOFF(CFS) =   13.92
  TC(MIN.) =  13.31

****************************************************************************
  FLOW PROCESS FROM NODE    902.00 TO NODE    901.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    645.00  DOWNSTREAM(FEET) =    580.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   540.00   CHANNEL SLOPE =  0.1204
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1152 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     13.92
  FLOW VELOCITY(FEET/SEC) =   4.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.97   Tc(MIN.) =  15.28
  LONGEST FLOWPATH FROM NODE    903.00 TO NODE    901.00 =  1850.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    902.00 TO NODE    901.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.485
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2628
  SUBAREA AREA(ACRES) =   14.64   SUBAREA RUNOFF(CFS) =   17.73
  TOTAL AREA(ACRES) =     25.84   TOTAL RUNOFF(CFS) =   30.46
  TC(MIN.) =  15.28

****************************************************************************
  FLOW PROCESS FROM NODE    901.00 TO NODE      9.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   580.00  DOWNSTREAM(FEET) =   560.00
  FLOW LENGTH(FEET) =   555.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  16.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.00
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     30.46
  PIPE TRAVEL TIME(MIN.) =   1.03    Tc(MIN.) =  16.31
  LONGEST FLOWPATH FROM NODE    903.00 TO NODE      9.00 =  2405.00 FEET.
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =     25.84  TC(MIN.) =     16.31
  PEAK FLOW RATE(CFS)    =     30.46
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Proposed Hydrology

Job #:
2469.01A

Date:
October 2006

Run Name:
MER10-PD
Page 1

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Land Use	Runoff Coeff.	Area (ac.)	Comments
1087	1086	2	1,472.0	1,467.0	100.0	21	0.35	0.61	
1086	1085	5	1,467.0	1,450.0	305.0				
1086	1085	8				21	0.35	2.18	
1085	1084	5	1,450.0	1,322.0	677.0				
1085	1084	8				17	0.51	8.11	Weighted C Factor
1084	1080	5	1,322.0		708.0				
1084	1080	8				17	0.39	20.53	Weighted C Factor
1080	1080	1							1 of 2
1083	1082	2	1,600.0		100.0	21	0.35	0.79	
1082	1081	5	1,513.0		628.0				
1082	1081	8				21	0.35	3.73	
1081	1080	5	1,450.0		1,415.0				
1081	1080	8				17	0.39	46.31	Weighted C Factor
1080	1080	1							2 of 2
1080	1051	5	1,165.0		1,200.0				
1080	1051	8				17	0.37	40.16	
1051	1051	10							Bank #1
1056	1055	2	1,455.9		100.0	7	0.79	0.26	
1055	1054	6	1,455.4		425.0	7	0.79	3.66	
1054	1053	3	1,447.0		220.0				
1053	1052	5	1,410.0		945.0				
1053	1052	8				21	0.35	5.98	
1052	1052	1							1 of 3
1065	1064	2	1,750.0		100.0	21	0.35	0.18	
1064	1063	5	1,725.0		850.0				
1064	1063	8				17	0.43	8.44	Weighted C Factor
1063	1060	5	1,475.0		285.0				
1062	1060	8				7	0.79	1.66	
1060	1052	5	1,420.0		1,160.0				
1063	1052	8				21	0.35	14.52	
1052	1052	1							2 of 3
1073	1072	2	1,500.0		100.0	21	0.36	1.77	
1072	1071	5	1,495.0		295.0				
1072	1071	8				17	0.46	6.04	Weighted C Factor
1071	1070	5	1,438.0		600.0				
1071	1070	8				17	0.42	17.57	
1070	1052	5	1,360.0		1,220.0				
1070	1052	8				17	0.38	20.56	Weighted C Factor
1052	1052	1							3 of 3
1052	1051	5	1,080.0		866.0				
1051	1051	11							Add Bank #1
1051	1051	12							Delete Bank #1
1051	1050	5	941.0		1,095.0				
1051	1050	8				21	0.31	46.31	

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Job Name:
Merriam Mountains - Proposed Hydrology

Job #:
2469.01A

Date:
October 2006

Run Name:
MER10-PD

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Land Use	Runoff Coeff.	Area (ac.)	Comments
1050	1010	5	800.0	675.0	1,570.0				
1050	1010	8				21	0.26	50.1	
1010	1010	10							Bank #1
1049.1	1049	2	1,605.0	1,575.0	100.0	21	0.35	0.15	
1049	1048	5	1,575.0	1,500.0	400.0				
1049	1048	8				21	0.35	2.46	
1048	1044	3	1,497.0	1,477.0	128.0				
1044.1	1044	8				7	0.79	2.9	
1044	1044	1							1 of 2
1047	1046	2	1,500.3	1,497.5	100.0	7	0.79	0.21	
1046	1045	6	1,497.0	1,487.2	400.0	7	0.79	3.32	32' /2%/ 2 Sides
1045	1044	3	1,484.0	1,477.0	385.0				
1045	1044	8				7	0.79	2.21	
1044	1044	1							
1044	1043	3	1,467.9	1,458.0	290.0				
1044	1043	8				7	0.79	3.42	
1043	1042	3	1,457.9	1,443.0	285.0				
1042.1	1042	8				7	0.79	3.84	
1042	1041	3	1,442.9	1,435.0	240.0				
1043	1041	8				7	0.79	2.49	
1041.1	1041	8				7	0.79	5.56	
1041	1040	3	1,434.9	1,400.0	210.0				
1040	1020	5	1,400.0	975.0	1,465.0				
1040	1020	8				21	0.28	22.37	
1020	1020	1							1 of 3
1035	1034	2	1,294.3	1,292.1	100.0	7	0.77	0.12	
1034	1033	6	1,291.6	1,265.0	580.0	7	0.77	3.04	32' /2%/ 2 Sides
1033	1032	3	1,262.0	1,250.0	450.0				
1033	1032	8				7	0.77	1.87	
1032.1	1032	8				7	0.77	2.9	
1032	1031	3	1,249.9	1,248.0	382.0				
1031.1	1031	8				7	0.77	6.6	
1031	1030	3	1,247.9	1,105.0	365.0				
1030	1020	5	1,105.0	975.0	935.0				
1030	1020	8				21	0.26	13.06	
1020	1020	1							2 of 3
1025	1024	2	1,303.4	1,303.0	100.0	7	0.79	0.29	
1024	1023	6	1,302.5	1,295.0	500.0	7	0.78	2.77	
1023	1022	3	1,290.0	1,288.5	290.0				
1022.1	1022	8				7	0.77	2.95	
1022	1021	3	1,288.0	1,125.0	450.0				
1021	1020	5	1,125.0	975.0	665.0				
1021	1020	8				2	0.32	6.44	
1020	1020	1							3 of 3
1020	1010	5	975.0	675.0	2,080.0				

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Date:
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Run Name:
MER10-PD

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Land Use	Runoff Coeff.	Area (ac.)	Comments
1020	1010	8				21	0.26	30.84	
1010	1010	10							Bank #2
1014	1013	2	1,310.9	1,310.5	100.0	7	0.79	0.42	
1013	1012	6	1,310.0	1,304.0	480.0	7	0.79	5.3	
1012	1011	3	1,301.0	1,300.0	125.0				
1011	1010	5	1,300.0	975.0	2,260.0				
1011	1010	8				21	0.27	21.78	
1010	1010	11							Add Bank #1
1010	1010	11							Add Bank #2
1010	1010	12							Delete Bank #1
1010	1010	12							Delete Bank #2
1010	1001	5	975.0	660.0	1,100.0				
1010	1001	8				21	0.28	17.67	
1001	1001	1							1 of 2
1003	1002	2	1,311.0	1,225.0	100.0	21	0.35	0.25	
1002	1001	5	1,225.0	660.0	2,210.0				
1002	1001	8				21	0.27	26.72	
1001	1001	1							2 of 2
1001	1001	7							DET OUT Q = 101.19
1001	10	4	660.0	550.0	760.0				Ex. 42" CSP Caltrans
									Storm Drain
								491.42	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2004 Advanced Engineering Software (aes)
            Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

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                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - PROPOSED HYDROLOGY                                 *
* SUBBASIN # 10 - WITH DETENTION ROUTING                                 *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MER10-PD.DAT
  TIME/DATE OF STUDY: 11:17 09/29/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   1087.00 TO NODE   1086.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1472.00
  DOWNSTREAM ELEVATION(FEET) =   1467.00
  ELEVATION DIFFERENCE(FEET) =      5.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.895
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.868
```

