Appendix G-1
Preliminary Drainage Reports

Preliminary Drainage Report:

Apple Valley 143 Acres Project

City of Apple Valley, California

September 24, 2022

APN: 472-211-06 (Parcel 1), 472-211-05 (Parcel 2), 472-222-11 (Parcel 3), 472-211-15 (Parcel 4), AND 472-222-06 (Parcel 5).

Stoddard Wells Road



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1 INTRODUCTION

1.1 Project Overview

The proposed project is located in the high desert region of southwest San Bernardino County, in the City of Apple Valley, California. The subject project is bordered by U.S. I-15 to the west, Stoddard Wells Road to the South, and Johnson Road to the North. North of Johnson Road, the "Golden Triangle" was annexed by the City in 2009 (Annexation 2008-001).

At the northeast intersection of U.S. I-15 and Stoddard Wells Road, the City is proposing a separate project, called the Apple Valley I-15 Travel Center, which consists in the construction and operation of a full-service travel center and recreational vehicle park on 33.52 acres of vacant land. A Notice of Preparation (NOP) of a EIR for the separate project has been filed on December 3, 2021 by the City. Utility coordination between the two adjacent project is needed during final design.

The project proposes to develop 3 logistic warehouses. This Preliminary Drainage Report covers the Apple Valley 143 Acres project, which proposes the development of 143 acres, including 2,519,000 square-feet of warehouse space (487 dock doors, 759 trailers), and 1336 stalls for automobiles. The project includes also the construction of driveways, landscape areas, utilities, and other appurtenances inherent to industrial warehouses.

The project coordinates are: (Lat: 34.597443 deg; Long: -117.250355 deg). The project is intended to be constructed on the following Assessor Parcel Numbers (APNs): 472-211-06 (Parcel 1), 472-211-05 (Parcel 2), 472-222-11 (Parcel 3), 472-211-15 (Parcel 4), AND 472-222-06 (Parcel 5).

1.2 Purpose

The purpose of this report is to demonstrate compliance of the proposed drainage mitigation infrastructure with the City of Apple Valley and San Bernardino County Flood Control, and California standards and guidelines. A copy of the City drainage requirements (Apple Valley Code of Ordinances s is provided as Attachment E. Specifically, the proposed project should mitigate (1) the DCV and the Hydromodification Volume; (2) the 10-year 24-hour storm hydrograph (peak discharge, runoff volume, and time of concentration); and (3) the 100-year 1-hour peak discharge.

In addition, this report will discuss existing and proposed drainage infrastructure using the preliminary layout shown in the Tentative Parcel Map. A review of FEMA designated flood hazard areas will also be included.

Conceptual sizes of the backbone storm drain lines are provided only. Hydraulic computations and sizing of both onsite and offsite drainage infrastructure will be provided during final engineering. The need for energy dissipation systems is anticipated at offsite inlets and discharge points to Bell Mountain Wash tributary. However, the sizing of such systems will be provided during final engineering.

1.3 Site Discussion

Watershed Description - The proposed project is tributary to the southeastern-flowing Bell Mountain Wash, also considered as a dry wash tributary of the Mojave River. Bell Mountain Wash is a natural channel that collects runoff primarily in the area north and west of Bell Mountain and runs for approximately 11 miles before its confluence with the Mojave River. A number of small, unnamed drainages flow towards the River from the western part of the Ord Mountains, which occur to the southeast. Bell Mountain, at 3,897 feet above sea level, is the highest point in the Town, while the lowest point, approximately 2,700 feet above sea level, occurs along the Mojave River.

The region is subject to temperature extremes, ranging from the 20°F in the winter months to more than 100°F in the summer, with variations based on elevation. The average annual rainfall is approximately 3.9 inches. The region is subject to intense seasonal storms, and the rainfall in a given year may vary.

Requests for existing drainage studies in the project vicinity were made to the City of Apple Valley, San Bernardino County Flood Control District, and Caltrans District 8. The Apple Valley Master Plan of Drainage (Williamson & Schmid, 1992) was obtained and reviewed. The preparation of the Master Plan of Drainage preceded the annexation by the City of supplemental unincorporated land. As identified by the City, no existing hydrology study is available in the vicinity of the proposed project.

A watershed delineation was carried out using available topographic data, aerial imagery from Google Earth, and an understanding of the location of existing culverts. The methodology is further described under Section 2.1.

Numerous dry, desert, washes are tributary to a series of seven culverts convey runoff from the southern slopes of Silver Mountain Range across I-15. Runoff from the seven culvert ultimately discharge onto or adjacent to the proposed project. Most of these watercourses are ephemeral, in that they rarely contain surface water flow and generally have poorly defined banks. A total of 1,583 acres of undeveloped, high desert, land is anticipated to drain to the seven culverts that connect the defined washes from west to east of I-15. The highest elevation of tributary drainage area west of I-15 culminates at 4,207 feet and its tributary desert wash runs southeasterly for approximately 4 miles before crossing I-15. The largest tributary drainage area to one of the seven I-15 cross-culverts (culvert #4) is of 610 acres.

East of I-15, the GIS-based delineation process determined that an additional 340 acres of currently undeveloped land will contribute to the single point of confluence with Bell Mountain Wash. The lowest point in the delineated tributary drainage area is of 2,894.2 feet. Multiple lines of evidence, including topographic data and aerial imagery, show that floodwaters in the dry washes cross are intended to cross Stoddard Wells Road at two existing culverts located near the interchange. However, the two existing culverts appear undersized to convey the existing 10- and 100-year peak discharges from the cumulative 1,923 acres of tributary drainage area. As such, floodwaters are expected to breach the roadway at numerous locations, notably at node 1021.

Aside from I-15 and dirt roads, the watershed is for the most part undeveloped. Land cover can be characterized as Desert Shrubs with poor cover (less than 50% of vegetation cover). 38% of native soils are conducive to infiltration (hydrologic soil group A) are generally located between Boulder Road and I-15, and along the southeast edge of the proposed Project. The upper reaches of Silver Mountain are made of Sparkhule-Rock outcrops. An exhibit showing the distribution of hydrologic soil groups across the drainage area is provided under Attachment A.

Onsite Existing Condition - Aside from a couple dirt roads graded for maintenance of the culverts owned and maintained by Caltrans, the proposed site is currently undeveloped with native vegetation. Land cover can be characterized as Desert Shrubs with poor cover (less than 50% of vegetation cover). There is no impervious development on the existing site.

Numerous dry desert washes generally drain in a southerly direction with slopes averaging 3-percent. Most of these watercourses are ephemeral, in that they rarely contain surface water flow and generally have poorly defined banks. Wider desert washes are present downstream of the seven culvert that originate from Silver Mountain.

Floodwaters in the dry washes cross are intended to cross Stoddard Wells Road at two existing culverts located near the interchange. However, the two existing culverts appear undersized to convey the existing 10- and 100-year peak discharges from the cumulative 1,923 acres of tributary drainage area. As such, floodwaters are expected to breach the roadway at numerous locations, notably at node 1021.

The presence of native soils that are conducive to infiltration (hydrologic soil group A) are only present along the southeast portion of the proposed project. Other onsite soils are generally of hydrologic soil group D.

Onsite Proposed Condition - The proposed project falls outside of the limits of the Citywide Master Plan of Drainage (Williamson & Schmid, 1992). As such, the proposed storm drain layout intends to capture and convey all onsite runoff from the 100-year storm event, and discharge it across Stoddard Wells Road to a tributary of Bell Mountain Wash. Two onsite storm drain lines are proposed to capture and convey all onsite runoff.

Storm Drain Line A generally captures and conveys all runoff from Building pad 3 (37.7 acres), the eastern parking lot for Building pad 2 (7.2 acres), and Building pad 1 (33.8 acres). Storm Drain Line A will successively run along the eastern and southern edges of the proposed project. A flow splitter will convey runoff to an underground infiltration chamber that is sized to (1) infiltrate the entire Design Capture volume and the delta hydromodification volume for compliance with the MS4 Permit, and (2) mitigate storm runoff peak discharges and volumes from both the 10- and 100-year events. Onsite slopes for areas tributary Storm Drain Line A average 2 percent. The only pervious areas are the perimeter planters.

Storm Drain Line B captures and conveys runoff from Building pad 2 (63.5 acres). Storm Drain Line B will run along the western edge of the proposed project and discharges to the dual-use extended detention basins. Both treated low-flow and mitigated high-flow outlets from the extended detention basin encroach onto Storm Drain Line A. Both extended detention basins are hydraulically connected through equalization pipes. The extended detention basins are sized to (1) biotreat the entire Design Capture volume and the delta hydromodification volume for compliance with the MS4 Permit, and (2) mitigate storm runoff peak discharges and volumes from both the 10- and 100-year events. Onsite slopes for areas tributary Storm Drain Line B average 2 percent. The only pervious areas include the perimeter planters and the extended detention basins.

Offsite run-on is anticipated from a total of seven culverts crossing I-15. Runoff from the two most northern culverts (Culvert #6 and #7) will drain east of Wrangler Road. The collector road will be improved to accommodate access to all three warehouses. A perimeter ditch that runs along the eastern toe of Wrangler Road will be constructed, thus preventing any run-on from Culverts #6 and #7 to spill onto the proposed project. Storm Drain Line D will be constructed at the northeast corner of the improved Wrangler Road and Stoddard Wells Road. Storm Drain Line D will convey offsite runoff and a segment of Stoddard Wells Road from approximately 439 acres of drainage area across Stoddard Wells to discharge it to a tributary of Bell Mountain Wash.

Another perimeter ditch will be constructed along the northern and western edges of the proposed project. A total of seven depressed inlets will be constructed to capture offsite runoff from the dry desert washes that originate from Silver Mountain and drain over 1,317 acres. Storm Drain Line C will convey all offsite runoff. Onsite Storm Drain Line A and Line B will confluence with Storm Drain Line C at Hydrologic Nodes 3012 and 3013, respectively. Storm Drain Line C will extend across Stoddard Wells Road and discharge to a tributary of Bell Mountain Wash. An energy dissipation at the outlet of Line C will be constructed.

The proposed site will be isolated by perimeter roadways, as well as a ditch and perimeter storm drain to capture offsite runoff.

1.4 Flood Insurance Rate Map Panel #06071C5810H

The existing Federal Emergency Management Agency (FEMA) map was used to determine if the project site is located within the limits of the 100-year floodplain. Review of the existing FEMA Flood Insurance Rate Map (FIRM), panel 06071C5810H and 06071C5830H (not printed) indicates that the project site is located in a Flood Designation Zone D, which indicates that the vicinity of the project site has not been mapped by FEMA, as it falls within a Flood Designation Zone D (undetermined but possible).

A FEMA Flood Designated Zone A (equivalent to a 100-year floodplain) is mapped for Bell Mountain Wash, approximately 2,200 feet downstream of the I-15 bridge and remains outside of the project limits.
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2 HYDROLOGY

2.1 Methodology

A watershed delineation was carried out using available topographic data, aerial imagery from Google Earth, and an understanding of the location of existing culverts. Specifically, the following topographic information was utilized:

- 3' LiDAR topographic data from San Bernardino County Flood Control District (2016)
- USGS NED 1/3 arc-second Contours for San Bernardino (2012)

A 10' composite Digital Elevation Model (DEM) was compiled and used as the basis for delineation. GIS watershed delineation tools were used to generate drainage catchments and flow paths, consistent with the guidelines set forth in the San Bernardino County Hydrology Manual (1986).

Due to the erratic nature of dry washes, including the potential to change course during major storm events, the rational method was applied to characterize the tributary drainage area to each culvert across I-15. Most of these watercourses are ephemeral, in that they rarely contain surface water flow and generally have poorly defined banks.

The hydrologic analysis was completed in accordance with the 1986 San Bernardino County Hydrology Manual and its 2010 Hydrology Manual Addendum. The rational method has been used to calculate peak flows for both the existing and proposed site conditions. The Hydrology Manual Addendum requires the use of NOAA Atlas 14 rainfall values when completing hydrologic analyses. The project site is designated as Antecedent Moisture Condition (AMC) II per Figure ADD-1 based on the NOAA Atlas statistical data. AMC II is classified as moderate runoff potential.

Peak discharge and volumetric mitigation computations were performed using the Unity Hydrograph method in AES. Both existing and proposed conditions Unit Hydrographs are derived from the Desert S-Graph, as defined in the County's Hydrology Manual.

Mitigation is included through the proposed subsurface infiltration chamber for Onsite Storm Drain Line A, and through the proposed extended detention basin for Onsite Storm Drain Line B. The proposed subsurface infiltration chamber has a total infiltration surface area of 96,653 square feet, as well as a total storage capacity of 7.90 acre-feet. The proposed extended detention basin is designed with a volumetric storage capacity of 27.2 acre-feet plus two feet of freeboard.

2.2 Rainfall

Rainfall statistics are derived from the published NOAA Atlas 14 intensity-duration statistics. A copy of the rainfall statistics is included under Appendix I.

Table 1 – NOAA Atlas 14 Statistics

Rainfall	Value (in)
10-year 1-hour	0.612
10-year 24-hour	2.17
100-year 1-hour	1.08
100-year 24-hour	3.52

2.3 Hydrologic Results

Refer to existing and proposed condition hydrology exhibits, along with rational method AES printouts, in Appendices G and H, respectively.

Refer to Appendices G and H for rational method computations.

Refer to Attachment H for Unit Hydrograph method mitigation computations.