```
  SUBAREA RUNOFF(CFS) =       1.47
  TOTAL AREA(ACRES) =       0.61   TOTAL RUNOFF(CFS) =       1.47

****************************************************************************
  FLOW PROCESS FROM NODE   1086.00 TO NODE   1085.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1467.00  DOWNSTREAM(FEET) =   1450.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   305.00   CHANNEL SLOPE =  0.0557
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0557 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.47
  FLOW VELOCITY(FEET/SEC) =   1.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.38   Tc(MIN.) =  11.28
  LONGEST FLOWPATH FROM NODE   1087.00 TO NODE   1085.00 =   405.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1086.00 TO NODE   1085.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.456
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =     2.18   SUBAREA RUNOFF(CFS) =     4.16
  TOTAL AREA(ACRES) =       2.79   TOTAL RUNOFF(CFS) =     5.33
  TC(MIN.) =  11.28

****************************************************************************
  FLOW PROCESS FROM NODE   1085.00 TO NODE   1084.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1450.00  DOWNSTREAM(FEET) =   1322.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   677.00   CHANNEL SLOPE =  0.1891
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1545 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       5.33
  FLOW VELOCITY(FEET/SEC) =   3.84 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.94   Tc(MIN.) =  14.22
  LONGEST FLOWPATH FROM NODE   1087.00 TO NODE   1084.00 =  1082.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1085.00 TO NODE   1084.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.700
  *USER SPECIFIED(SUBAREA):
  STREETS & ROADS (DITCHES) RUNOFF COEFFICIENT = .5100
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4690
  SUBAREA AREA(ACRES) =     8.11   SUBAREA RUNOFF(CFS) =    19.44
  TOTAL AREA(ACRES) =      10.90   TOTAL RUNOFF(CFS) =    24.03
  TC(MIN.) =  14.22

****************************************************************************
  FLOW PROCESS FROM NODE   1084.00 TO NODE   1080.00 IS CODE =  53
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1322.00  DOWNSTREAM(FEET) =   1165.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   708.00   CHANNEL SLOPE =  0.2218
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1706 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     24.03
  FLOW VELOCITY(FEET/SEC) =   6.67 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.77   Tc(MIN.) =  15.99
  LONGEST FLOWPATH FROM NODE   1087.00 TO NODE   1080.00 =  1790.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1084.00 TO NODE   1080.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.357
  *USER SPECIFIED(SUBAREA):
  STREETS & ROADS (DITCHES) RUNOFF COEFFICIENT = .3900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4174
  SUBAREA AREA(ACRES) =   20.53   SUBAREA RUNOFF(CFS) =   34.89
  TOTAL AREA(ACRES) =     31.43   TOTAL RUNOFF(CFS) =   57.17
  TC(MIN.) =  15.99

****************************************************************************
  FLOW PROCESS FROM NODE   1080.00 TO NODE   1080.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  15.99
  RAINFALL INTENSITY(INCH/HR) =   4.36
  TOTAL STREAM AREA(ACRES) =    31.43
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     57.17

****************************************************************************
  FLOW PROCESS FROM NODE   1083.00 TO NODE   1082.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1600.00
  DOWNSTREAM ELEVATION(FEET) =   1513.00
  ELEVATION DIFFERENCE(FEET) =     87.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      2.20
  TOTAL AREA(ACRES) =      0.79   TOTAL RUNOFF(CFS) =      2.20

****************************************************************************
  FLOW PROCESS FROM NODE   1082.00 TO NODE   1081.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   1513.00  DOWNSTREAM(FEET) =   1450.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   628.00   CHANNEL SLOPE =  0.1003
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1002 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      2.20
  FLOW VELOCITY(FEET/SEC) =   2.31 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.54   Tc(MIN.) =  10.80
  LONGEST FLOWPATH FROM NODE   1083.00 TO NODE   1081.00 =   728.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1082.00 TO NODE   1081.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.610
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    3.73   SUBAREA RUNOFF(CFS) =    7.32
  TOTAL AREA(ACRES) =      4.52   TOTAL RUNOFF(CFS) =    8.88
  TC(MIN.) =  10.80

****************************************************************************
  FLOW PROCESS FROM NODE   1081.00 TO NODE   1080.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1450.00  DOWNSTREAM(FEET) =   1165.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1415.00   CHANNEL SLOPE =  0.2014
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1607 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      8.88
  FLOW VELOCITY(FEET/SEC) =   4.64 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.08   Tc(MIN.) =  15.88
  LONGEST FLOWPATH FROM NODE   1083.00 TO NODE   1080.00 =  2143.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1081.00 TO NODE   1080.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.376
  *USER SPECIFIED(SUBAREA):
  STREETS & ROADS (DITCHES) RUNOFF COEFFICIENT = .3900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3864
  SUBAREA AREA(ACRES) =   46.31   SUBAREA RUNOFF(CFS) =   79.03
  TOTAL AREA(ACRES) =     50.83   TOTAL RUNOFF(CFS) =   85.96
  TC(MIN.) =  15.88

****************************************************************************
  FLOW PROCESS FROM NODE   1080.00 TO NODE   1080.00 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.) =  15.88
  RAINFALL INTENSITY(INCH/HR) =   4.38
  TOTAL STREAM AREA(ACRES) =    50.83
```

```
PEAK FLOW RATE(CFS) AT CONFLUENCE =     85.96

** CONFLUENCE DATA **
STREAM      RUNOFF      Tc       INTENSITY      AREA
NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
    1        57.17    15.99        4.357         31.43
    2        85.96    15.88        4.376         50.83

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

** PEAK FLOW RATE TABLE **
STREAM      RUNOFF      Tc       INTENSITY
NUMBER       (CFS)    (MIN.)    (INCH/HOUR)
    1       142.75    15.88       4.376
    2       142.76    15.99       4.357

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =    142.76   Tc(MIN.) =   15.99
TOTAL AREA(ACRES) =     82.26
LONGEST FLOWPATH FROM NODE   1083.00 TO NODE   1080.00 =  2143.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1080.00 TO NODE   1051.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1165.00  DOWNSTREAM(FEET) =    941.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1200.00   CHANNEL SLOPE =  0.1867
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1533 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =    142.76
FLOW VELOCITY(FEET/SEC) =  11.44 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.75   Tc(MIN.) =  17.73
LONGEST FLOWPATH FROM NODE   1083.00 TO NODE   1051.00 =  3343.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1080.00 TO NODE   1051.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.075
*USER SPECIFIED(SUBAREA):
STREETS & ROADS (DITCHES) RUNOFF COEFFICIENT = .3700
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3890
SUBAREA AREA(ACRES) =   40.16   SUBAREA RUNOFF(CFS) =   60.56
TOTAL AREA(ACRES) =    122.42   TOTAL RUNOFF(CFS) =  194.07
TC(MIN.) =  17.73

****************************************************************************
FLOW PROCESS FROM NODE   1051.00 TO NODE   1051.00 IS CODE =  10
----------------------------------------------------------------------------
>>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
FLOW PROCESS FROM NODE   1056.00 TO NODE   1055.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
*USER SPECIFIED(SUBAREA):
```

```
RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
S.C.S. CURVE NUMBER (AMC II) =   0
INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
UPSTREAM ELEVATION(FEET) =   1455.90
DOWNSTREAM ELEVATION(FEET) =   1455.40
ELEVATION DIFFERENCE(FEET) =      0.50
SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.971
WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
         THE MAXIMUM OVERLAND FLOW LENGTH =    50.00
         (Reference: Table 3-1B of Hydrology Manual)
         THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) =      1.89
TOTAL AREA(ACRES) =      0.26   TOTAL RUNOFF(CFS) =      1.89

****************************************************************************
FLOW PROCESS FROM NODE   1055.00 TO NODE   1054.00 IS CODE =  61
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) = 1455.00  DOWNSTREAM ELEVATION(FEET) = 1450.00
STREET LENGTH(FEET) =   425.00   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 16.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  11.00
INSIDE STREET CROSSFALL(DECIMAL) =  0.020
OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.38
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.41
  HALFSTREET FLOOD WIDTH(FEET) =   14.07
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.95
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.20
STREET FLOW TRAVEL TIME(MIN.) =   2.40   Tc(MIN.) =   7.37
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.180
*USER SPECIFIED(SUBAREA):
RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT =  0.790
SUBAREA AREA(ACRES) =    3.66      SUBAREA RUNOFF(CFS) =   20.76
TOTAL AREA(ACRES) =      3.92        PEAK FLOW RATE(CFS) =      22.24

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.47   HALFSTREET FLOOD WIDTH(FEET) =  16.00
FLOW VELOCITY(FEET/SEC.) =  3.54   DEPTH*VELOCITY(FT*FT/SEC.) =   1.68
LONGEST FLOWPATH FROM NODE   1056.00 TO NODE   1054.00 =   525.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1054.00 TO NODE   1053.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  1447.00  DOWNSTREAM(FEET) =  1410.00
FLOW LENGTH(FEET) =   220.00   MANNING'S N =  0.013
```

```
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.61
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     22.24
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   7.52
  LONGEST FLOWPATH FROM NODE   1056.00 TO NODE   1053.00 =   745.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1053.00 TO NODE   1052.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1410.00  DOWNSTREAM(FEET) =   1080.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   945.00   CHANNEL SLOPE =  0.3492
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2051 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     22.24
  FLOW VELOCITY(FEET/SEC) =   7.12 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.21   Tc(MIN.) =   9.74
  LONGEST FLOWPATH FROM NODE   1056.00 TO NODE   1052.00 =  1690.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1053.00 TO NODE   1052.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.000
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5242
  SUBAREA AREA(ACRES) =     5.98   SUBAREA RUNOFF(CFS) =   12.56
  TOTAL AREA(ACRES) =       9.90   TOTAL RUNOFF(CFS) =   31.14
  TC(MIN.) =   9.74

****************************************************************************
  FLOW PROCESS FROM NODE   1052.00 TO NODE   1052.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.74
  RAINFALL INTENSITY(INCH/HR) =   6.00
  TOTAL STREAM AREA(ACRES) =     9.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     31.14

****************************************************************************
  FLOW PROCESS FROM NODE   1065.00 TO NODE   1064.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1750.00
  DOWNSTREAM ELEVATION(FEET) =   1725.00
  ELEVATION DIFFERENCE(FEET) =     25.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
SUBAREA RUNOFF(CFS) =      0.50
TOTAL AREA(ACRES) =      0.18   TOTAL RUNOFF(CFS) =      0.50

****************************************************************************
FLOW PROCESS FROM NODE   1064.00 TO NODE   1063.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1725.00  DOWNSTREAM(FEET) =   1475.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   850.00   CHANNEL SLOPE =  0.2941
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1935 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
CHANNEL FLOW THRU SUBAREA(CFS) =      0.50
FLOW VELOCITY(FEET/SEC) =   2.46 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   5.75   Tc(MIN.) =  12.02
LONGEST FLOWPATH FROM NODE   1065.00 TO NODE   1063.00 =   950.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1064.00 TO NODE   1063.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.238
*USER SPECIFIED(SUBAREA):
STREETS & ROADS (DITCHES) RUNOFF COEFFICIENT = .4300
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4283
SUBAREA AREA(ACRES) =    8.44   SUBAREA RUNOFF(CFS) =   19.01
TOTAL AREA(ACRES) =      8.62   TOTAL RUNOFF(CFS) =   19.34
TC(MIN.) =  12.02

****************************************************************************
FLOW PROCESS FROM NODE   1063.00 TO NODE   1060.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1475.00  DOWNSTREAM(FEET) =   1420.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   285.00   CHANNEL SLOPE =  0.1930
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1565 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =     19.34
FLOW VELOCITY(FEET/SEC) =   5.94 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   0.80   Tc(MIN.) =  12.82
LONGEST FLOWPATH FROM NODE   1065.00 TO NODE   1060.00 =  1235.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1062.00 TO NODE   1060.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.025
*USER SPECIFIED(SUBAREA):
RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4867
SUBAREA AREA(ACRES) =    1.66   SUBAREA RUNOFF(CFS) =    6.59
TOTAL AREA(ACRES) =     10.28   TOTAL RUNOFF(CFS) =   25.14
TC(MIN.) =  12.82
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1060.00 TO NODE   1052.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1420.00  DOWNSTREAM(FEET) =   1080.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1160.00   CHANNEL SLOPE =  0.2931
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1933 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     25.14
  FLOW VELOCITY(FEET/SEC) =   7.20 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.68   Tc(MIN.) =  15.50
  LONGEST FLOWPATH FROM NODE   1065.00 TO NODE   1052.00 =  2395.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1063.00 TO NODE   1052.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.445
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4067
  SUBAREA AREA(ACRES) =   14.52   SUBAREA RUNOFF(CFS) =   22.59
  TOTAL AREA(ACRES) =     24.80   TOTAL RUNOFF(CFS) =   44.83
  TC(MIN.) =  15.50

****************************************************************************
  FLOW PROCESS FROM NODE   1052.00 TO NODE   1052.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  15.50
  RAINFALL INTENSITY(INCH/HR) =   4.45
  TOTAL STREAM AREA(ACRES) =    24.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     44.83

****************************************************************************
  FLOW PROCESS FROM NODE   1073.00 TO NODE   1072.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3600
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1500.00
  DOWNSTREAM ELEVATION(FEET) =   1495.00
  ELEVATION DIFFERENCE(FEET) =      5.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.790
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.928
  SUBAREA RUNOFF(CFS) =      4.41
  TOTAL AREA(ACRES) =      1.77   TOTAL RUNOFF(CFS) =      4.41

****************************************************************************
  FLOW PROCESS FROM NODE   1072.00 TO NODE   1071.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1495.00  DOWNSTREAM(FEET) =   1438.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   295.00   CHANNEL SLOPE =  0.1932
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1566 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      4.41
  FLOW VELOCITY(FEET/SEC) =   3.63 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.35   Tc(MIN.) =   9.14
  LONGEST FLOWPATH FROM NODE   1073.00 TO NODE   1071.00 =   395.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1072.00 TO NODE   1071.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.248
  *USER SPECIFIED(SUBAREA):
  STREETS & ROADS (DITCHES) RUNOFF COEFFICIENT = .4600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4373
  SUBAREA AREA(ACRES) =    6.04   SUBAREA RUNOFF(CFS) =   17.36
  TOTAL AREA(ACRES) =      7.81   TOTAL RUNOFF(CFS) =   21.34
  TC(MIN.) =   9.14

****************************************************************************
  FLOW PROCESS FROM NODE   1071.00 TO NODE   1070.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1438.00  DOWNSTREAM(FEET) =   1360.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   600.00   CHANNEL SLOPE =  0.1300
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1217 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     21.34
  FLOW VELOCITY(FEET/SEC) =   5.41 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.85   Tc(MIN.) =  10.99
  LONGEST FLOWPATH FROM NODE   1073.00 TO NODE   1070.00 =   995.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1071.00 TO NODE   1070.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.549
  *USER SPECIFIED(SUBAREA):
  STREETS & ROADS (DITCHES) RUNOFF COEFFICIENT = .4200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4253
  SUBAREA AREA(ACRES) =   17.57   SUBAREA RUNOFF(CFS) =   40.95
  TOTAL AREA(ACRES) =     25.38   TOTAL RUNOFF(CFS) =   59.90
  TC(MIN.) =  10.99

****************************************************************************
  FLOW PROCESS FROM NODE   1070.00 TO NODE   1052.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1360.00  DOWNSTREAM(FEET) =   1080.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1220.00   CHANNEL SLOPE =  0.2295
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1732 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
  CHANNEL FLOW THRU SUBAREA(CFS) =      59.90
  FLOW VELOCITY(FEET/SEC) =   9.11 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.23   Tc(MIN.) =  13.22
  LONGEST FLOWPATH FROM NODE   1073.00 TO NODE   1052.00 =  2215.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1070.00 TO NODE   1052.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.925
  *USER SPECIFIED(SUBAREA):
  STREETS & ROADS (DITCHES) RUNOFF COEFFICIENT = .3800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4050
  SUBAREA AREA(ACRES) =   20.56   SUBAREA RUNOFF(CFS) =   38.47
  TOTAL AREA(ACRES) =     45.94   TOTAL RUNOFF(CFS) =   91.64
  TC(MIN.) =  13.22

****************************************************************************
  FLOW PROCESS FROM NODE   1052.00 TO NODE   1052.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =  13.22
  RAINFALL INTENSITY(INCH/HR) =   4.92
  TOTAL STREAM AREA(ACRES) =    45.94
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     91.64

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1        31.14     9.74        6.000         9.90
     2        44.83    15.50        4.445        24.80
     3        91.64    13.22        4.925        45.94

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       126.76     9.74       6.000
     2       155.44    13.22       4.925
     3       150.61    15.50       4.445

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    155.44   Tc(MIN.) =   13.22
  TOTAL AREA(ACRES) =     80.64
  LONGEST FLOWPATH FROM NODE   1065.00 TO NODE   1052.00 =  2395.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1052.00 TO NODE   1051.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1080.00  DOWNSTREAM(FEET) =    941.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   866.00   CHANNEL SLOPE =  0.1605
  SLOPE ADJUSTMENT CURVE USED:
```

```
  EFFECTIVE SLOPE = .1403 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    155.44
  FLOW VELOCITY(FEET/SEC) =  11.26 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.28   Tc(MIN.) =  14.51
  LONGEST FLOWPATH FROM NODE   1065.00 TO NODE   1051.00 =  3261.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1051.00 TO NODE   1051.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1      155.44    14.51       4.639       80.64
  LONGEST FLOWPATH FROM NODE   1065.00 TO NODE   1051.00 =  3261.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1      194.07    17.73       4.075      122.42
  LONGEST FLOWPATH FROM NODE   1083.00 TO NODE   1051.00 =  3343.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1     314.18      14.51        4.639
     2     330.62      17.73        4.075