Onsite mitigation of increased peak discharge and volumetric runoff that is due to the proposed improvements is achieved by the proposed subsurface infiltration chamber for Onsite Storm Drain Line A, and through the proposed extended detention basin for Onsite Storm Drain Line B. Onsite mitigation performance is summarized in Table 2 and Table 3 for Storm Drain Line A (Hydrologic Node 3013) and Storm Drain Line B (Hydrologic Node 3012), respectively. The proposed infiltration chamber is designed to capture and infiltrate the full 10-year runoff volume from Storm Drain Line A, effectively reducing its discharge to none. The extended detention basin will effectively reduce the 10-year peak discharge from Storm Drain Line B to low flows only. While the extended detention basin sits on soils that are designated of Hydrologic Soil Group D, losses through infiltration and evaporation are anticipated given the footprint of the proposed basins.

Table 2 – Onsite Mitigation Storm Drain Line A at Hydrologic Node 3013

Parameter	Storm	Proposed Condition without mitigation	Proposed Condition with mitigation
Peak Discharge Q (cfs)	10-year	86.2	0
	100-year	158.2	19.1
Runoff Volume V (AF)	10-year	12.1	0
	100-year	20.4	1.0

Table 3 – Onsite Mitigation Storm Drain Line B at Hydrologic Node 3012

Parameter	Storm	Proposed Condition without mitigation	Proposed Condition with mitigation
Peak Discharge Q (cfs)	10-year	79.6	0.5
	100-year	150.4	1.0
Runoff Volume V (AF)	10-year	9.4	9.4
	100-year	16.3	16.3

At the scale of the entire watershed tributary to Bell Mountain Wash, full mitigation is achieved and confirms mitigation to the drainage standards. Table 4 summarizes full hydrologic mitigation at Hydrologic Node 1025.

Table 4 – 100-Year 1-Hour Peak Discharge Mitigation at Hydrologic Node 1025

Parameter	Storm	Existing Condition	Proposed Condition with mitigation
Peak Discharge Q (cfs)	10-year	1,210	1,003
	100-year	2,233	2,175
Runoff Volume V (AF)	10-year	82.3	81.7
	100-year	198.9	193.9

3 CONCEPTUAL DEBRIS YIELD COMPUTATIONS

3.1 Methodology

3.1.1 Approach, methodologies, and assumptions

The USACE Los Angeles District Debris Method (USACE, 2000) consists of a set of predictive equations expressing the single event unit debris yield of a watershed as a function of physiographic, hydrologic, and meteorologic parameters. These predictive equations were developed by multiple regression analyses of single event debris data observed in the San Gabriel Ranges of southern California.

As defined in this method, the "total debris yield" is the total debris outflow from a watershed measurable at a specific concentration point for a specified event. It may include clay, silt, sand, gravel, boulders, tree stumps, and other organic materials. The "debris production" is the gross erosion within a watershed while the "debris yield" is the quantity of debris actually delivered to a concentration point of interest. The entire debris production of the watershed may not necessarily reach its outlet because it is stored temporarily within the watershed due to the lack of transporting capacity of the conveyance system.

There are five empirical equations that were derived on the basis of watershed size ranging from 0.1 to 200 square miles. The multiple regression analyses indicated that the unit debris yield (DY) for a watershed is highly correlated with the following basin parameters: relief ratio (RR) analogous to watershed slope, drainage area (A), unit peak flow (Q), and the non-dimensional fire factor (FF).

Equation 2 is usually applied to drainages 3 to 10 square miles in area. Equation 1, which is a function of precipitation rather than runoff, is used for basins 0.1 to 3; however, if frequency discharge information is available, Equation 2 may be used for areas less than 3 square miles (USACE, 2002).

Equation 2 was applied herein to the drainages of interest less than 3 square miles in size since frequency discharge information was available; thus, Equation 2 was applied to every subbasin:

$$\log DY = 0.85\log Q + 0.53\log RR + 0.04\log A + 0.22FF$$

where

DY = unit debris yield (yd3/mi2),

RR = relief ratio (feet/mile),

A = drainage area (acres),

FF = non-dimensional fire factor, and

Q = unit peak flow (cfs/mi2)

3.1.2 Limitations

The general limitations related to the applications of the USACE Los Angeles District Debris Method in the prediction of debris yield are as follows: (1) geographic constraints, (2) drainage area constraints, (3) topographic constraints, (4) frequency constraints, and (5) input constraints. The frequency and input constraints pertain to small events less than 20-percent annual chance and low runoff or precipitation. Since the recurrence interval in this study is 100-year, only the geographic, drainage area and topographic constraints remain. This method is intended to be used for the estimation of debris yield mainly from coastal-draining mountainous watersheds located in southern California. Since the predictive equations were derived from data observed in the San Gabriel Range, the use of these equations for watershed conditions different from those of the San Gabriel Range must be specifically addressed. The method is applicable only to watersheds with areas ranging from 0.1 to 200 square miles and with a high proportion

of their total area in steep, mountainous terrain. The use of this method to compute debris yields for watersheds in mild-sloped valley areas with a high percentage of piedmonts and alluvial fans or valley fill areas may result in estimates that are higher than actual yield. If the sediment transport capacity is less than the statistical debris method results, the sediment transport capacity governs the debris yield.

3.1.3 Adjustment-Transposition (A-T) factor

The use of predictive equations developed from data pertaining to watersheds, which historically demonstrate extremely high unit yields will result in overestimates of debris yields when applied to areas with less erosional activity. Recognizing this limitation, and the importance of uncertain geomorphic and geologic parameters, the USACE Los Angeles District developed an Adjustment-Transposition (A-T) factor.

3.1.4 Regional assumptions

The NHC (2015) Study identified the use of a A-T factor of 0.5 based on previous work completed by Bechtel. The factor of 0.5 was also used in this study.

Due to the low risk of wildfires occurring in this region due to sparse vegetation, the Fire Factor (FF) used in the analysis of each subbasin was assigned a minimum value of 3.0 based on fire factor (Tables A-1 and A-2; USACE, 2000).

3.1.5 Computational results

Debris yield calculations were performed for both Storm Drain Line C and Storm Drain Line D, which are both intended to capture and convey all offsite runoff that traverses the seven culverts of I-15. Since I-15 is elevated, it is likely that the interstate will effectively act as a debris barrier and prevent the transport of significant amount of debris and sediments. Further investigations should be performed during final engineering.

The proposed project does not include any debris basin. Rather, the proposed design is intended to bypass all debris and sediments to (1) allow the conveyance of coarse grained sediments that are critical to the geomorphology of Bell Mountain Wash and the Mojave River; and (2) minimize maintenance of large flood control facilities by the City and the San Bernardino County Flood Control District.

A summary of the debris yield calculations by subbasin and storm event are listed in Table 5 (10-year event) and Table 6 (100-year event). Bulking factors of 1.11 and 1.23 were computed for Storm Drain Line C and Storm Drain Line D, respectively. These translate to 100-year bulked discharges of 667 cfs and 1,941 cfs, respectively.

The calculated bulked peak flows will be utilized in the final engineering design of the project flood conveyance.

3.1.6 Supplemental grading considerations

Proposed grading within the project site should be performed with an understanding of existing watercourses to prevent the creation of concentrated runoff, localized erosion, and, in some cases, trigger the formation of flow-cut watercourses downstream.

Table 5 – Debris Yield and Bulked Peak Discharges – 10 Year Event

subbasin	drainage area {sq mi}	relief ratio {ft/mi}	fire factor	A-T factor	Max 1 Hour Precipitation {in}	10-percent annual chance storm						
						Q_p {cfs}	q_p {cfs/mi^2}	flood volume {ac-ft}	debris yield {ac-ft}	bulked volume {ac-ft}	bulking factor	$Q_{p,bulked}$ {cfs}
3011 - Storm Drain Line D	0.76	174	3.0	0.50	0.61	275	364	19	2.5	21	1.13	312
1018 - Storm Drain Line C	2.07	206	3.0	0.50	0.61	727	352	62	17.8	80	1.29	935

Table 6 – Debris Yield and Bulked Peak Discharges – 100 Year Event

subbasin	drainage area {sq mi}	relief ratio {ft/mi}	fire factor	A-T factor	Max 1 Hour Precipitation {in}	1-percent annual chance storm						
						Q_p {cfs}	q_p {cfs/mi^2}	flood volume {ac-ft}	debris yield {ac-ft}	bulked volume {ac-ft}	bulking factor	$Q_{p,bulked}$ {cfs}
3011 - Storm Drain Line D	0.76	174	3.0	0.50	1.08	600	793	44	4.9	49	1.11	667
1018 - Storm Drain Line C	2.07	206	3.0	0.50	1.08	1,574	761	147	34.3	181	1.23	1,941

4 CONCEPTUAL HYDRAULICS

4.1 Methodology

Hydraulics will be performed during final engineering. It is anticipated that final hydraulic design will include:

- Hydraulic sizing of proposed backbone and lateral storm drain lines using WSPG or similar;
- Hydraulic sizing of catch basin inlets, drainage ditches, and outlet structures using the FHWA Hydraulic Toolbox or similar;
- Hydraulic sizing of depressed culvert inlets using FHWA HY8;
- Hydraulic sizing of riprap pad or other adequate energy dissipation systems using FHWA HEC 14.

In this preliminary drainage reports, conceptual sizing the backbone storm drains was generated using FHWA Hydraulic Toolbox. Sizing assumed no backwater effects, no energy losses from bend or transition structures, and that all facilities would function in non-pressurized conditions. While the average longitudinal slope of onsite storm drains will exceed 2 percent, these assumptions should be revisited during final engineering.

4.2 Results

Attachment L includes an exhibit that defines the conceptual size of each onsite Storm Drain Line based on the identified 100-year peak un-bulked discharge. A summary of the sizes for Storm Drain Lines A, B, C, and D is included in Table 7, Table 8, Table 9, and Table 10, respectively. Final engineering of storm drain lines should be based on bulked flows for both Storm Drain Line C and Storm Drain Line D.

Table 7 – Conceptual Sizing – Storm Drain Line A

Line	Upstream Hydrologic Node	Downstream Hydrologic Node	Q100 (cfs)	SD Size
Lat A-3	8004	8005	91.16	42” HDPE
Line A	8101	8005	9.69	18” HPDE
Line A	8005	8006	101.03	42” HDPE
Line A	8006	8007	106.48	42” HDPE
Line A	8007	8008	109.77	42” HDPE
Line A	8008	8009	109.77	42” HDPE
Lat A-1	8202	8009	33.21	30” HDPE
Line A	8009	8010	141.41	48” HDPE
Line A	8010	8011	145.98	48” HDPE
Line A	8011	8012	161.98	54” HDPE
Lat A-4	8400	8012	15.40	24” HDPE

Line	Upstream Hydrologic Node	Downstream Hydrologic Node	Q100 (cfs)	SD Size
Lat A-5	8012	8012.5	167.94	54” HDPE
Line A	8012	3013	167.94	54” HDPE

Table 8 – Conceptual Sizing – Storm Drain Line B

Line	Upstream Hydrologic Node	Downstream Hydrologic Node	Q100 (cfs)	SD Size
Line B	9000.5	9001	19.35	24” HDPE
Line B	9001	9002	45.18	36” HPDE
Line B	9002	9003	61.03	42” HDPE
Line B	9003	9004	108.57	48” HDPE
Lat B-2	9102	9003	41.28	36” HDPE
Lat B-3	9004.5	3012	128.67	48” HDPE

Table 9 – Conceptual Sizing – Storm Drain Line C

Line	Upstream Hydrologic Node	Downstream Hydrologic Node	Q100 (cfs)	SD Size
Line C	2003	3006	43.78	36” RCP
Lat C-1	3005.5	3006	53.90	42” RCP
Line C	3006	3007	91.91	48” RCP
Lat C-2	4002.5	3007	27.22	36” RCP
Line C	3007	3008	117.27	48” RCP
Lat C-3	5800.5	3008	9.98	18” RCP
Line C	3008	3009	122.29	48” RCP
Lat C-4	5019.5	3009	1,019.00	96” RCP
Line C	3009	3010	1,106.06	96” RCP
Lat C-5	6009.5	3010	92.15	48” RCP
Line C	3010	3011	1,183.77	108” RCP
Lat C-6	7007.5	3011	110.48	48” RCP
Line C	3011	3012	1,264.25	108” RCP
Line C	3012	3013	1,342.03	108” RCP
Line C	3013	3014	1,470.09	9’x8’ RCB
Lat C-8	2204	3014	12.38	18” RCP
Line C	3014	1023.5	1,475.95	9’x8’ RCB

Table 10 – Conceptual Sizing – Storm Drain Line D

Line	Upstream Hydrologic Node	Downstream Hydrologic Node	Q100 (cfs)	SD Size
Line D	1019	1019.5	286.74	72” RCP
Lat D-1	1401	1019.5	1.13	18” RCP
Line D	1019.5	1021	287.18	72” RCP

5 PRIORITY PROJECT WQMP REQUIREMENTS

5.1 Findings

A separate Preliminary Water Quality Management Plan (WQMP) has been prepared to demonstrate the proposed project's compliance with the requirements of the Phase II MS4 Permit and the Mojave Watershed Technical Guidance Documents. Specifically, the project is classified as a Priority Project and will comply with the following criteria:

- LID Performance Criteria: "Site Design Measures as defined in Section F.5.g.1. shall be based on the objective of achieving infiltration, evapotranspiration and/or harvesting/reuse of the 85th percentile rainfall event, to the extent feasible, to meet Section F.5.g.2.b. Numeric Sizing Criteria for Storm Water Retention and Treatment. Site design measures shall be used to reduce the amount of runoff, to the extent technically feasible, for which retention and runoff is required."
- Hydromodification Performance Criteria: "Post-development runoff volume, time of concentration, and peak flow velocity for the 10-year frequency storm does not exceed that of the pre-development condition by more than five percent".

The proposed underground infiltration chamber (7.90 acre-feet) will have the capacity to retain and infiltrate the full delta volume (300,000 cu-ft) and address the Hydromodification Performance Criteria for the full proposed project. Infiltration of the full delta volume will occur in less than 48 hours for the proposed onsite improvements tributary to Storm Drain Line A.

The proposed extended detention basin (27.2 acre-feet) will provide the adequate biofiltration treatment capacity of the full design capture volume (127,625 cubic-feet) and the full hydromodification volume (204,770 cubic-feet). The design of both underground infiltration chamber and extended detention basins is based on preliminary engineering considerations, including the minimum setback from structures as recommended by the geotechnical engineer. Further refinement of the project is anticipated during final engineering.

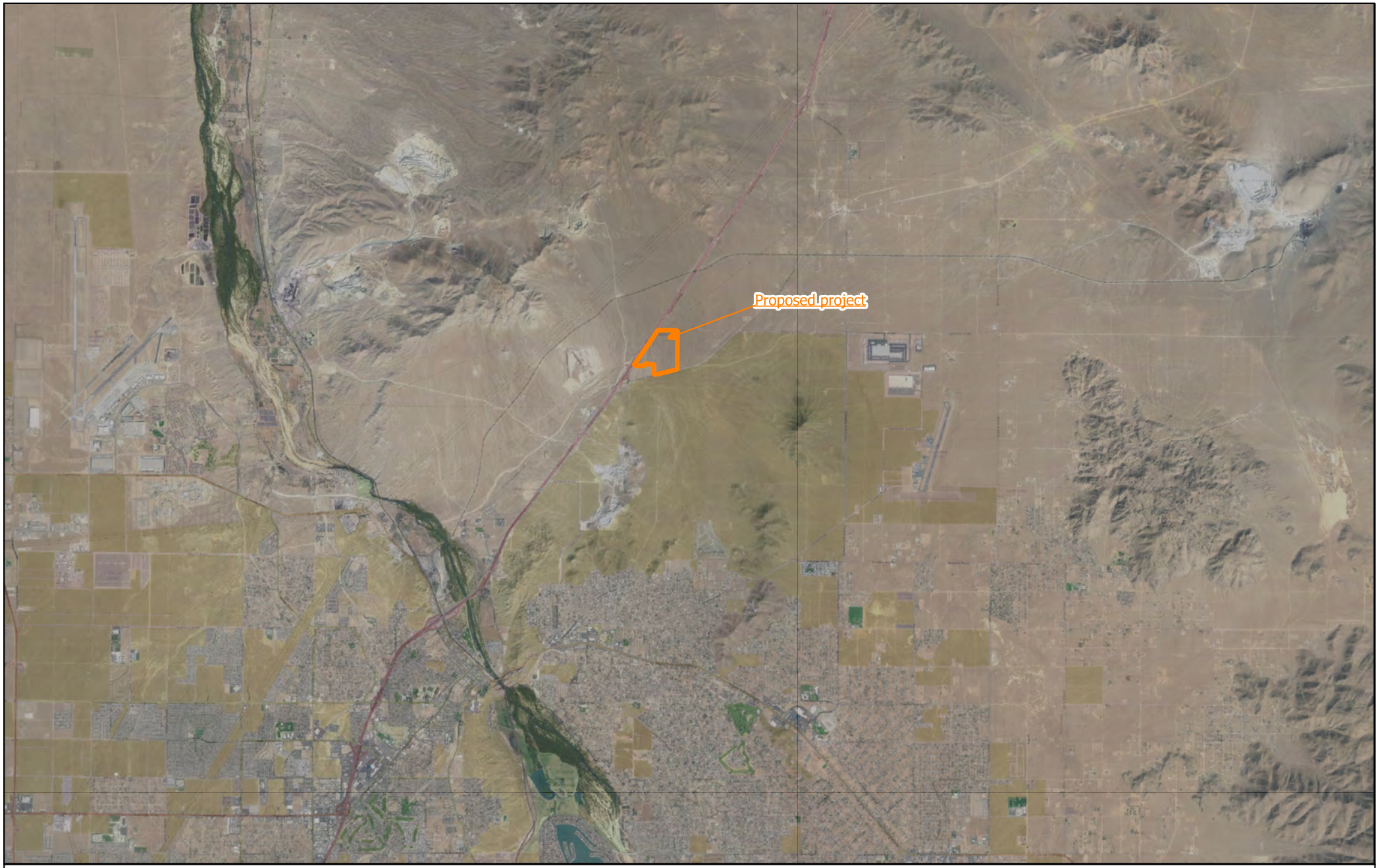
6 CONCLUSIONS

In conclusion, the proposed development will not adversely affect the existing drainage patterns in the area and will provide adequate protection for the proposed on-site improvements and structures. The combination of underground infiltration chamber and extended detention basins will capture and mitigate the design capture volume, the hydromodification volume, and both peak discharge and runoff volumes from the 10-year 24-hour and the 100-year 24-hour storm events. Post-development hydrologic conditions are mitigated to levels below those in the pre-development hydrologic conditions.

Technical Appendices

Appendix A

Maps



Consulting

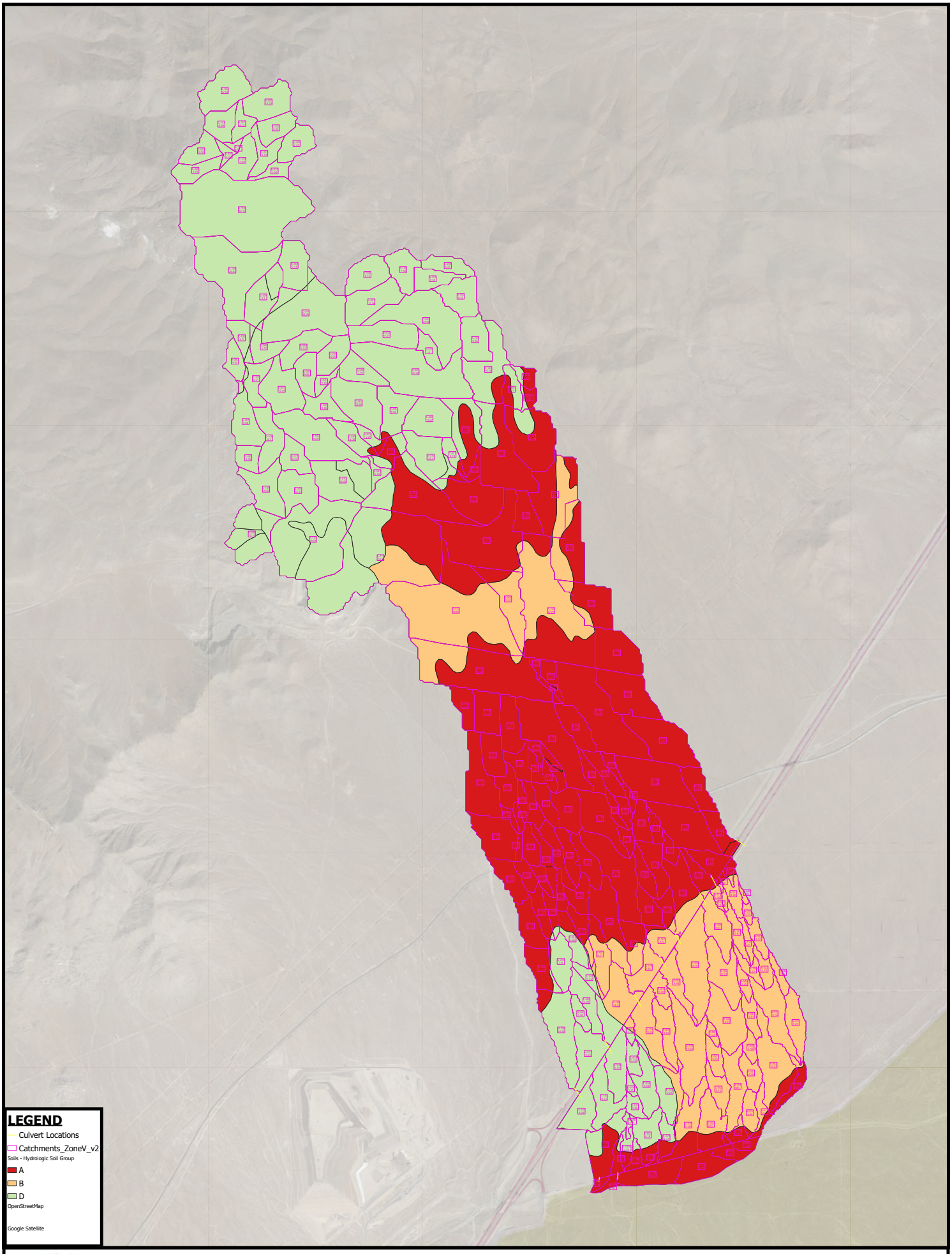
0 1 2 mi

N:\40.TEMP.XXX Apple Valley 143\GIS\MXD\VicinityMap_AV143AC.qgz

Vicinity Map

Apple Valley 143-Acre Project, Apple Valley, California

2022-09-23



Town of Apple Valley California

Q3 Consulting

Preliminary Drainage Exhibit - Hydrologic Soil Groups

Apple Valley 143-Acre Project, Apple Valley, California
For: Covington Development Partners, LLC
2022-08-25

Appendix B

DFIRM Panel #06071C5810H

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 11 North. The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from digital orthophotography collected by the U.S. Department of Agriculture Farm Service Agency. This imagery was flown in 2005 and was produced with a 1-meter ground sample distance.

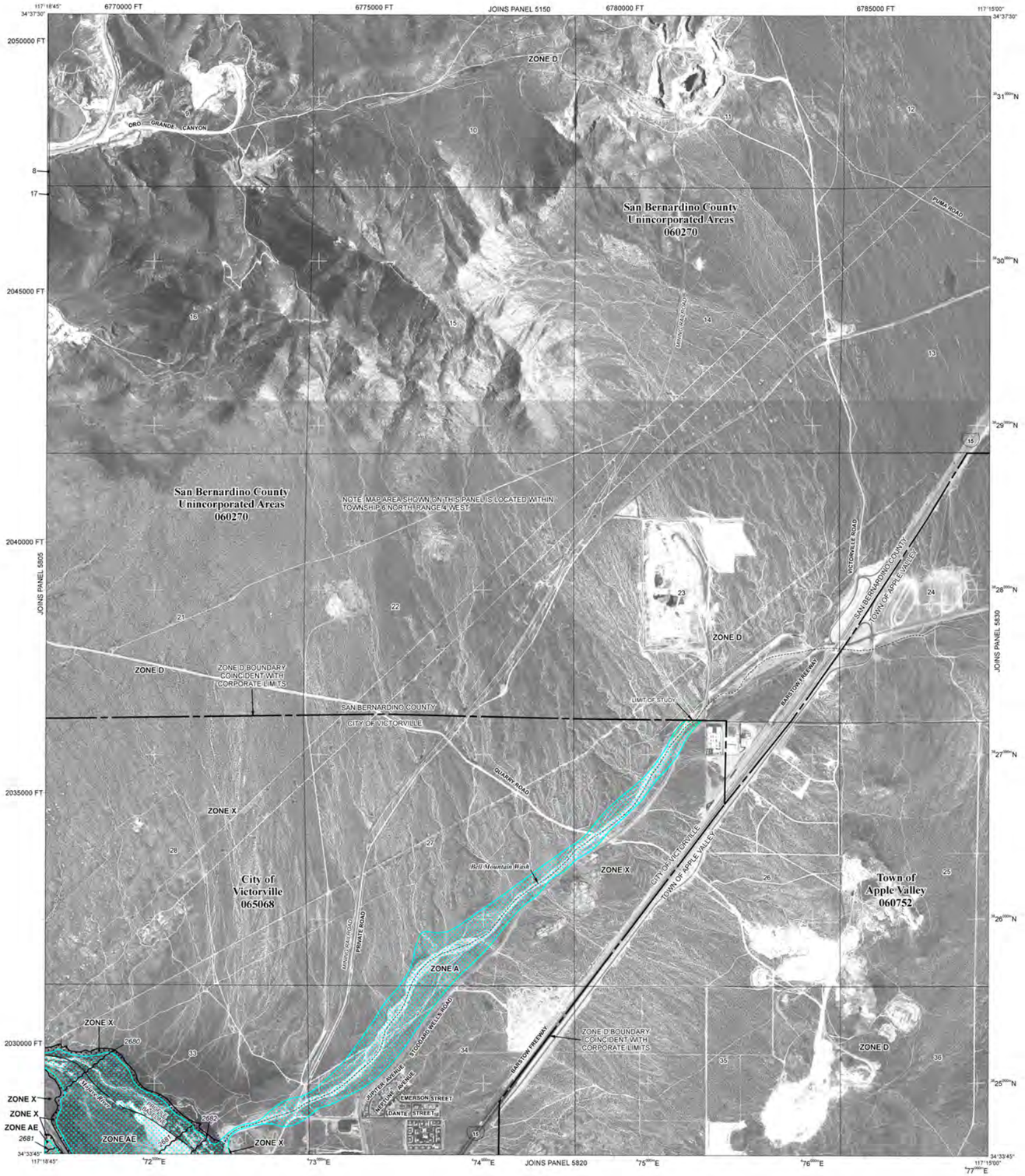
This map may reflect more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to confirm to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL. 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 — 23	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
4276000mN	1000-meter Universal Transverse Mercator grid values, zone 11N
600000 FT	5000-foot grid ticks: California State Plane coordinate system, zone V (FIPSZONE 0405), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
●M1.5	River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
March 18, 1996