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    330.62   Tc(MIN.) =   17.73
  TOTAL AREA(ACRES) =    203.06

****************************************************************************
  FLOW PROCESS FROM NODE   1051.00 TO NODE   1051.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1051.00 TO NODE   1050.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    941.00  DOWNSTREAM(FEET) =    800.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1095.00   CHANNEL SLOPE =  0.1288
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1208 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    330.62
  FLOW VELOCITY(FEET/SEC) =  13.43 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.36   Tc(MIN.) =  19.09
  LONGEST FLOWPATH FROM NODE   1083.00 TO NODE   1050.00 =  4438.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1051.00 TO NODE   1050.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.886
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3100
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3844
  SUBAREA AREA(ACRES) =   46.31   SUBAREA RUNOFF(CFS) =   55.79
  TOTAL AREA(ACRES) =    249.37   TOTAL RUNOFF(CFS) =  372.50
  TC(MIN.) =  19.09

****************************************************************************
  FLOW PROCESS FROM NODE   1050.00 TO NODE   1010.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    800.00  DOWNSTREAM(FEET) =    675.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1570.00   CHANNEL SLOPE =  0.0796
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0796 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    372.50
  FLOW VELOCITY(FEET/SEC) =  11.35 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.31   Tc(MIN.) =  21.40
  LONGEST FLOWPATH FROM NODE   1083.00 TO NODE   1010.00 =  6008.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1050.00 TO NODE   1010.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.610
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3636
  SUBAREA AREA(ACRES) =   50.10   SUBAREA RUNOFF(CFS) =   47.03
  TOTAL AREA(ACRES) =    299.47   TOTAL RUNOFF(CFS) =  393.11
  TC(MIN.) =  21.40

****************************************************************************
  FLOW PROCESS FROM NODE   1010.00 TO NODE   1010.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1049.10 TO NODE   1049.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1605.00
  DOWNSTREAM ELEVATION(FEET) =   1575.00
  ELEVATION DIFFERENCE(FEET) =     30.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      0.42
  TOTAL AREA(ACRES) =      0.15   TOTAL RUNOFF(CFS) =      0.42

****************************************************************************
  FLOW PROCESS FROM NODE   1049.00 TO NODE   1048.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
```

```
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1575.00  DOWNSTREAM(FEET) =   1500.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   400.00   CHANNEL SLOPE =  0.1875
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1538 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.42
  FLOW VELOCITY(FEET/SEC) =   2.20 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.04   Tc(MIN.) =   9.30
  LONGEST FLOWPATH FROM NODE   1049.10 TO NODE   1048.00 =   500.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1049.00 TO NODE   1048.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.179
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    2.46   SUBAREA RUNOFF(CFS) =    5.32
  TOTAL AREA(ACRES) =      2.61   TOTAL RUNOFF(CFS) =    5.64
  TC(MIN.) =   9.30

****************************************************************************
  FLOW PROCESS FROM NODE   1048.00 TO NODE   1044.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1497.00  DOWNSTREAM(FEET) =  1477.00
  FLOW LENGTH(FEET) =   128.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.83
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      5.64
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   9.44
  LONGEST FLOWPATH FROM NODE   1049.10 TO NODE   1044.00 =   628.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1044.10 TO NODE   1044.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.122
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5816
  SUBAREA AREA(ACRES) =    2.90   SUBAREA RUNOFF(CFS) =   14.02
  TOTAL AREA(ACRES) =      5.51   TOTAL RUNOFF(CFS) =   19.62
  TC(MIN.) =   9.44

****************************************************************************
  FLOW PROCESS FROM NODE   1044.00 TO NODE   1044.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
```

```
  TIME OF CONCENTRATION(MIN.) =   9.44
  RAINFALL INTENSITY(INCH/HR) =   6.12
  TOTAL STREAM AREA(ACRES) =     5.51
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     19.62

****************************************************************************
  FLOW PROCESS FROM NODE   1047.00 TO NODE   1046.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1500.30
  DOWNSTREAM ELEVATION(FEET) =   1497.50
  ELEVATION DIFFERENCE(FEET) =      2.80
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.714
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    88.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.53
  TOTAL AREA(ACRES) =      0.21   TOTAL RUNOFF(CFS) =      1.53

****************************************************************************
  FLOW PROCESS FROM NODE   1046.00 TO NODE   1045.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1497.00  DOWNSTREAM ELEVATION(FEET) = 1487.20
  STREET LENGTH(FEET) =   400.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  11.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.06
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   12.35
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.97
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.48
  STREET FLOW TRAVEL TIME(MIN.) =   1.68   Tc(MIN.) =   5.39
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.784
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.790
  SUBAREA AREA(ACRES) =    3.32      SUBAREA RUNOFF(CFS) =   23.04
  TOTAL AREA(ACRES) =      3.53        PEAK FLOW RATE(CFS) =      24.50

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  15.96
```

```
  FLOW VELOCITY(FEET/SEC.) =  4.60   DEPTH*VELOCITY(FT*FT/SEC.) =   2.05
  LONGEST FLOWPATH FROM NODE   1047.00 TO NODE   1045.00 =   500.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1045.00 TO NODE   1044.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1484.00  DOWNSTREAM(FEET) =  1477.00
  FLOW LENGTH(FEET) =   385.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.33
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     24.50
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =   6.01
  LONGEST FLOWPATH FROM NODE   1047.00 TO NODE   1044.00 =   885.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1045.00 TO NODE   1044.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.188
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7900
  SUBAREA AREA(ACRES) =    2.21   SUBAREA RUNOFF(CFS) =   14.29
  TOTAL AREA(ACRES) =      5.74   TOTAL RUNOFF(CFS) =   37.13
  TC(MIN.) =   6.01

****************************************************************************
  FLOW PROCESS FROM NODE   1044.00 TO NODE   1044.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   6.01
  RAINFALL INTENSITY(INCH/HR) =   8.19
  TOTAL STREAM AREA(ACRES) =     5.74
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     37.13

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       19.62     9.44        6.122          5.51
     2       37.13     6.01        8.188          5.74

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       49.62     6.01       8.188
     2       47.37     9.44       6.122

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     49.62   Tc(MIN.) =    6.01
  TOTAL AREA(ACRES) =     11.25
```

```
  LONGEST FLOWPATH FROM NODE   1047.00 TO NODE   1044.00 =   885.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1044.00 TO NODE   1043.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1467.90  DOWNSTREAM(FEET) =  1458.00
  FLOW LENGTH(FEET) =   290.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.48
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     49.62
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =   6.32
  LONGEST FLOWPATH FROM NODE   1047.00 TO NODE   1043.00 =  1175.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1044.00 TO NODE   1043.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.925
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7117
  SUBAREA AREA(ACRES) =    3.42   SUBAREA RUNOFF(CFS) =   21.41
  TOTAL AREA(ACRES) =     14.67   TOTAL RUNOFF(CFS) =   82.74
  TC(MIN.) =   6.32

****************************************************************************
  FLOW PROCESS FROM NODE   1043.00 TO NODE   1042.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1457.90  DOWNSTREAM(FEET) =  1443.00
  FLOW LENGTH(FEET) =   285.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.59
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     82.74
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   6.56
  LONGEST FLOWPATH FROM NODE   1047.00 TO NODE   1042.00 =  1460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1042.10 TO NODE   1042.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.744
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7280
  SUBAREA AREA(ACRES) =    3.84   SUBAREA RUNOFF(CFS) =   23.49
  TOTAL AREA(ACRES) =     18.51   TOTAL RUNOFF(CFS) =  104.34
  TC(MIN.) =   6.56

****************************************************************************
  FLOW PROCESS FROM NODE   1042.00 TO NODE   1041.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1442.90  DOWNSTREAM(FEET) =  1435.00
  FLOW LENGTH(FEET) =   240.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.40
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    104.34
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   6.77
  LONGEST FLOWPATH FROM NODE   1047.00 TO NODE   1041.00 =  1700.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1043.00 TO NODE   1041.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.582
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7353
  SUBAREA AREA(ACRES) =    2.49   SUBAREA RUNOFF(CFS) =   14.92
  TOTAL AREA(ACRES) =     21.00   TOTAL RUNOFF(CFS) =  117.08
  TC(MIN.) =   6.77

****************************************************************************
  FLOW PROCESS FROM NODE   1041.10 TO NODE   1041.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.582
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7468
  SUBAREA AREA(ACRES) =    5.56   SUBAREA RUNOFF(CFS) =   33.30
  TOTAL AREA(ACRES) =     26.56   TOTAL RUNOFF(CFS) =  150.39
  TC(MIN.) =   6.77

****************************************************************************
  FLOW PROCESS FROM NODE   1041.00 TO NODE   1040.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1434.90  DOWNSTREAM(FEET) =  1400.00
  FLOW LENGTH(FEET) =   210.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  36.77
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    150.39
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   6.87
  LONGEST FLOWPATH FROM NODE   1047.00 TO NODE   1040.00 =  1910.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1040.00 TO NODE   1020.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1400.00  DOWNSTREAM(FEET) =    975.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1465.00   CHANNEL SLOPE =  0.2901
```

```
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1925 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     150.39
  FLOW VELOCITY(FEET/SEC) =  13.05 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.87   Tc(MIN.) =   8.74
  LONGEST FLOWPATH FROM NODE   1047.00 TO NODE   1020.00 =  3375.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1040.00 TO NODE   1020.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.433
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5334
  SUBAREA AREA(ACRES) =   22.37   SUBAREA RUNOFF(CFS) =   40.29
  TOTAL AREA(ACRES) =     48.93   TOTAL RUNOFF(CFS) =  167.87
  TC(MIN.) =   8.74

****************************************************************************
  FLOW PROCESS FROM NODE   1020.00 TO NODE   1020.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   8.74
  RAINFALL INTENSITY(INCH/HR) =   6.43
  TOTAL STREAM AREA(ACRES) =    48.93
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    167.87

****************************************************************************
  FLOW PROCESS FROM NODE   1035.00 TO NODE   1034.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .7700
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1294.30
  DOWNSTREAM ELEVATION(FEET) =   1292.10
  ELEVATION DIFFERENCE(FEET) =      2.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.136
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    82.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.85
  TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.85

****************************************************************************
  FLOW PROCESS FROM NODE   1034.00 TO NODE   1033.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1291.60  DOWNSTREAM ELEVATION(FEET) = 1265.00
  STREET LENGTH(FEET) =   580.00   CURB HEIGHT(INCHES) =  6.0
```

```
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  11.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.33
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    9.86
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.74
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.53
  STREET FLOW TRAVEL TIME(MIN.) =   2.04   Tc(MIN.) =   6.18
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.048
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .7700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.770
  SUBAREA AREA(ACRES) =     3.04      SUBAREA RUNOFF(CFS) =   18.84
  TOTAL AREA(ACRES) =       3.16        PEAK FLOW RATE(CFS) =      19.58

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  12.86
  FLOW VELOCITY(FEET/SEC.) =  5.52   DEPTH*VELOCITY(FT*FT/SEC.) =   2.12
  LONGEST FLOWPATH FROM NODE   1035.00 TO NODE   1033.00 =   680.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1033.00 TO NODE   1032.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1262.00  DOWNSTREAM(FEET) =  1250.00
  FLOW LENGTH(FEET) =   450.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.33
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     19.58
  PIPE TRAVEL TIME(MIN.) =   0.66    Tc(MIN.) =   6.84
  LONGEST FLOWPATH FROM NODE   1035.00 TO NODE   1032.00 =  1130.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1033.00 TO NODE   1032.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.536
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .7700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7700
  SUBAREA AREA(ACRES) =     1.87   SUBAREA RUNOFF(CFS) =   10.85
  TOTAL AREA(ACRES) =       5.03   TOTAL RUNOFF(CFS) =   29.19
  TC(MIN.) =   6.84

****************************************************************************
  FLOW PROCESS FROM NODE   1032.10 TO NODE   1032.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.536
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .7700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7700
  SUBAREA AREA(ACRES) =     2.90   SUBAREA RUNOFF(CFS) =   16.83
  TOTAL AREA(ACRES) =       7.93   TOTAL RUNOFF(CFS) =   46.02
  TC(MIN.) =   6.84

****************************************************************************
  FLOW PROCESS FROM NODE   1032.00 TO NODE   1031.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1249.90  DOWNSTREAM(FEET) =  1248.00
  FLOW LENGTH(FEET) =   382.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.45
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     46.02
  PIPE TRAVEL TIME(MIN.) =   0.85    Tc(MIN.) =   7.69
  LONGEST FLOWPATH FROM NODE   1035.00 TO NODE   1031.00 =  1512.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1031.10 TO NODE   1031.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.985
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .7700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7700
  SUBAREA AREA(ACRES) =     6.60   SUBAREA RUNOFF(CFS) =   35.50
  TOTAL AREA(ACRES) =      14.53   TOTAL RUNOFF(CFS) =   78.15
  TC(MIN.) =   7.69

****************************************************************************
  FLOW PROCESS FROM NODE   1031.00 TO NODE   1030.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1247.90  DOWNSTREAM(FEET) =  1105.00
  FLOW LENGTH(FEET) =   365.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  43.73
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     78.15
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   7.83
  LONGEST FLOWPATH FROM NODE   1035.00 TO NODE   1030.00 =  1877.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1030.00 TO NODE   1020.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1105.00  DOWNSTREAM(FEET) =    975.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   935.00   CHANNEL SLOPE =  0.1390
```

```
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1277 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      78.15
  FLOW VELOCITY(FEET/SEC) =   8.54 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.82   Tc(MIN.) =   9.65
  LONGEST FLOWPATH FROM NODE   1035.00 TO NODE   1020.00 =  2812.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1030.00 TO NODE   1020.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.032
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5286
  SUBAREA AREA(ACRES) =   13.06   SUBAREA RUNOFF(CFS) =   20.48
  TOTAL AREA(ACRES) =     27.59   TOTAL RUNOFF(CFS) =   87.97
  TC(MIN.) =   9.65

****************************************************************************
  FLOW PROCESS FROM NODE   1020.00 TO NODE   1020.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   9.65
  RAINFALL INTENSITY(INCH/HR) =   6.03
  TOTAL STREAM AREA(ACRES) =    27.59
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     87.97

****************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1024.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1303.40
  DOWNSTREAM ELEVATION(FEET) =   1303.00
  ELEVATION DIFFERENCE(FEET) =      0.40
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.971
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    50.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      2.11
  TOTAL AREA(ACRES) =      0.29   TOTAL RUNOFF(CFS) =      2.11

****************************************************************************
  FLOW PROCESS FROM NODE   1024.00 TO NODE   1023.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1302.50  DOWNSTREAM ELEVATION(FEET) = 1295.00
  STREET LENGTH(FEET) =   500.00   CURB HEIGHT(INCHES) =  6.0
```

```
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  11.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.75
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   12.18
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.05
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.13
  STREET FLOW TRAVEL TIME(MIN.) =   2.74   Tc(MIN.) =   7.71
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.976
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .7800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.781
  SUBAREA AREA(ACRES) =    2.77      SUBAREA RUNOFF(CFS) =   15.07
  TOTAL AREA(ACRES) =      3.06        PEAK FLOW RATE(CFS) =      16.67

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  15.10
  FLOW VELOCITY(FEET/SEC.) =  3.48   DEPTH*VELOCITY(FT*FT/SEC.) =   1.49
  LONGEST FLOWPATH FROM NODE   1025.00 TO NODE   1023.00 =   600.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1023.00 TO NODE   1022.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1290.00  DOWNSTREAM(FEET) =  1288.50
  FLOW LENGTH(FEET) =   290.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.89
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     16.67
  PIPE TRAVEL TIME(MIN.) =   0.82    Tc(MIN.) =   8.53
  LONGEST FLOWPATH FROM NODE   1025.00 TO NODE   1022.00 =   890.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1022.10 TO NODE   1022.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.535
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .7700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7756
  SUBAREA AREA(ACRES) =    2.95   SUBAREA RUNOFF(CFS) =   14.84
  TOTAL AREA(ACRES) =      6.01   TOTAL RUNOFF(CFS) =   30.46
  TC(MIN.) =   8.53

****************************************************************************
  FLOW PROCESS FROM NODE   1022.00 TO NODE   1021.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1288.00  DOWNSTREAM(FEET) =  1125.00
  FLOW LENGTH(FEET) =   450.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  34.07
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     30.46
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   8.75
  LONGEST FLOWPATH FROM NODE   1025.00 TO NODE   1021.00 =  1340.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1021.00 TO NODE   1020.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1125.00  DOWNSTREAM(FEET) =    975.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   665.00   CHANNEL SLOPE =  0.2256
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1719 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     30.46
  FLOW VELOCITY(FEET/SEC) =   7.24 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.53   Tc(MIN.) =  10.28
  LONGEST FLOWPATH FROM NODE   1025.00 TO NODE   1020.00 =  2005.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1021.00 TO NODE   1020.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.794
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (2. DU/AC OR LESS) RUNOFF COEFFICIENT = .3200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5399
  SUBAREA AREA(ACRES) =    6.44   SUBAREA RUNOFF(CFS) =   11.94
  TOTAL AREA(ACRES) =     12.45   TOTAL RUNOFF(CFS) =   38.95
  TC(MIN.) =  10.28

****************************************************************************
  FLOW PROCESS FROM NODE   1020.00 TO NODE   1020.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =  10.28
  RAINFALL INTENSITY(INCH/HR) =   5.79
  TOTAL STREAM AREA(ACRES) =    12.45
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     38.95