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
August 28, 2008 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET
300 0 300 600 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 5810H

FIRM

FLOOD INSURANCE RATE MAP

SAN BERNARDINO COUNTY, CALIFORNIA AND INCORPORATED AREAS
PANEL 5810 OF 9400

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
APPLE VALLEY, TOWN OF	060752	5810	H
SAN BERNARDINO COUNTY	060270	5810	H
VICTORVILLE, CITY OF	065068	5810	H

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

MAP NUMBER
06071C5810H

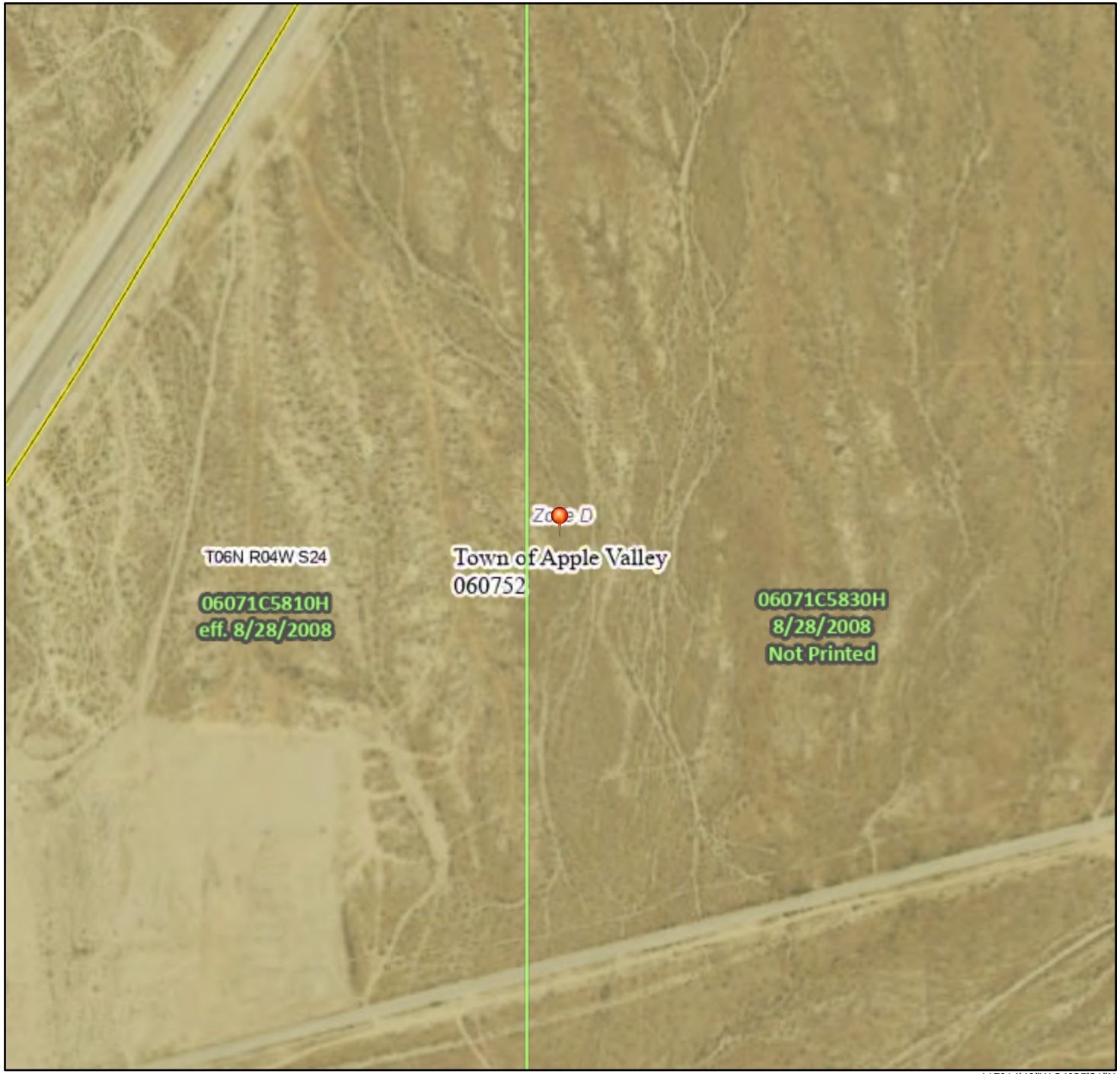
MAP REVISED
AUGUST 28, 2008

Federal Emergency Management Agency

National Flood Hazard Layer FIRMette

FEMA

117°15'18"W 34°36'1"N



117°14'40"W 34°35'31"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 9/23/2022 at 1:30 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Appendix C

NOAA Atlas 14 Precipitation Intensity-Duration

NOAA Atlas 14, Volume 6, Version 2
Location name: Apple Valley, California, USA*
Latitude: 34.5965°, Longitude: -117.2482°
Elevation: 2952.79 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.088** (0.072-0.107)	**0.122** (0.100-0.150)	**0.170** (0.140-0.209)	**0.212** (0.172-0.262)	**0.272** (0.214-0.348)	**0.321** (0.248-0.420)	**0.374** (0.282-0.502)	**0.432** (0.317-0.595)	**0.516** (0.363-0.740)	**0.585** (0.398-0.868)
10-min	**0.125** (0.103-0.154)	**0.175** (0.144-0.214)	**0.244** (0.200-0.300)	**0.303** (0.247-0.376)	**0.390** (0.307-0.499)	**0.460** (0.355-0.602)	**0.536** (0.404-0.719)	**0.619** (0.454-0.853)	**0.739** (0.520-1.06)	**0.838** (0.570-1.24)
15-min	**0.152** (0.125-0.186)	**0.211** (0.174-0.259)	**0.295** (0.242-0.363)	**0.367** (0.299-0.455)	**0.471** (0.371-0.604)	**0.557** (0.430-0.728)	**0.649** (0.489-0.869)	**0.749** (0.549-1.03)	**0.894** (0.629-1.28)	**1.01** (0.690-1.51)
30-min	**0.206** (0.170-0.252)	**0.287** (0.236-0.352)	**0.400** (0.328-0.492)	**0.497** (0.405-0.617)	**0.639** (0.504-0.819)	**0.755** (0.583-0.988)	**0.880** (0.663-1.18)	**1.02** (0.745-1.40)	**1.21** (0.853-1.74)	**1.38** (0.935-2.04)
60-min	**0.253** (0.209-0.310)	**0.353** (0.290-0.433)	**0.492** (0.403-0.605)	**0.612** (0.498-0.759)	**0.786** (0.619-1.01)	**0.929** (0.717-1.22)	**1.08** (0.816-1.45)	**1.25** (0.916-1.72)	**1.49** (1.05-2.14)	**1.69** (1.15-2.51)
2-hr	**0.358** (0.295-0.439)	**0.483** (0.397-0.592)	**0.655** (0.538-0.806)	**0.803** (0.654-0.996)	**1.01** (0.799-1.30)	**1.19** (0.916-1.55)	**1.37** (1.03-1.84)	**1.57** (1.15-2.16)	**1.85** (1.30-2.65)	**2.08** (1.41-3.08)
3-hr	**0.432** (0.356-0.529)	**0.576** (0.474-0.707)	**0.774** (0.636-0.953)	**0.943** (0.768-1.17)	**1.18** (0.933-1.52)	**1.38** (1.06-1.80)	**1.58** (1.19-2.12)	**1.80** (1.32-2.48)	**2.11** (1.49-3.03)	**2.37** (1.61-3.51)
6-hr	**0.587** (0.484-0.720)	**0.778** (0.640-0.954)	**1.04** (0.850-1.27)	**1.25** (1.02-1.56)	**1.56** (1.23-2.00)	**1.81** (1.39-2.36)	**2.06** (1.55-2.76)	**2.33** (1.71-3.21)	**2.71** (1.91-3.90)	**3.02** (2.06-4.48)
12-hr	**0.755** (0.622-0.926)	**1.01** (0.828-1.24)	**1.34** (1.10-1.65)	**1.62** (1.32-2.01)	**2.01** (1.59-2.58)	**2.32** (1.79-3.03)	**2.64** (1.99-3.53)	**2.97** (2.18-4.09)	**3.43** (2.42-4.93)	**3.80** (2.59-5.64)
24-hr	**0.988** (0.876-1.14)	**1.34** (1.18-1.54)	**1.79** (1.59-2.07)	**2.17** (1.90-2.53)	**2.69** (2.28-3.24)	**3.10** (2.57-3.81)	**3.52** (2.85-4.43)	**3.95** (3.11-5.12)	**4.55** (3.44-6.14)	**5.02** (3.67-7.01)
2-day	**1.16** (1.02-1.33)	**1.59** (1.41-1.83)	**2.16** (1.91-2.49)	**2.63** (2.30-3.06)	**3.27** (2.77-3.93)	**3.77** (3.13-4.63)	**4.28** (3.47-5.39)	**4.82** (3.79-6.24)	**5.55** (4.19-7.49)	**6.12** (4.47-8.56)
3-day	**1.26** (1.12-1.45)	**1.74** (1.54-2.01)	**2.38** (2.10-2.75)	**2.91** (2.55-3.39)	**3.63** (3.08-4.37)	**4.19** (3.48-5.15)	**4.77** (3.86-6.00)	**5.37** (4.23-6.95)	**6.19** (4.68-8.36)	**6.84** (5.00-9.56)
4-day	**1.34** (1.19-1.54)	**1.85** (1.64-2.13)	**2.54** (2.24-2.93)	**3.10** (2.72-3.61)	**3.87** (3.28-4.66)	**4.47** (3.71-5.49)	**5.08** (4.12-6.40)	**5.72** (4.51-7.41)	**6.59** (4.98-8.90)	**7.28** (5.32-10.2)
7-day	**1.46** (1.29-1.67)	**2.00** (1.77-2.31)	**2.72** (2.41-3.15)	**3.32** (2.91-3.86)	**4.13** (3.50-4.97)	**4.76** (3.95-5.85)	**5.41** (4.38-6.81)	**6.08** (4.79-7.87)	**7.00** (5.29-9.45)	**7.72** (5.64-10.8)
10-day	**1.54** (1.37-1.77)	**2.11** (1.87-2.43)	**2.86** (2.53-3.30)	**3.48** (3.05-4.05)	**4.32** (3.67-5.21)	**4.98** (4.14-6.13)	**5.66** (4.58-7.13)	**6.36** (5.01-8.24)	**7.32** (5.54-9.89)	**8.08** (5.90-11.3)
20-day	**1.77** (1.57-2.03)	**2.43** (2.15-2.80)	**3.31** (2.93-3.83)	**4.04** (3.54-4.71)	**5.05** (4.28-6.08)	**5.84** (4.85-7.18)	**6.66** (5.39-8.39)	**7.51** (5.92-9.72)	**8.68** (6.56-11.7)	**9.61** (7.02-13.4)
30-day	**2.00** (1.77-2.30)	**2.76** (2.44-3.18)	**3.79** (3.35-4.37)	**4.64** (4.07-5.41)	**5.85** (4.96-7.04)	**6.80** (5.64-8.35)	**7.78** (6.30-9.80)	**8.81** (6.94-11.4)	**10.3** (7.75-13.8)	**11.4** (8.32-15.9)
45-day	**2.34** (2.07-2.69)	**3.25** (2.88-3.74)	**4.49** (3.97-5.19)	**5.55** (4.86-6.46)	**7.05** (5.97-8.48)	**8.25** (6.85-10.1)	**9.51** (7.71-12.0)	**10.9** (8.55-14.1)	**12.7** (9.63-17.2)	**14.3** (10.4-19.9)
60-day	**2.56** (2.27-2.94)	**3.55** (3.14-4.09)	**4.93** (4.35-5.69)	**6.11** (5.36-7.12)	**7.82** (6.63-9.42)	**9.21** (7.65-11.3)	**10.7** (8.66-13.5)	**12.3** (9.68-15.9)	**14.6** (11.0-19.7)	**16.4** (12.0-23.0)

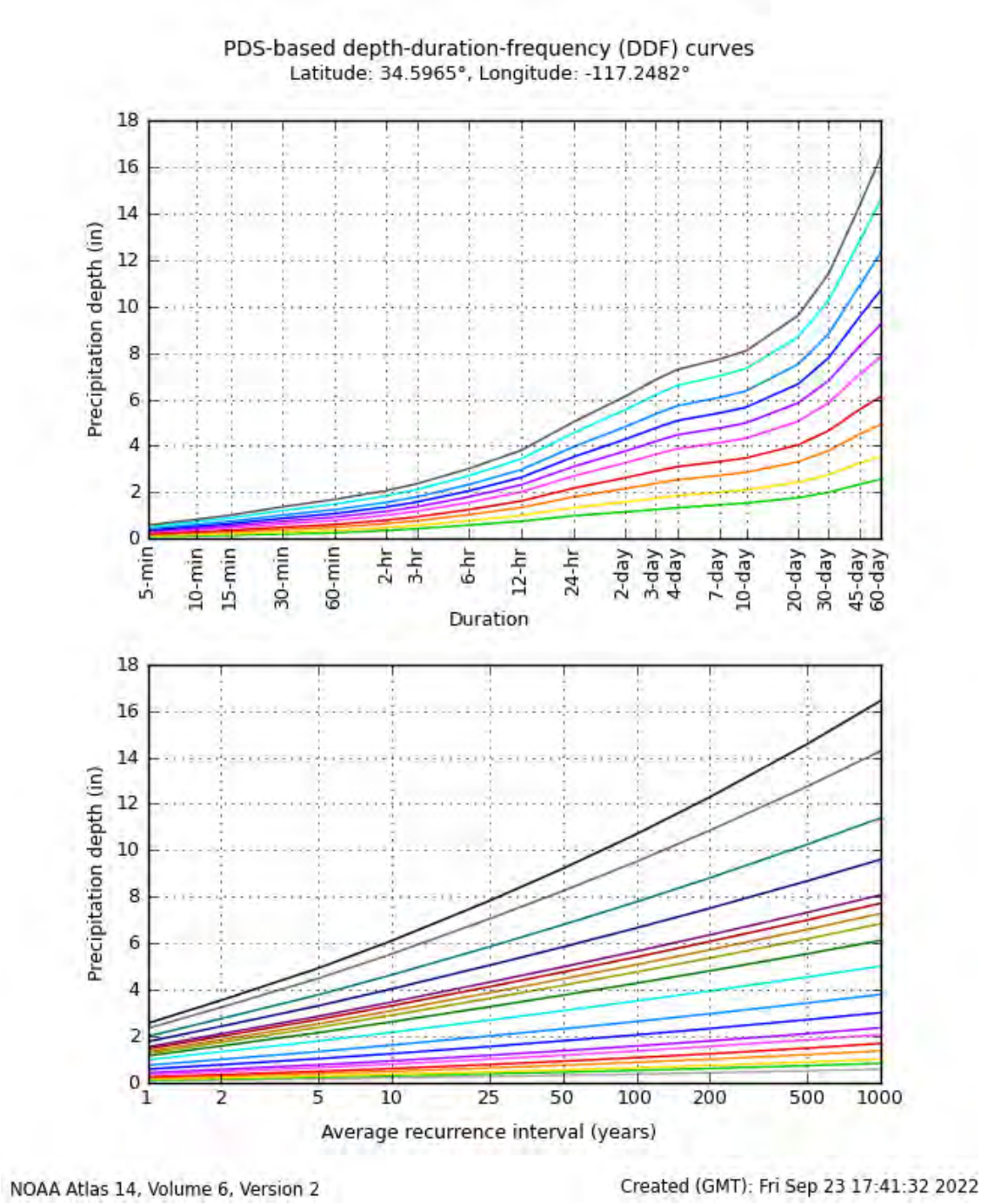
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

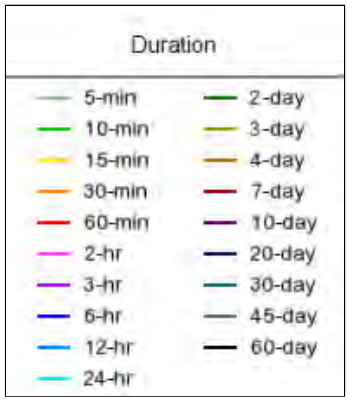
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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PF graphical





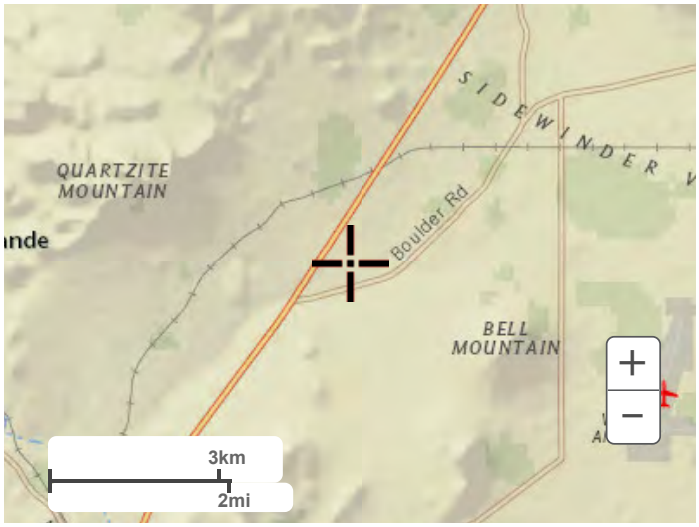
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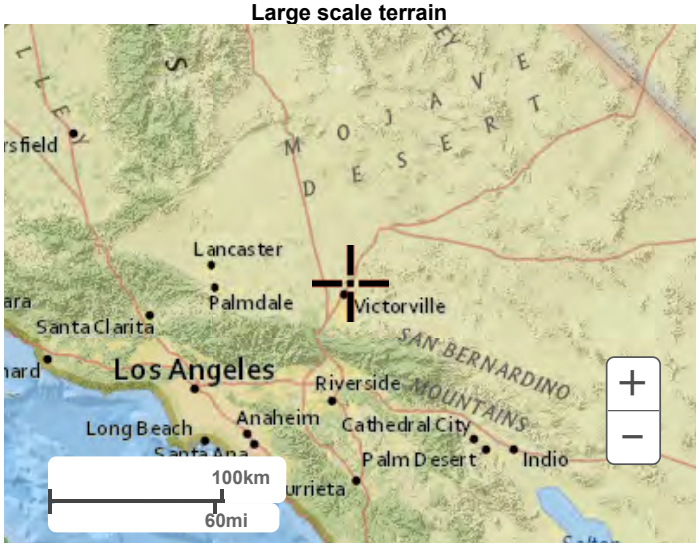
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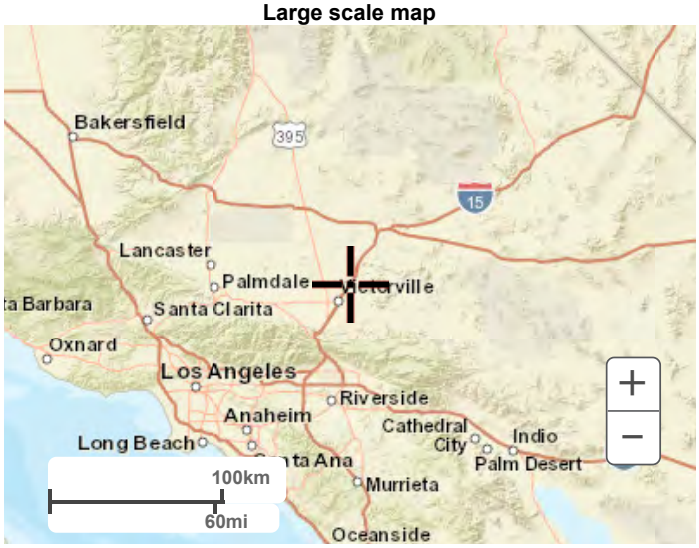
Small scale terrain



Large scale terrain



Large scale map



Large scale aerial



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US Department of Commerce
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Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Appendix D

City Master Plan of Drainage

APPLE VALLEY MASTER PLAN OF DRAINAGE



VOLUME I
FINAL REPORT

PREPARED BY

WILLIAMSON & SCHMID

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APPLE VALLEY MASTER PLAN OF DRAINAGE

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APPLE VALLEY MASTER PLAN OF DRAINAGE

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EXISTING RIGHT-OF-WAY	(1" = 2000')
STREET FLOW MAP	(1" = 2000')
FOOTHILL HYDROLOGY MAP	(1" = 2000')
ALTERNATIVE A2 DRAINAGE ALIGNMENTS	(1" = 2000')
EAST COMMUNITY HYDROLOGY MAP ALTERNATIVE A2	(1" = 1000')
NORTH COMMUNITY HYDROLOGY MAP ALTERNATIVE A2	(1" = 1000')
SOUTH COMMUNITY HYDROLOGY MAP ALTERNATIVE A2	(1" = 1000')
ALTERNATIVES A1 & A3 MAJOR ALIGNMENTS & RIGHT-OF-WAY	(1" = 2000')
ALTERNATIVES A1 & A3 MAJOR ALIGNMENTS & DRAINAGE DIVIDES	(1" = 2000')
EAST COMMUNITY HYDROLOGY MAP ALTERNATIVES A1 & A3	(1" = 1000')
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EAST COMMUNITY FACILITY MAP	(1" = 1000')
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SOUTH COMMUNITY FACILITY MAP	(1" = 1000')
DETENTION BASIN LOCATION & DOWNSIZED REGIONAL FACILITIES	(1" = 2000')

Note: These maps are not included in this report but may be obtained from SBCFCD.

EXECUTIVE SUMMARY

I. Basis of the Study

The Apple Valley watershed, located in the high desert of Southern California (see Figure 1), encompasses approximately 98 square miles which drain to the Apple Valley Dry Lake. This high desert area, which normally receives small amounts of rainfall, is subject to infrequent thunderstorms of such intensity as to cause significant flooding, especially in and around the dry lake.

In the past, such flooding has been of little consequence, due to the scarcity of development. But the area is now experiencing rapid development with no provisions being made for flood control facilities. This poses an increasing threat to both life and property. Because further development is imminent, the watershed needs a master plan of drainage in order to develop an efficient network of flood control facilities that will lessen this increasing threat, and to provide a basis for establishing funding mechanisms.

The feasibility of development within the dry lake has been an issue for some time, and is one of the motivating reasons for this study. Section 1.4 is a brief history of development within the dry lake. Because of its importance, two chapters (chapters 8 and 9) have been prepared to discuss the problems of and proposed engineering strategies for the dry lake.

In this master plan of drainage, two hydrologic models are utilized: the well-known rational method, for smaller areas, and the unit hydrograph method, for larger areas. Chapter 2 discusses the application of the methods to this storm drain master plan. Section 2.2 discusses the uncertainty of all hydrologic models due to the combined uncertainty in the model variables. Due to the particular hydrologic characteristics of the watershed under study, new techniques were developed and implemented during the course of this analysis.

II. Study Approach

Three studies were developed for the watershed which are generally defined as follows: Alternative A1 uses the General Plan Land Use and open channel facilities utilizing natural channel alignments; Alternative A2 uses the General Plan Land Use and an underground system following street alignments; and Alternative A3 uses a projected future land use and open channel facilities utilizing natural channel alignments.

For each alternative, the watershed was divided into subareas, and the rational method was applied. Peak flow rates were generated, pipe sizes were estimated, and channel sections were sized. From these results a preliminary cost estimate was generated for the three alternatives (see Table 1).

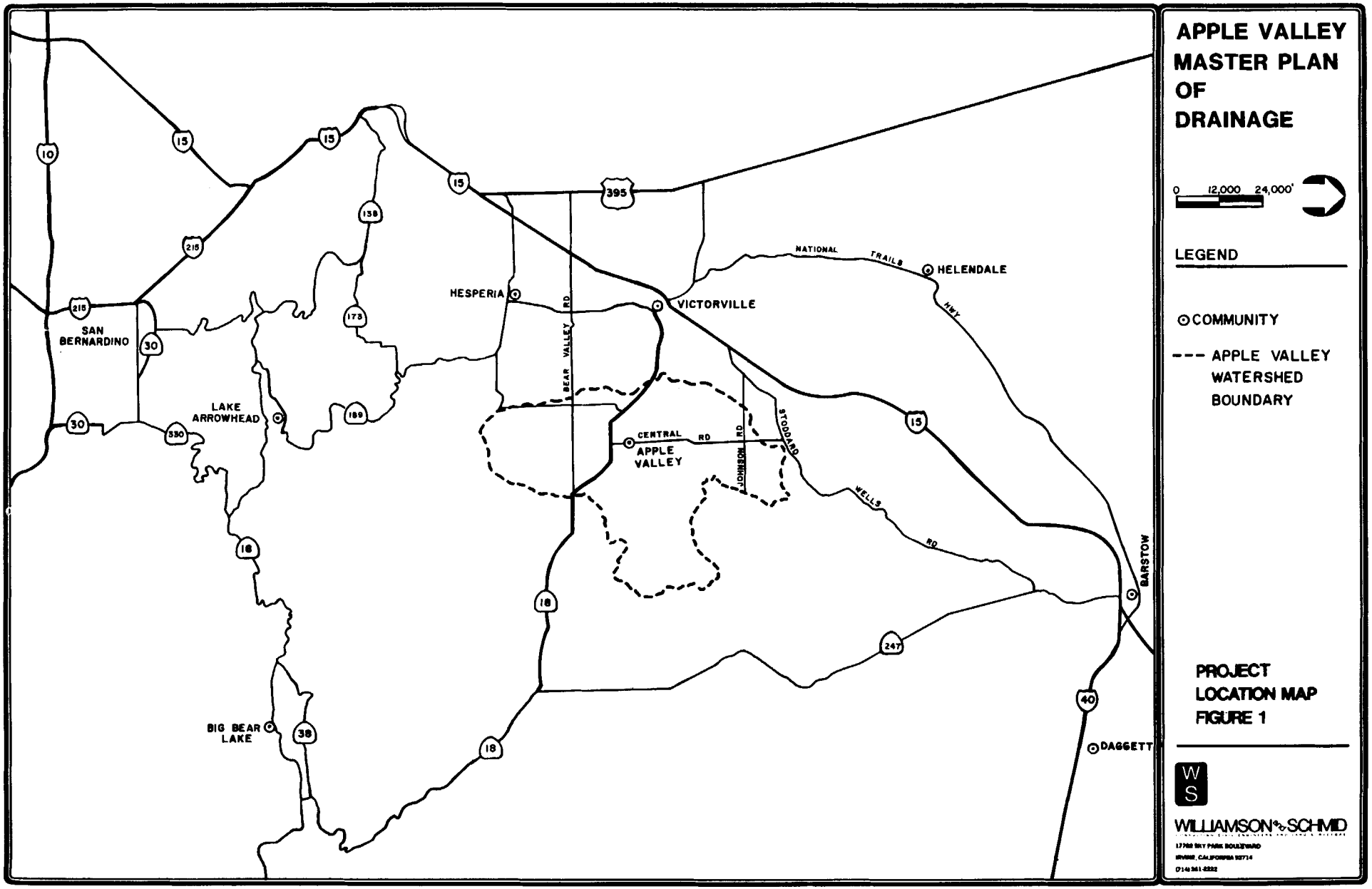

APPLE VALLEY
MASTER PLAN
OF
DRAINAGE
0 12,000 24,000'
LEGEND
COMMUNITY
APPLE VALLEY WATERSHED BOUNDARY
PROJECT
LOCATION MAP
FIGURE 1
WILLIAMSON & SCHMID
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SAN BERNARDINO
LAKE ARROWHEAD
BIG BEAR LAKE
HESPERIA
VICTORVILLE
HELENDALE
NATIONAL TRAILS HWY
BEAR VALLEY RD
CENTRAL RD
APPLE VALLEY
ROEHRICH RD
STODDARD
WELLS RD
BARSTOW
DAGGETT

Table 1

PRELIMINARY COST COMPARISON OF THREE DRAINAGE ALTERNATIVES

ALTERNATIVE	ESTIMATED COST (DOLLARS)
A1	84,265,390
A2	353,176,225
A3	86,062,590

These preliminary comparative costs were used to determine the recommended project alternative for which detailed cost estimates were prepared. The recommended alternative, Alternative A1, detailed cost is $315,643,000. Alternatives A2 and A3 detailed costs would increase accordingly.