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1       167.87     8.74        6.433         48.93
     2        87.97     9.65        6.032         27.59
     3        38.95    10.28        5.794         12.45

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
```

```
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       280.63     8.74       6.433
     2       281.99     9.65       6.032
     3       274.65    10.28       5.794

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    281.99   Tc(MIN.) =    9.65
  TOTAL AREA(ACRES) =     88.97
  LONGEST FLOWPATH FROM NODE   1047.00 TO NODE   1020.00 =  3375.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1020.00 TO NODE   1010.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    975.00  DOWNSTREAM(FEET) =    675.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2080.00   CHANNEL SLOPE =  0.1442
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1312 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    281.99
  FLOW VELOCITY(FEET/SEC) =  13.27 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.61   Tc(MIN.) =  12.27
  LONGEST FLOWPATH FROM NODE   1047.00 TO NODE   1010.00 =  5455.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1020.00 TO NODE   1010.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.169
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4626
  SUBAREA AREA(ACRES) =   30.84   SUBAREA RUNOFF(CFS) =   41.45
  TOTAL AREA(ACRES) =    119.81   TOTAL RUNOFF(CFS) =  286.48
  TC(MIN.) =  12.27

****************************************************************************
  FLOW PROCESS FROM NODE   1010.00 TO NODE   1010.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1014.00 TO NODE   1013.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1310.90
  DOWNSTREAM ELEVATION(FEET) =   1310.50
  ELEVATION DIFFERENCE(FEET) =      0.40
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.971
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
```

```
          THE MAXIMUM OVERLAND FLOW LENGTH =    50.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) =      3.06
TOTAL AREA(ACRES) =      0.42   TOTAL RUNOFF(CFS) =      3.06

****************************************************************************
FLOW PROCESS FROM NODE   1013.00 TO NODE   1012.00 IS CODE =  61
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) = 1310.00  DOWNSTREAM ELEVATION(FEET) = 1304.00
STREET LENGTH(FEET) =   480.00   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 16.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  11.00
INSIDE STREET CROSSFALL(DECIMAL) =  0.020
OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      18.36
  ***STREET FLOWING FULL***
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.45
  HALFSTREET FLOOD WIDTH(FEET) =   16.00
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.34
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.51
STREET FLOW TRAVEL TIME(MIN.) =   2.39   Tc(MIN.) =   7.37
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.183
*USER SPECIFIED(SUBAREA):
RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT =  0.790
SUBAREA AREA(ACRES) =    5.30      SUBAREA RUNOFF(CFS) =   30.08
TOTAL AREA(ACRES) =      5.72        PEAK FLOW RATE(CFS) =      32.46

END OF SUBAREA STREET FLOW HYDRAULICS:
DEPTH(FEET) = 0.52   HALFSTREET FLOOD WIDTH(FEET) =  17.01
FLOW VELOCITY(FEET/SEC.) =  4.19   DEPTH*VELOCITY(FT*FT/SEC.) =   2.18
*NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
       AND L =  480.0 FT WITH ELEVATION-DROP =   6.0 FT, IS   38.6 CFS,
       WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE   1012.00
LONGEST FLOWPATH FROM NODE   1014.00 TO NODE   1012.00 =   580.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1012.00 TO NODE   1011.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  1301.00  DOWNSTREAM(FEET) =  1300.00
FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   8.06
ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     32.46
```

```
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =   7.62
  LONGEST FLOWPATH FROM NODE   1014.00 TO NODE   1011.00 =   705.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1011.00 TO NODE   1010.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1300.00  DOWNSTREAM(FEET) =    975.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2260.00   CHANNEL SLOPE =  0.1438
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1309 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     32.46
  FLOW VELOCITY(FEET/SEC) =   6.45 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.84   Tc(MIN.) =  13.46
  LONGEST FLOWPATH FROM NODE   1014.00 TO NODE   1010.00 =  2965.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1011.00 TO NODE   1010.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.869
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3782
  SUBAREA AREA(ACRES) =   21.78   SUBAREA RUNOFF(CFS) =   28.63
  TOTAL AREA(ACRES) =     27.50   TOTAL RUNOFF(CFS) =   50.63
  TC(MIN.) =  13.46

****************************************************************************
  FLOW PROCESS FROM NODE   1010.00 TO NODE   1010.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1       50.63    13.46       4.869       27.50
  LONGEST FLOWPATH FROM NODE   1014.00 TO NODE   1010.00 =  2965.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF     Tc      INTENSITY     AREA
  NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
     1      393.11    21.40       3.610      299.47
  LONGEST FLOWPATH FROM NODE   1083.00 TO NODE   1010.00 =  6008.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1     297.89      13.46        4.869
     2     430.66      21.40        3.610

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    430.66   Tc(MIN.) =   21.40
  TOTAL AREA(ACRES) =    326.97

****************************************************************************
  FLOW PROCESS FROM NODE   1010.00 TO NODE   1010.00 IS CODE =  11
----------------------------------------------------------------------------
```

```
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
==============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM      RUNOFF      Tc       INTENSITY      AREA
  NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
     1       430.66     21.40        3.610       326.97
  LONGEST FLOWPATH FROM NODE   1083.00 TO NODE   1010.00 =  6008.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM      RUNOFF      Tc       INTENSITY      AREA
  NUMBER       (CFS)    (MIN.)    (INCH/HOUR)    (ACRE)
     1       286.48     12.27        5.169       119.81
  LONGEST FLOWPATH FROM NODE   1047.00 TO NODE   1010.00 =  5455.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF        Tc       INTENSITY
  NUMBER      (CFS)      (MIN.)    (INCH/HOUR)
     1      533.35       12.27        5.169
     2      630.75       21.40        3.610

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    630.75   Tc(MIN.) =   21.40
  TOTAL AREA(ACRES) =    446.78

****************************************************************************
  FLOW PROCESS FROM NODE   1010.00 TO NODE   1010.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
==============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1010.00 TO NODE   1010.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
==============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1010.00 TO NODE   1001.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    975.00  DOWNSTREAM(FEET) =    660.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1100.00   CHANNEL SLOPE =  0.2864
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1916 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    630.75
  FLOW VELOCITY(FEET/SEC) =  20.98 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.87   Tc(MIN.) =  22.27
  LONGEST FLOWPATH FROM NODE   1083.00 TO NODE   1001.00 =  7108.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1010.00 TO NODE   1001.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.518
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3868
  SUBAREA AREA(ACRES) =   17.67   SUBAREA RUNOFF(CFS) =   17.41
```

```
  TOTAL AREA(ACRES) =     464.45   TOTAL RUNOFF(CFS) =  632.08
  TC(MIN.) =  22.27

****************************************************************************
  FLOW PROCESS FROM NODE   1001.00 TO NODE   1001.00 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.) =  22.27
  RAINFALL INTENSITY(INCH/HR) =   3.52
  TOTAL STREAM AREA(ACRES) =   464.45
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    632.08

****************************************************************************
  FLOW PROCESS FROM NODE   1003.00 TO NODE   1002.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1311.00
  DOWNSTREAM ELEVATION(FEET) =   1225.00
  ELEVATION DIFFERENCE(FEET) =     86.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
  SUBAREA RUNOFF(CFS) =      0.70
  TOTAL AREA(ACRES) =      0.25   TOTAL RUNOFF(CFS) =      0.70

****************************************************************************
  FLOW PROCESS FROM NODE   1002.00 TO NODE   1001.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1225.00  DOWNSTREAM(FEET) =    660.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2210.00   CHANNEL SLOPE =  0.2557
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1819 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      0.70
  FLOW VELOCITY(FEET/SEC) =   2.39 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  15.42   Tc(MIN.) =  21.69
  LONGEST FLOWPATH FROM NODE   1003.00 TO NODE   1001.00 =  2310.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1002.00 TO NODE   1001.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.579
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2707
  SUBAREA AREA(ACRES) =    26.72   SUBAREA RUNOFF(CFS) =   25.82
  TOTAL AREA(ACRES) =      26.97   TOTAL RUNOFF(CFS) =   26.13
  TC(MIN.) =  21.69
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1001.00 TO NODE   1001.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  21.69
  RAINFALL INTENSITY(INCH/HR) =   3.58
  TOTAL STREAM AREA(ACRES) =    26.97
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     26.13

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
     1      632.08    22.27        3.518        464.45
     2       26.13    21.69        3.579         26.97

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1      641.65    21.69       3.579
     2      657.77    22.27       3.518

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    657.77   Tc(MIN.) =   22.27
  TOTAL AREA(ACRES) =    491.42
  LONGEST FLOWPATH FROM NODE   1083.00 TO NODE   1001.00 =  7108.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1001.00 TO NODE   1001.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  22.62   RAIN INTENSITY(INCH/HOUR) =  3.48
  TOTAL AREA(ACRES) =   491.42   TOTAL RUNOFF(CFS) =    101.19

****************************************************************************
  FLOW PROCESS FROM NODE   1001.00 TO NODE     10.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   660.00  DOWNSTREAM(FEET) =   550.00
  FLOW LENGTH(FEET) =   760.00   MANNING'S N =  0.015
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  16.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  29.14
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    101.19
  PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =  23.05
  LONGEST FLOWPATH FROM NODE   1083.00 TO NODE     10.00 =  7868.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =    491.42  TC(MIN.) =     23.05
  PEAK FLOW RATE(CFS)    =    101.19
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name: Merriam Mountains - Proposed Hydrology

Date: October 2006

Job #: 2469.01A

Run Name: MERR11-P

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
1105	1104	2	1,310.0	1,205.0	185.0	0.35	0.41	
1104	1103	5	1,205.0	850.0	640.0			
1104	1103	8				0.31	3.48	
1103	1102	5	850.0	745.0	533.0			
1103	1102	8				0.25	8.63	
1102	1101	5	745.0	740.0	35.0			
1102	1101	8				0.29	9.22	
1101	11	4	740.0	625.0	590.0			EX. 42" CSP Caltrans
								Storm Drain
							21.74	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2004 Advanced Engineering Software (aes)
            Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC
                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************** DESCRIPTION OF STUDY **************************
* MERRIAM MOUNTAINS - PROPOSED HYDROLOGY                                  *
* SUBBASIN # 11                                                           *
* 2469.01A - OCTOBER 2006                                                 *
 **************************************************************************

  FILE NAME: MERR11-P.DAT
  TIME/DATE OF STUDY: 14:53 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   1105.00 TO NODE   1104.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   185.00
  UPSTREAM ELEVATION(FEET) =   1310.00
  DOWNSTREAM ELEVATION(FEET) =   1205.00
  ELEVATION DIFFERENCE(FEET) =    105.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
```

```
THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
(Reference: Table 3-1B of Hydrology Manual)
THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.972
SUBAREA RUNOFF(CFS) =      1.14
TOTAL AREA(ACRES) =      0.41   TOTAL RUNOFF(CFS) =      1.14

****************************************************************************
 FLOW PROCESS FROM NODE   1104.00 TO NODE   1103.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1205.00  DOWNSTREAM(FEET) =    850.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   640.00   CHANNEL SLOPE =  0.5547
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .2277 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =      1.14
 FLOW VELOCITY(FEET/SEC) =   2.79 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   3.82   Tc(MIN.) =  10.08
 LONGEST FLOWPATH FROM NODE   1105.00 TO NODE   1103.00 =   825.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1104.00 TO NODE   1103.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.866
 *USER SPECIFIED(SUBAREA):
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3100
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3142
 SUBAREA AREA(ACRES) =    3.48   SUBAREA RUNOFF(CFS) =    6.33
 TOTAL AREA(ACRES) =      3.89   TOTAL RUNOFF(CFS) =    7.17
 TC(MIN.) =  10.08

****************************************************************************
 FLOW PROCESS FROM NODE   1103.00 TO NODE   1102.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    850.00  DOWNSTREAM(FEET) =    745.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   533.00   CHANNEL SLOPE =  0.1970
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .1585 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =      7.17
 FLOW VELOCITY(FEET/SEC) =   4.30 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.07   Tc(MIN.) =  12.15
 LONGEST FLOWPATH FROM NODE   1105.00 TO NODE   1102.00 =  1358.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1103.00 TO NODE   1102.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.201
 *USER SPECIFIED(SUBAREA):
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.2700
 SUBAREA AREA(ACRES) =    8.63   SUBAREA RUNOFF(CFS) =   11.22
 TOTAL AREA(ACRES) =     12.52   TOTAL RUNOFF(CFS) =   17.58
```

```
  TC(MIN.) =  12.15
****************************************************************************
  FLOW PROCESS FROM NODE   1102.00 TO NODE   1101.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    745.00  DOWNSTREAM(FEET) =    740.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    35.00   CHANNEL SLOPE =  0.1429
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1302 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     17.58
  FLOW VELOCITY(FEET/SEC) =   5.25 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.11   Tc(MIN.) =  12.26
  LONGEST FLOWPATH FROM NODE   1105.00 TO NODE   1101.00 =  1393.00 FEET.
****************************************************************************
  FLOW PROCESS FROM NODE   1102.00 TO NODE   1101.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.170
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2785
  SUBAREA AREA(ACRES) =    9.22   SUBAREA RUNOFF(CFS) =   13.82
  TOTAL AREA(ACRES) =     21.74   TOTAL RUNOFF(CFS) =   31.30
  TC(MIN.) =  12.26
****************************************************************************
  FLOW PROCESS FROM NODE   1101.00 TO NODE     11.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   740.00  DOWNSTREAM(FEET) =   625.00
  FLOW LENGTH(FEET) =   590.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  10.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.63
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     31.30
  PIPE TRAVEL TIME(MIN.) =   0.59    Tc(MIN.) =  12.85
  LONGEST FLOWPATH FROM NODE   1105.00 TO NODE     11.00 =  1983.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     21.74  TC(MIN.) =     12.85
  PEAK FLOW RATE(CFS)   =     31.30
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Proposed Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MERR12-P

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
1203	1202.8	2	1,160.0	1,110.0	75.0	0.35	0.69	
1202.8	1202.6	5	1,110.0	1,055.0	300.0			
1202.8	1202.6	8				0.35	1.56	
1202.6	1202	5	1,055.0	1,040.0	137.0			
1202.6	1202	8				0.35	1.08	
1202	1201	5	1,040.0	775.0	910.0			
1202	1201	8				0.28	10.88	
1201	12	4	775.0	650.0	545.0			EX . 36" CSP Caltrans
								Storm Drain
							14.21	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
        (c) Copyright 1982-2004 Advanced Engineering Software (aes)
            Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

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                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - PROPOSED HYDROLOGY                                 *
* SUBBASIN # 12                                                          *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MERR12-P.DAT
  TIME/DATE OF STUDY: 14:54 09/28/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   1203.00 TO NODE   1202.80 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =   1160.00
  DOWNSTREAM ELEVATION(FEET) =   1110.00
  ELEVATION DIFFERENCE(FEET) =     50.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.427
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.747
SUBAREA RUNOFF(CFS) =       2.11
TOTAL AREA(ACRES) =       0.69   TOTAL RUNOFF(CFS) =       2.11

****************************************************************************
FLOW PROCESS FROM NODE   1202.80 TO NODE   1202.60 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1110.00  DOWNSTREAM(FEET) =   1055.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.1833
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1517 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       2.11
FLOW VELOCITY(FEET/SEC) =   2.80 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.79   Tc(MIN.) =   7.21
LONGEST FLOWPATH FROM NODE   1203.00 TO NODE   1202.60 =   375.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1202.80 TO NODE   1202.60 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.280
*USER SPECIFIED(SUBAREA):
RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
SUBAREA AREA(ACRES) =     1.56   SUBAREA RUNOFF(CFS) =     3.97
TOTAL AREA(ACRES) =       2.25   TOTAL RUNOFF(CFS) =     5.73
TC(MIN.) =   7.21

****************************************************************************
FLOW PROCESS FROM NODE   1202.60 TO NODE   1202.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1055.00  DOWNSTREAM(FEET) =   1040.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   137.00   CHANNEL SLOPE =  0.1095
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .1071 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =       5.73
FLOW VELOCITY(FEET/SEC) =   3.28 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   0.70   Tc(MIN.) =   7.91
LONGEST FLOWPATH FROM NODE   1203.00 TO NODE   1202.00 =   512.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1202.60 TO NODE   1202.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.859
*USER SPECIFIED(SUBAREA):
NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
SUBAREA AREA(ACRES) =     1.08   SUBAREA RUNOFF(CFS) =     2.59
TOTAL AREA(ACRES) =       3.33   TOTAL RUNOFF(CFS) =     7.99
TC(MIN.) =   7.91