From this comparison Alternative A2 was excluded from further study as its estimated cost is four times that of either of the other two options. The difference in cost between Alternatives A1 and A3 is small enough that one was not chosen over the other based on this cost comparison alone.

The recommended flood control plan, Alternative A1, was chosen over Alternative A3 because the General Plan Land Use is established, whereas the projected future land use is an uncertain prediction with a scope of about 50 years. Several options for the plan were also studied such as onsite detention and regional detention basins.

The recommended alternative (A1) was studied in more detail to determine the times of concentration, peak flow rates, facility sizes, and final cost estimates. The rational method was used to generate peak flow rates for areas less than approximately two square miles and also to generate times of concentration for the entire watershed. The unit hydrograph method was used to generate peak flow rates for areas larger than approximately two square miles utilizing the times of concentration from the rational method. The corresponding peak flow rates were then used to size the master planned facilities.

III. Characteristics of the Watershed

Existing San Bernardino County Flood Control District rights-of-way, San Bernardino County Drainage Easements and other drainage reservations, were identified for possible use in the development of this master plan of drainage. Figure 3.1 depicts these drainage reservations. Major utilities within the Apple Valley watershed were also identified in the development of this master plan for conflicts with proposed flood control facilities. A discussion of the utilities is contained in Chapter 3.

The Apple Valley watershed boundary is outlined in Fig. 4.1. It is generally defined by the Ord Mountains on the south, the Granite and Fairview Mountains on the east, and Black Mountain on the north. Chapter 4 discusses the development of the adopted watershed boundary.

Two rainfall data bases were considered for use in the hydrologic models. Data from both data bases (Department of Water Resources and NOAA Atlas II) were analyzed and compared. Chapter 5 summarizes the analyses of these data. Isohyetal maps from the data base selected are reproduced for the Apple Valley watershed in Figs. 5.2 through 5.7.

The Apple Valley watershed can generally be classified into two broad categories; the steep impervious mountains with incised channels on the perimeter of the waterhsed, and the remainder of the watershed, which is the valley floor, sloping gently to the dry lake. These areas are very different natural landscapes with distinctive patterns of soils, relief, and drainage. The soils from the watersheds are classified into four hydrologic soils groups, as discussed in Chapter 6 and illustrated in Fig. 6.1.

The land use or development type of the areas in Apple Valley cannot be classified into a general category, as they vary greatly within the study. The type of vegetation cover, which is estimated from the land use, determines the runoff infiltration rate and the percent of pervious cover. Two land use plans were considered in the hydrologic calculations for this study. Loss rates were chosen, both to match the development appropriate to the drainage plan, and to provide a sensitivity analysis of the loss rates. Further discussion of the loss rates is contained in Chapter 7, along with a discussion of the two land use plans, which are depicted in Figs. 7.1 and 7.2. The amount of land from each type of land use is listed in Tables 7.3, 7.4, and 7.5. A land use study for the dry lake is presented separately in Chapter 9.

IV. The Dry Lake

Contained in Chapter 8 is a study to determine the economic feasibility of reclaiming the dry lake from the 100-year floodplain. The approach used for this study is to determine low cursory cost estimates of various drainage scenarios, in order to identify, and study in detail, one or two options which appear to be more economically feasible than the others.

Section 8.3 establishes the dry lake high water elevation at 2915. The dry lake elevation vs. storage and surface area curves, shown in Fig. 8.1, were used in conjunction with runoff hydrographs to establish high water elevations for various storms and conditions. A brief history of prior flooding in the dry lake is also included in section 8.3. In section 8.4, six possible scenarios of reclaiming the dry lake from the 1-day 100-year floodplain are investigated. Cost estimates for these scenarios are discussed in section 8.5 and summarized in Table 8.3. The six alternatives are: 1) a drainage channel to the Mojave River. This channel would be approximately 6.5 miles long originating at the intersection of Central Road and Zuni Road. Excavation would be required to be as deep as 80 feet in certain areas. The total estimated cost for this alternative is approximately $27 million; 2) a single 40-foot deep retention basin in the dry lake. This basin would require 354 acres of surface area. The estimated cost for this alternative is $35 million; 3) a single 100-foot deep retention basin in the dry lake. This basin is estimated to cost $34 million and would require 159 acres of surface area;

4) dual dry lake retention basins. The first basin (and largest) would be bermed six feet above natural ground and excavated 94 feet below natural ground. The second basin would be completely below natural ground to drain local tributary area within the dry lake. The basins would require 144 and 21 acres of surface area, respectively, and the total estimated cost is $32 million; 5) a 500 cfs pump station which discharges to the Mojave River. The discharge line is sized as a 7-foot diameter pipe for the entire length to the Mojave River. The detention basin is assumed to be 100 feet deep which occupies 146 acres of surface area. The total cost is estimated at $40 million; and 6) a 3000 cfs pump station which discharges to the Mojave River. The required detention basin is assumed to be 100 feet deep and occupies 90 acres. The total estimated cost for this system is $46 million. The conclusion of the feasibility study is that land values cannot presently support even the least expensive scenario for reclaiming the dry lake.

Chapter 9 is a land use study focusing on a recommended course of action should major development within the dry lake be proposed. Section 9.3 discusses the necessary additional studies required to establish proper planning and engineering policies. These studies include master plans of roadways, water and sewer, telephone and electricity, storm water circulation in the dry lake, and open space. Another important study needed would be a soils and geology study of the dry lake to determine the structural integrity and other properties of the soils as a construction resource. Because any development within the dry lake is mutually dependent upon all developments within the dry lake, these additional studies are recommended as being completed prior to any construction.

Sections 9.6 and 9.7 study two hypothetical residential, medium-size land development schemes for the purpose of identifying anticipated costs of development. These two studies are also used to identify the need for the additional studies discussed in section 9.3. The first hypothetical development is within the central portion of the dry lake, and the second is within the fringe of the dry lake. The total development costs for each hypothetical development are summarized in sections 9.6 and 9.7. These costs range from $54,075.00/unit at the dry lake perimeter to $69,213.50/unit within the central area of the dry lake. Figures 9.1, 9.2 and 9.3 illustrate the development concepts. Figures 9.4 and 9.5 show flood control channel outlets at the dry lake. Recommendations for land use within the dry lake are contained in section 9.9.

V. Development of the Master Plan Alternatives

Since the foothill and mountain areas within the Apple Valley watershed will remain largely undeveloped, their hydrologic link-node models were the same for each master plan alternative. Chapter 10 describes the master plan of drainage for the foothill areas. Figures 10.1 shows the boundaries for these watersheds, and Table 10.1 summarizes the rational method study results for the watersheds.

Chapter 11 discusses the flood control alternatives considered for the rest of the Apple Valley watershed, excluding the dry lake. The intent of Alternative A1 is to maintain natural channel alignments, as much as possible, for larger facilities,

which would be open channels. The intent of Alternative A2 is to provide a fully urbanized underground storm drain system, similar to the high density commercial/residential areas of Orange and San Bernardino Counties. The third alternative, A3, uses the same alignments as Alternative A1, however, the land use plan is revised to reflect the second land use discussed in Chapter 7. The three alternative master plans of drainage were developed independently, and resulted in over 25,000 calculation subareas.

In the development of these flood control alternatives it was necessary to establish certain standard criteria that would ensure an equitable cost comparison of alternatives and options. These criteria are discussed in section 11.3. Based upon these criteria, Chapter 12 develops preliminary cost estimates for the recommended alignment alternative. Detention basins were also studied at several locations as an option to the recommended all-conveyance alternative. Use of detention basins were found to provide cost savings only in certain particular circumstances. Estimated cost savings of the facilities due to these basins are summarized in Table 12.2.

VI. The Master Plans

The master plan of drainage is divided into three separate areas based on geographic location relative to the dry lake. The three areas of study are referred to as the East, North, and South Communities. Each community has unique topographic, land use, and hydrologic charactistics which are discussed in the separate studies. Any existing flood control facilities are also discussed in each study.

The master plan of drainage for the East Community is contained in Chapter 13. It is evident from Fig. 7.1 and Table 7.3 that most of the East Community will remain sparsely developed. Therefore, the amount of flood control improvements proposed is small relative to the size of the study area. The improvements that are proposed, however, are contained in section 13.5.3. The largest conveyance system in the East Community is Fairview Wash, which will convey, in the 100-year storm, approximately 8500 cfs at the outlet. Figure 13.1 illustrates the resulting floodplain in one portion of the wash. The preliminary cost comparison of alternatives in the East Community is presented in section 13.5.3 and Table 13.1. The conclusion of the detention basin study discussed in section 13.5.5 is that a basin on Facility E-04 presents a potential cost savings, however, further studies would be required to verify this savings. Recommendations included in section 13.6 are the establishment of certain drainage criteria to be met prior to issuance of building permits, installation of rain gages and stream gages along Fairview Wash, monitoring of debris yields from foothills, and requiring building setbacks from known flow paths.

The master plan of drainage for the North Community is contained in Chapter 14. A preliminary cost comparison of the alternatives is presented in section 14.5.3 and Table 14.1 and the proposed flood control improvements for the recommended alternative are discussed in section 14.5.4. The conclusion of the detention basin study discussed in section 14.5.5 is that none of the basins analyzed in the North Community appeared to provide a reasonable cost to

benefit ratio. Existing development within the North Community is sparse; so even though the projected ultimate land use shows approximately half of the area being developed with a density greater than one dwelling unit per 2.5 acres, recommendations have been made for the interim condition. These recommendations, contained in section 14.6, are similar to the recommendations made for the East Community.

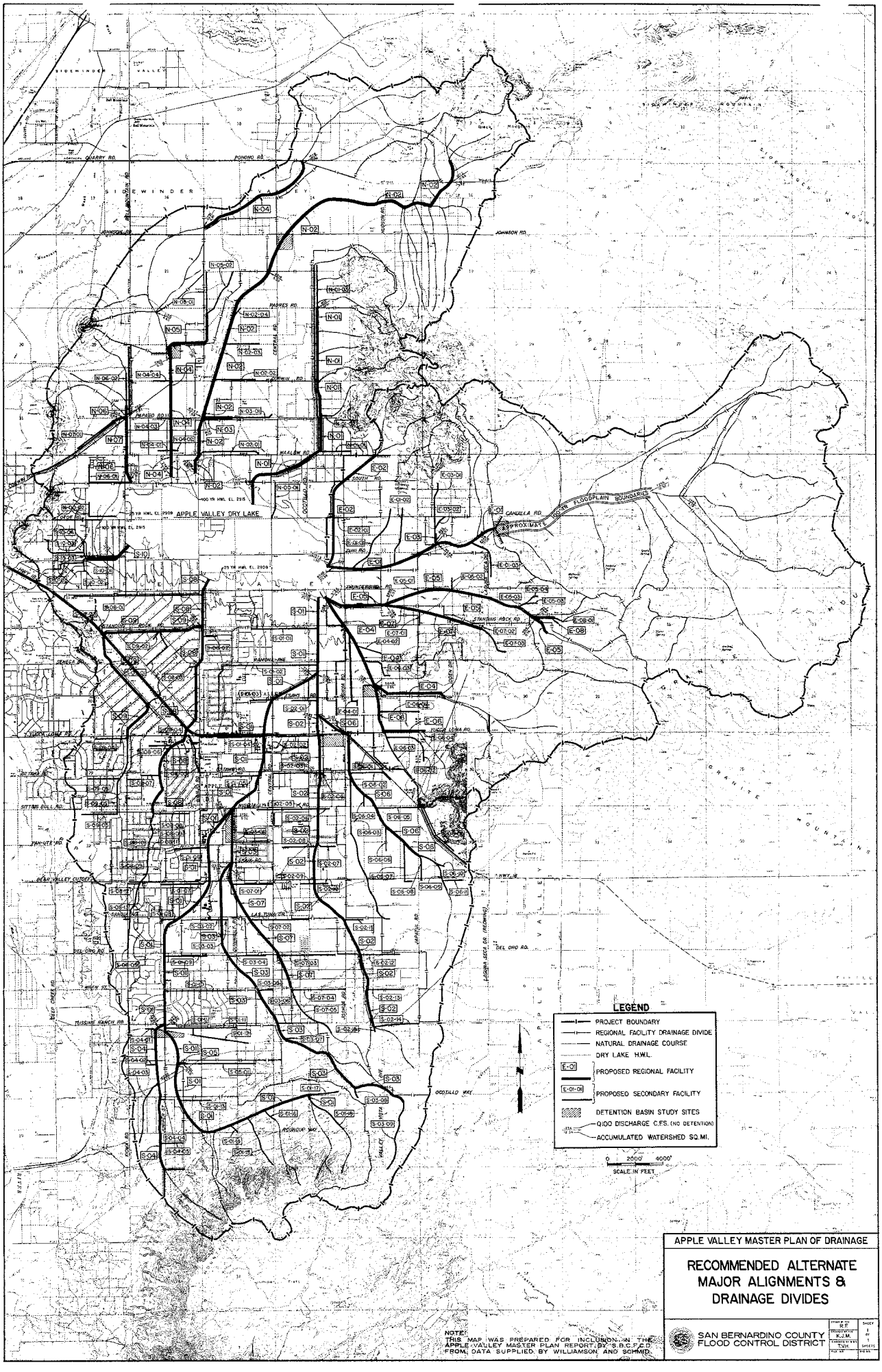
The South Community area is larger than the North and the East Communities, and the rate of development within the South Community is also higher than the other communities. Other distinct features of the South Community are discussed in sections 15.1 through 15.4. The flood control alternatives, including the proposed improvements for the recommended alternative are presented in section 15.5. Table 15.1 summarizes the preliminary costs of the three alternatives in the South Community. The cost savings with detention basins in the South Community was found to be sizable, with savings of up to $19 million. This is summarized in section 15.5.5. A combination of three detention basins in the South Community accounted for this cost savings. Separately each basin presents a potential cost savings, though not as proportionally large. The first basin is located at the intersection of Boxwood Street and Juniper Street which intercepts both facilities S-01 and S-04. The second is located northeast of Apple Valley Junior High School intercepting facilities S-01 and S-03. Finally the third detention basin intercepts facilities S-02 and S-06 just south of Highway 18. The recommendations in section 15.6 include immediate action on the already rapidly developing west half of the South Community. Public awareness of the potential flooding hazards should also be increased. Other recommendations are similar to recommendations made for the East and North Communities.

VII. Financial Analysis

This portion of the study presents a strategy for financing the costs of master plan drainage facilities in the Apple Valley Dry Lake watershed. The original study was prepared by Don Owen and Associates (Newport Beach, California) under the direction of Williamson and Schmid. The strategy focuses primarily on development fees levied against new land uses in the benefit area to establish a "fair share" cost relationship between future development projects and the public improvement for which a developer fee is charged.

The financing study has two objectives: develop a "fair share" method of allocating the costs of recommended master planned drainage facilities to different land uses within the East, North, and South Communities; and recommend a financing strategy to be employed by the County and the newly incorporated Town of Apple Valley in paying for the required facilities.

Section 2 of the Don Owen and Associates report (Chapter 16 of this report) provides a summary of the fair share cost allocations and recommended financing strategy along with an implementation plan for each drainage area. Section 3 provides a more complete description of project costs, as well as an overview of drainage area land uses at buildout of the General Plan. Section 4 contains a detailed discussion of the fair share cost allocations within each drainage area. Finally, section 5 presents the recommended financing strategy.

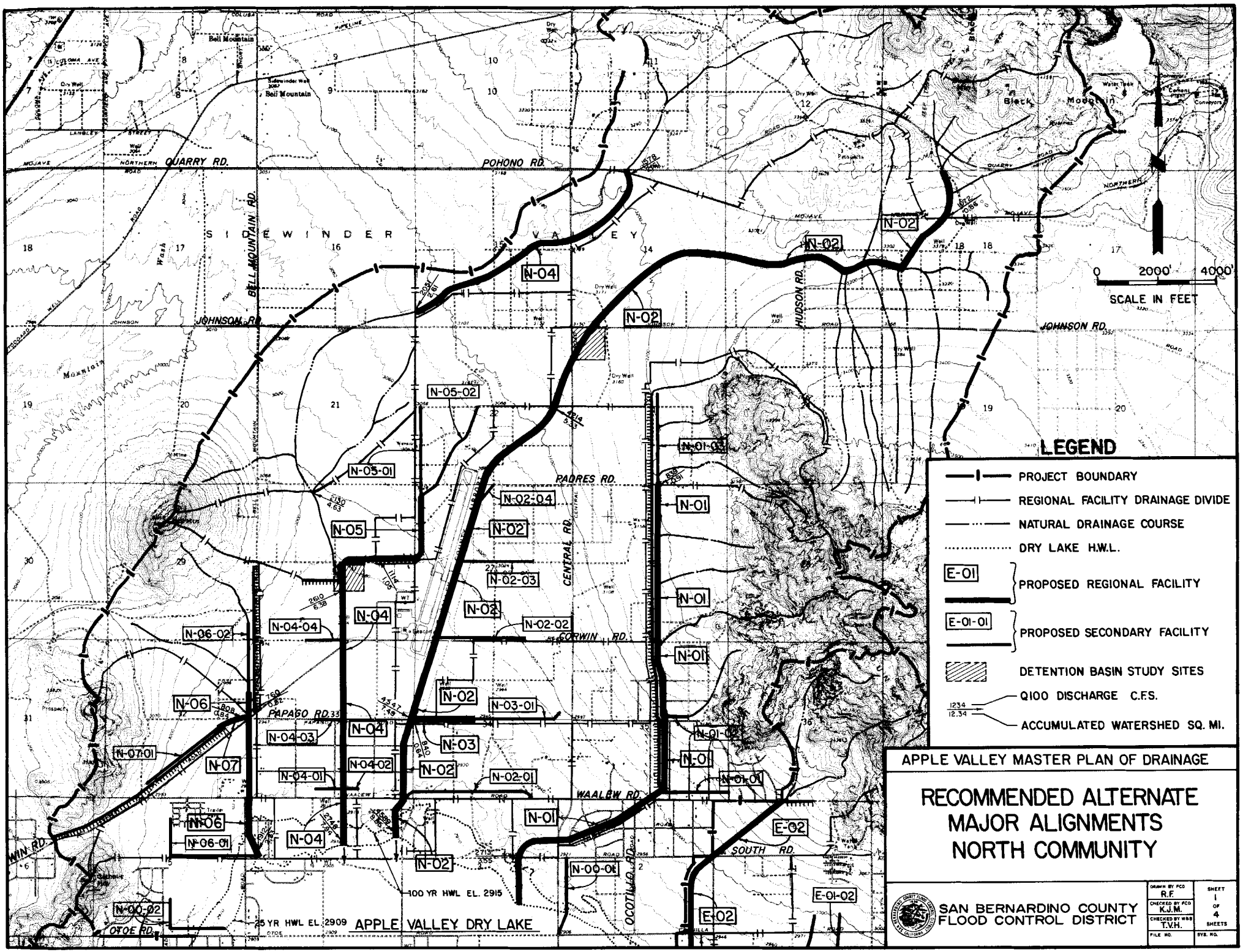


APPLE VALLEY MASTER PLAN OF DRAINAGE

RECOMMENDED ALTERNATE MAJOR ALIGNMENTS & DRAINAGE DIVIDES

SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT

NOTE:
THIS MAP WAS PREPARED FOR INCLUSION IN THE APPLE VALLEY MASTER PLAN REPORT BY S.B.C.F.C.D. FROM DATA SUPPLIED BY WILLIAMSON AND SCHMID.

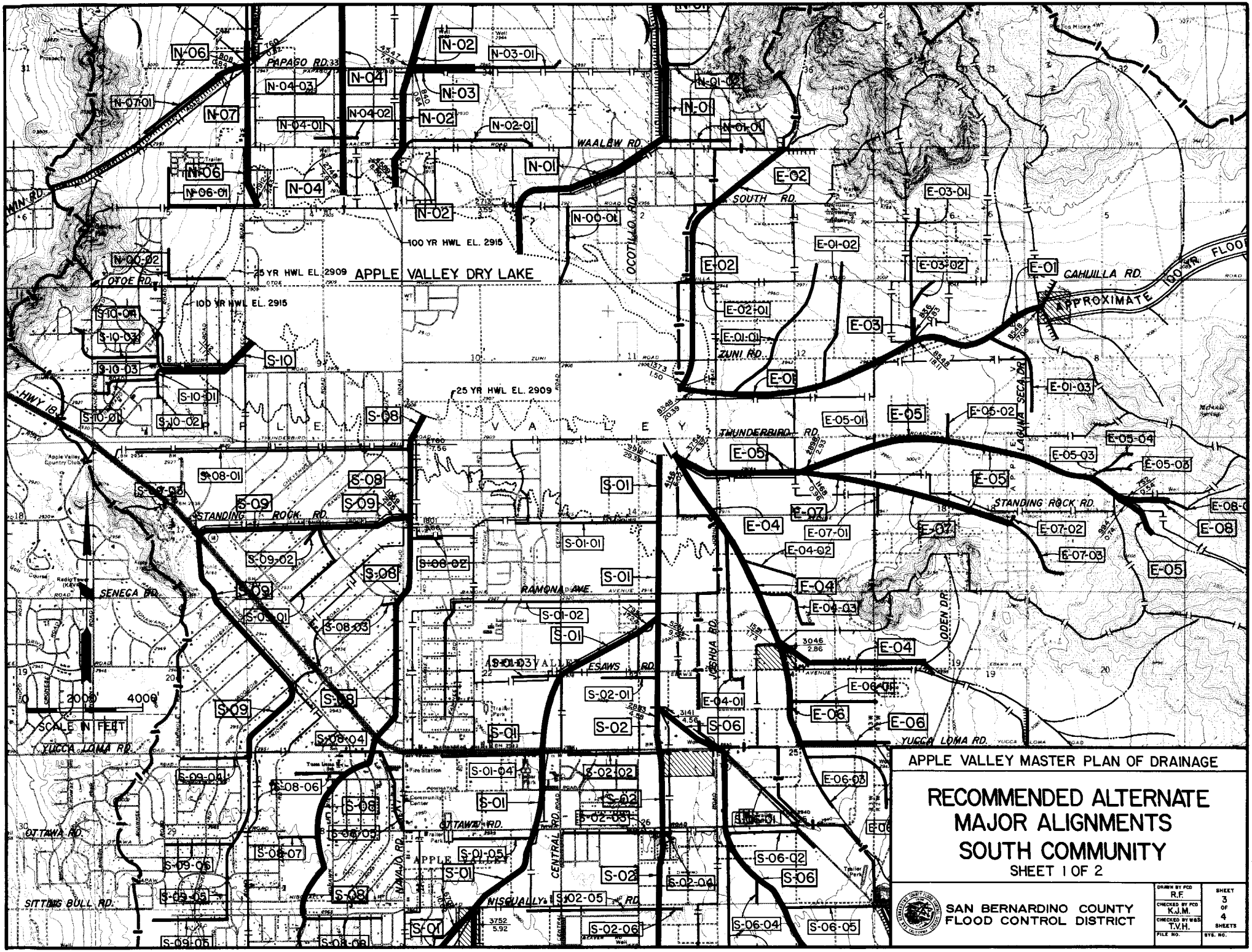


APPLE VALLEY MASTER PLAN OF DRAINAGE

RECOMMENDED ALTERNATE MAJOR ALIGNMENTS NORTH COMMUNITY

SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT

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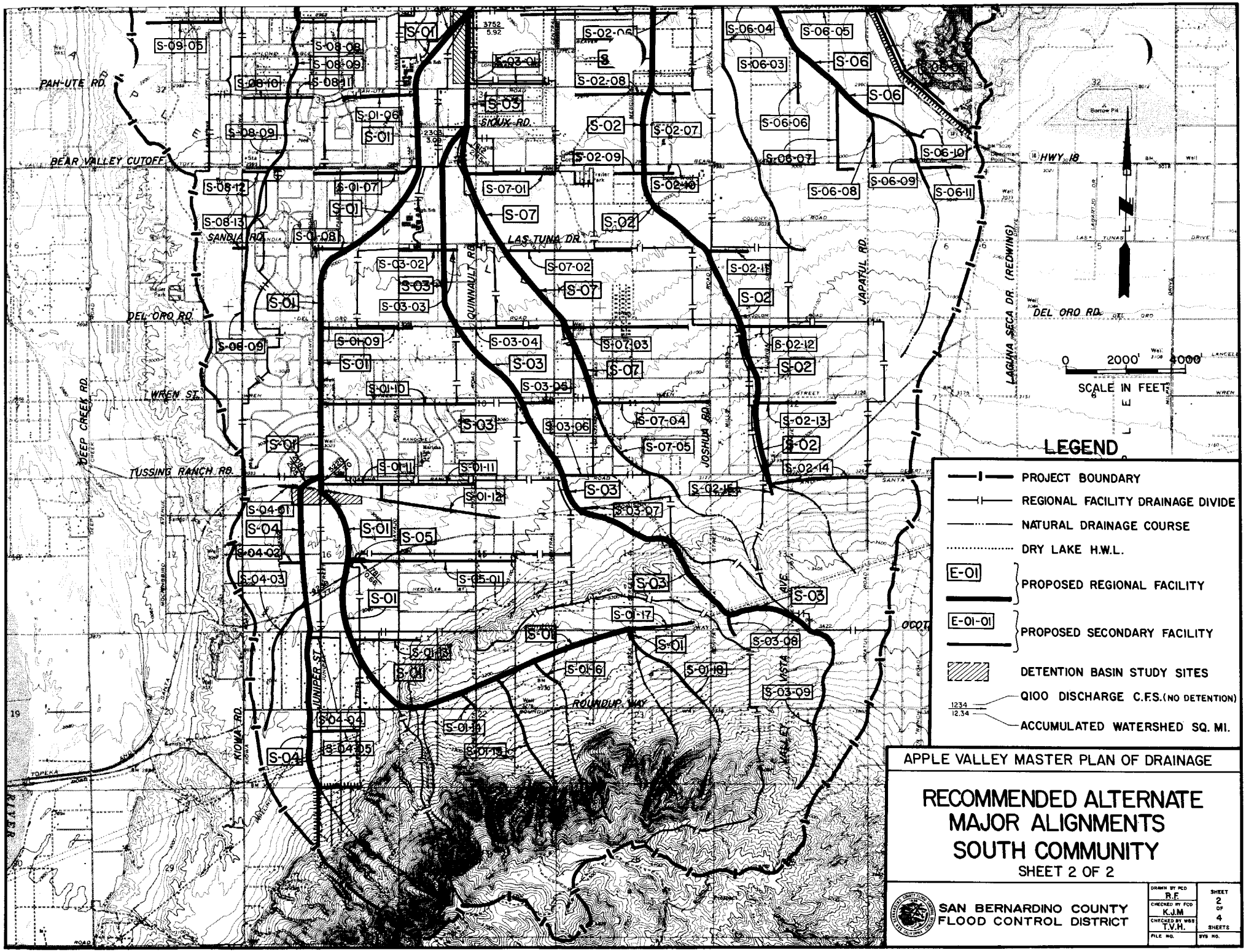
APPLE VALLEY MASTER PLAN OF DRAINAGE