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

```
  FLOW PROCESS FROM NODE   1202.00 TO NODE   1201.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1040.00  DOWNSTREAM(FEET) =    775.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   910.00   CHANNEL SLOPE =  0.2912
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1928 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      7.99
  FLOW VELOCITY(FEET/SEC) =   4.91 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.09   Tc(MIN.) =  11.00
  LONGEST FLOWPATH FROM NODE   1203.00 TO NODE   1201.00 =  1422.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1202.00 TO NODE   1201.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.546
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2964
  SUBAREA AREA(ACRES) =   10.88   SUBAREA RUNOFF(CFS) =   16.90
  TOTAL AREA(ACRES) =     14.21   TOTAL RUNOFF(CFS) =   23.36
  TC(MIN.) =  11.00

****************************************************************************
  FLOW PROCESS FROM NODE   1201.00 TO NODE     12.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   775.00  DOWNSTREAM(FEET) =   650.00
  FLOW LENGTH(FEET) =   545.00   MANNING'S N =  0.024
  DEPTH OF FLOW IN  36.0 INCH PIPE IS   9.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.45
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     23.36
  PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =  11.55
  LONGEST FLOWPATH FROM NODE   1203.00 TO NODE     12.00 =  1967.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =     14.21  TC(MIN.) =     11.55
  PEAK FLOW RATE(CFS)    =     23.36
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Job Name:
Merriam Mountains - Proposed Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MER13-PD

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
1335	1334	2	1,307.2	1,307.0	100.0	0.79	0.17	
1334	1333	6	1,307.0	1,303.0	403.0	0.78	2.82	
1333	1331	3	1,297.0	1,287.0	500.0			
1332	1331	8				0.79	1.51	
1331	1330	3	1,287.0	1,125.0	420.0			
1331	1330	8				0.45	4.16	Fill Slope
1330	1310	5	1,125.0	840.0	1,170.0			
1330	1310	8				0.33	10.46	
1310	1310	10						Bank #1
1329	1328	2	1,300.2	1,300.0	100.0	0.79	0.25	
1328	1327	6	1,300.0	1,295.3	445.0	0.78	2.87	
1327	1326	3	1,290.0	1,285.0	264.0			
1326.1	1326	8				0.77	1.82	
1326	1325	3	1,285.0	1,283.0	74.0			
1325.1	1325	8				0.77	1.98	
1325	1324	3	1,283.0	1,280.0	387.0			
1324	1324	8				0.77	1.08	
1324	1322	3	1,280.0	1,275.0	235.0			
1323	1322	8				0.79	2.95	
1322	1321	3	1,275.0	1,165.0	355.0			
1321	1320	5	1,165.0	1,045.0	480.0			
1321	1320	8				0.32	7.09	
1320	1310	5	1,045.0	840.0	618.0			
1320	1310	8				0.26	6.38	
1310	1310	1						1 of 2
1313	1312	2	1,282.0	1,240.0	100.0	0.31	0.39	
1312	1311	5	1,240.0	1,075.0	835.0			
1312	1311	8				0.27	10.66	
1311	1310	5	1,075.0	840.0	725.0			
1311	1310	8				0.25	5.84	
1310	1310	1						2 of 2
1310	1310	11						ADD Bank #1
1310	1302	5	840.0	775.0	580.0			
1310	1302	8				0.27	6.24	
1302	1302	1						1 of 2
1307	1306	2	1,267.0	1,240.0	100.0	0.40	0.64	
1306	1304	5	1,240.0	1,045.0	935.0			
1306	1304	8				0.26	6.52	
1305	1304	8				0.27	6.11	
1304	1303	5	1,045.0	935.0	600.0			
1304	1303	8				0.25	13.86	
1303	1302	5	935.0	775.0	1,041.0			
1303	1302	8				0.27	12.12	
1302	1302	1						2 of 2

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Job Name:
Merriam Mountains - Proposed Hydrology

Date:
October 2006

Job #:
2469.01A

Run Name:
MER13-PD

Node to Node		Code	Elev 1 (feet)	Elev 2 (feet)	Length (feet)	Runoff Coeff.	Area (ac.)	Comments
1302	1301	5	775.0	760.0	130.0			
1302	1301	8				0.29	2.75	
1301	1301	7						DET OUT Q = 69.76
1301	13	4	760.0	670.0	665.0			EX. 36" RCP Caltrans
								Storm Drain
							108.67	Total Area

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

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2004 Advanced Engineering Software (aes)
             Ver. 2.0 Release Date: 01/01/2004  License ID 1355

                          Analysis prepared by:

                   FUSCOE ENGINEERING - SAN DIEGO, INC.
                     6390 GREENWICH DRIVE, SUITE 170
                       SAN DIEGO, CALIFORNIA 92122
                             (858) 554-1500

 ************************* DESCRIPTION OF STUDY *************************
* MERRIAM MOUNTAINS - PROPOSED HYDROLOGY                                 *
* SUBBASIN # 13 - WITH DETENTION ROUTING                                 *
* 2469.01A - OCTOBER 2006                                                *
 ************************************************************************

  FILE NAME: MER13-PD.DAT
  TIME/DATE OF STUDY: 12:03 09/29/2006
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.500
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE   1335.00 TO NODE   1334.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1307.20
  DOWNSTREAM ELEVATION(FEET) =   1307.00
  ELEVATION DIFFERENCE(FEET) =      0.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.971
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
```

```
          THE MAXIMUM OVERLAND FLOW LENGTH =    50.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.24
  TOTAL AREA(ACRES) =      0.17   TOTAL RUNOFF(CFS) =      1.24

****************************************************************************
  FLOW PROCESS FROM NODE   1334.00 TO NODE   1333.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1307.00  DOWNSTREAM ELEVATION(FEET) = 1303.00
  STREET LENGTH(FEET) =   403.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   8.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.10
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   12.84
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.57
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.99
  STREET FLOW TRAVEL TIME(MIN.) =   2.61   Tc(MIN.) =   7.58
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.050
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .7800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.781
  SUBAREA AREA(ACRES) =    2.82      SUBAREA RUNOFF(CFS) =   15.51
  TOTAL AREA(ACRES) =      2.99        PEAK FLOW RATE(CFS) =      16.45

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  16.00
  FLOW VELOCITY(FEET/SEC.) =  3.00   DEPTH*VELOCITY(FT*FT/SEC.) =   1.35
  LONGEST FLOWPATH FROM NODE   1335.00 TO NODE   1333.00 =   503.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1333.00 TO NODE   1331.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1297.00  DOWNSTREAM(FEET) =  1287.00
  FLOW LENGTH(FEET) =   500.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.76
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     16.45
  PIPE TRAVEL TIME(MIN.) =   0.85    Tc(MIN.) =   8.44
  LONGEST FLOWPATH FROM NODE   1335.00 TO NODE   1331.00 =  1003.00 FEET.

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

```
  FLOW PROCESS FROM NODE   1332.00 TO NODE   1331.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.581
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7837
  SUBAREA AREA(ACRES) =     1.51   SUBAREA RUNOFF(CFS) =     7.85
  TOTAL AREA(ACRES) =       4.50   TOTAL RUNOFF(CFS) =    23.21
  TC(MIN.) =   8.44

****************************************************************************
  FLOW PROCESS FROM NODE   1331.00 TO NODE   1330.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1287.00  DOWNSTREAM(FEET) =  1125.00
  FLOW LENGTH(FEET) =   420.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  32.51
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     23.21
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   8.65
  LONGEST FLOWPATH FROM NODE   1335.00 TO NODE   1330.00 =  1423.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1331.00 TO NODE   1330.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.475
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .4500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6234
  SUBAREA AREA(ACRES) =     4.16   SUBAREA RUNOFF(CFS) =    12.12
  TOTAL AREA(ACRES) =       8.66   TOTAL RUNOFF(CFS) =    34.96
  TC(MIN.) =   8.65

****************************************************************************
  FLOW PROCESS FROM NODE   1330.00 TO NODE   1310.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1125.00  DOWNSTREAM(FEET) =    840.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1170.00   CHANNEL SLOPE =  0.2436
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1779 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     34.96
  FLOW VELOCITY(FEET/SEC) =   7.71 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.53   Tc(MIN.) =  11.18
  LONGEST FLOWPATH FROM NODE   1335.00 TO NODE   1310.00 =  2593.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1330.00 TO NODE   1310.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.488
*USER SPECIFIED(SUBAREA):
RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .3300
S.C.S. CURVE NUMBER (AMC II) =   0
AREA-AVERAGE RUNOFF COEFFICIENT = 0.4629
SUBAREA AREA(ACRES) =   10.46   SUBAREA RUNOFF(CFS) =   18.94
TOTAL AREA(ACRES) =     19.12   TOTAL RUNOFF(CFS) =   48.57
TC(MIN.) =  11.18

****************************************************************************
  FLOW PROCESS FROM NODE   1310.00 TO NODE   1310.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1329.00 TO NODE   1328.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTAIL (14.5 DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1300.20
  DOWNSTREAM ELEVATION(FEET) =   1300.00
  ELEVATION DIFFERENCE(FEET) =      0.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.971
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    50.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  9.222
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.82
  TOTAL AREA(ACRES) =      0.25   TOTAL RUNOFF(CFS) =      1.82

****************************************************************************
  FLOW PROCESS FROM NODE   1328.00 TO NODE   1327.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1300.00  DOWNSTREAM ELEVATION(FEET) = 1295.30
  STREET LENGTH(FEET) =   445.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   8.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.70
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.39
    HALFSTREET FLOOD WIDTH(FEET) =   13.03
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.67
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.03
  STREET FLOW TRAVEL TIME(MIN.) =   2.78   Tc(MIN.) =   7.75
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