RECOMMENDED ALTERNATE MAJOR ALIGNMENTS SOUTH COMMUNITY

SHEET 1 OF 2

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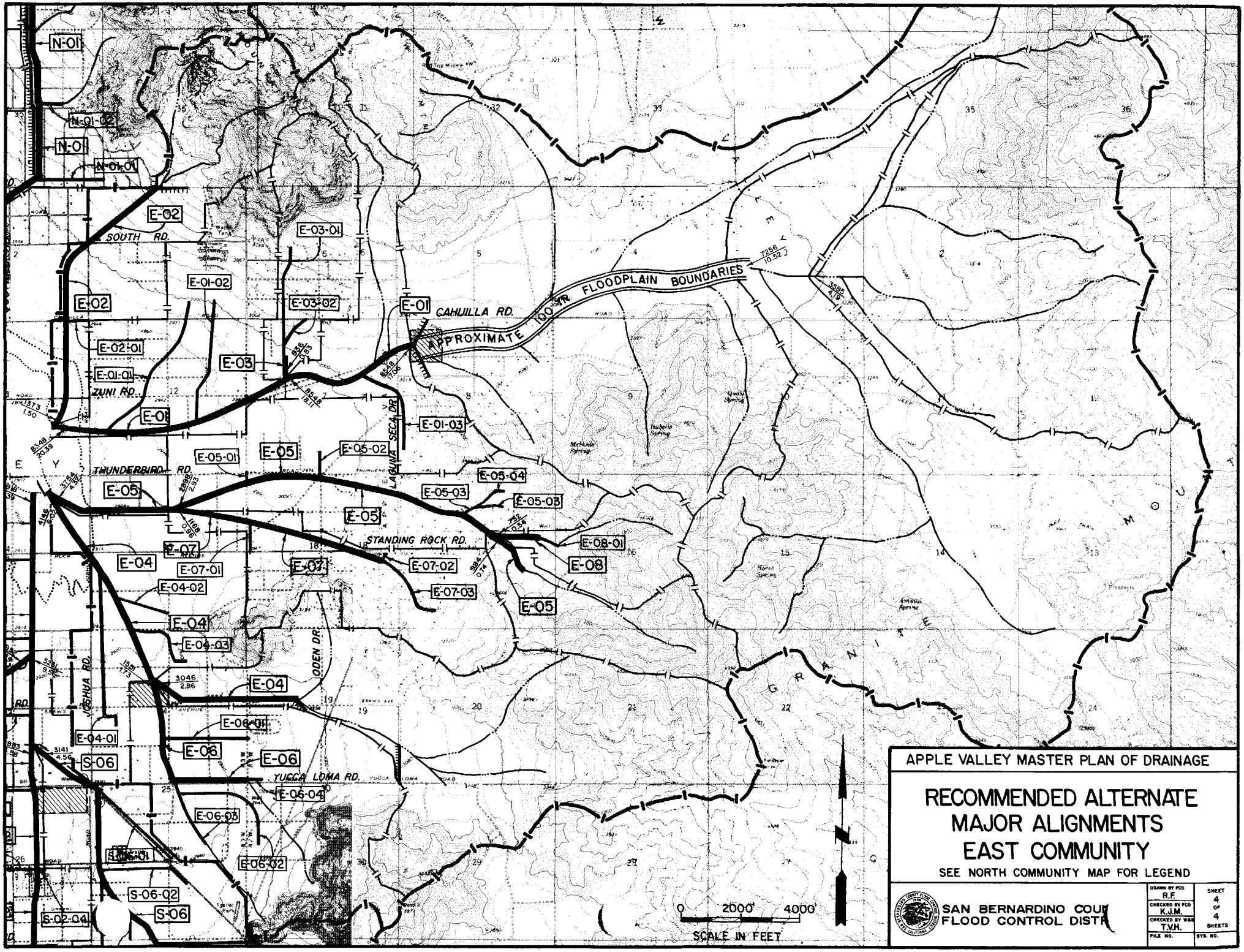
APPLE VALLEY MASTER PLAN OF DRAINAGE

RECOMMENDED ALTERNATE MAJOR ALIGNMENTS SOUTH COMMUNITY

SHEET 2 OF 2

SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT

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APPLE VALLEY MASTER PLAN OF DRAINAGE

RECOMMENDED ALTERNATE MAJOR ALIGNMENTS EAST COMMUNITY

SEE NORTH COMMUNITY MAP FOR LEGEND

SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT

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CHAPTER 1

BACKGROUND

1.1. Introduction

The Apple Valley watershed is located in the high desert area of Southern California. The watershed encompasses approximately 98 square miles which drain to the Apple Valley Dry Lake near the center of the watershed (see Figure 1.1). The area normally experiences infrequent precipitation. However, in the Spring and Summer months, the area is subject to thunderstorms of high intensities and short durations over relatively small areas. Consequently, the watershed has a history of local flooding problems, especially in and around the dry lake.

1.2. Purpose of Study

The main objective of this report is to develop a Master Plan of Drainage (M.P.D.) for the Apple Valley Dry Lake watershed. Major considerations of the M.P.D. include the flood protection of existing development in the area, the conveyance of flows to the dry lake, and the feasibility of development in the dry lake. The area is experiencing rapid development with no provisions being made for flood control facilities. Because further development seems imminent, the watershed needs a master plan in order to develop an efficient network of flood control facilities and to provide a basis for establishing funding mechanisms.

1.3. Study Approach

On a 1 inch = 2000 feet scale map of the entire watershed, the regional storm drain facility alignments were determined, taking into account existing and future development, existing right-of-way, and natural topography. The secondary storm drain facilities, which generally drain to the regional facilities were determined in the same manner. Natural channel flow, street flow, and pipe flow, which make up the local storm drain facilities, were also determined using the same rationale. The local facilities generally drain to secondary facilities. It should be noted that a projected future development pattern was used when designing the storm drain systems, therefore the alignments of streets were also projected and may not reflect future design.

Peak flow rates were generated for the regional, secondary and local storm drain facilities using hydrologic computer models. The well known rational method was used to generate peak flow rates for small areas (less than two square miles) and times of concentration (tc) for large areas (larger than two square miles). For the larger areas the unit hydrograph method was used to generate peak flow rates utilizing the tc's from the rational method.



BASE MAP SOURCE: U.S.G.S. 1980

The peak flow rates were used to size facilities within the watershed, including pipes, culverts, and improved open channels. Cost estimates were then prepared for the estimated facilites. An overall cost comparison was made to determine the economic feasibility of several flood control alternatives. From the alternatives, one was chosen as the recommended alternative based on the cost comparisons, the environmental impact of the proposed facilities, and county policy.

A strategy for financing the costs of the master planned drainage facilities (regional and secondary) was then developed. The strategy focuses primarily on developent fees levied against new land uses in the benefit area.

The dry lake was studied separately in order to determine the feasibility of developing within the 100-year floodplain. The dry lake land use study provides the motivation for establishing engineering and planning criteria and the need for additional studies to properly provide for the safety of dry lake floodplain area inhabitants.

1.4. Development History in Apple Valley Dry Lake

The earliest development recorded within this study's 25-year high water line (HWL) elevation of 2909 appears to be Tract 4286, recorded on June 23, 1954. No mention was made of the dry lake at that time.

Tract 5436, recorded November 8, 1956 initially had no comments regarding the dry lake. However, there was notice made of a ponding area which was added to the recorded map. The area shown as subject to ponding was below the 2904 contour.

In 1958 a third tract was filed and the dry lake became an issue. It was recommended that lots fill to elevation 2906 or label the area below contour 2904 as "flood hazard area." Obtaining the dry lake area "...by some county agency to preclude continued encroachments..." was discussed at the Subdivision Review Committee meeting, but apparently not acted upon.

A fourth tract located in the dry lake was recorded October, 1958. Comments were made regarding poor drainage and ponding potential. County Engineer Martin Nicholas pointed out the growing concern over drainage in the Apple Valley Dry Lake and the impacts from developments at the Zone 4 Advisory Committee meeting of April, 1959. A contour map of the area was prepared in 1961.[1]

The last tract recorded within lake boundaries occurred in October, 1964 (not including subdivisions of less than 5 lots). This tract was delayed pending a report from the Flood Control District, which recommended pad elevations at contour 2906 or greater. The view at this time was "...areas below elevations 2906 may be subject to flood hazards by reason of inundation."

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1. Memo from Allan J. Kielhold, Chief, Water Resources Division to Charles L. Laird, Assistant Director, Flood Control District, July 31, 1984.

Following the preparation of contour maps in 1961, a fairly extensive report was compiled by the Planning Division of the Flood Control District in June, 1966. This report established the 2908 elevation as the high water line for a 100-year storm. This elevation was used for the next several years.

In 1975, the U.S. Geological Survey published a report entitled "Flood Hazard Study - 100-year Flood Stage for Apple Valley Dry Lake - San Bernardino County, California." The report established a building pad elevation of 2912.5, including a two-foot freeboard and wave action allowance. This criteria was subsequently modified by the District to an HWL elevation of 2909 and building pad elevations of 2911. The District also recommended fill not be allowed for natural ground with an elevation below contour 2908.[2]

These new restrictions were challenged by the applicants of Land Division 74-0510. Because the land in their proposal was entirely below contour 2908, County staff recommended denial to the Planning Commission. The applicants hired a law firm who threatened litigation if they were not permitted to build or sell their land to the County. In subsequent land division applications the restriction stating that fill would not be allowed on land below the 2908 contour was applied, as summarized in a memo dated March 11, 1975.

The Apple Valley Community General Plan was prepared in December, 1975. Four policies were offered for consideration regarding the dry lake, namely: (1) prohibit development below the 2909 contour. Floodplain restrictions preclude the construction of structures for human occupancy, gradually eliminate existing structures and promote recreation and agriculture; (2) allow elevation of pads if sewage system is flood-proofed. This proposal would lead to property insolation by flood waters and unsightly building pad/borrow pit combinations; (3) allow development around perimeter of dry lake if sewage systems are flood-proofed; (4) allow development after retention basins are constructed.[3]

The General Plan strove to protect both life and property within those areas designated as flood hazard areas. Preservation and the open rural character of Apple Valley Dry Lake was deemed essential.

The second option was eventually recommended with six other restrictions, namely: (1) no parcels of less than 2.5 acres, and in no case below elevation 2904; (2) the lot must be located accurately on a property boundary map, with proper elevations noted; (3) a soils test must be completed; (4) a grading plan showing house location and septic tank flood-proofing techniques must be provided; (5) all appropriate County departments must approve; (6) prospective buyers should be informed of the existence of the dry lake.[4]

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2. Summarized in an inter-office memo from Bill Mann to Ken Topping dated June 12, 1974.
3. Excerpted from Apple Valley General Plan, December 16, 1975.
4. Minutes, Board of Supervisors meeting, April 4, 1977.

The Apple Valley Community Plan was adopted June 26, 1979. The last land division application to occur was Tract 12422. The Surveyor's Office recommended denial and the proposal has been up for review many times since its filing in July, 1983. The recommendation for denial has been upheld several times. A problem occurred in that the General Plan map showed the allowable density as one lot per acre, which was not in keeping with the text, requiring a correction of the map.

In October, 1983, the Board of Supervisors denied a Zone Change appeal to allow a subdivision to create 2.5 acre parcel sizes and directed staff to initiate an amendment to the General Plan maps to reflect the development policies contained in the text of the General Plan relating to the Apple Valley Dry Lake. The amendment would update development in Apple Valley Dry Lake to 40-H-1-T (40-acre minimum flood hazard, transitional development standards). The amendment site is 1810 acres within the Apple Valley Dry Lake, occupying the lowest part of a closed desert basin, subject to periodic flooding. Though most of the 1810 acres under consideration are vacant, there are approximately 200 plus acres of approved tentative tracts, some with 1/2 acre lots. About 300 parcels are developed within the dry lake.[5]

Through many Planning Commission hearings, Board of Supervisors meetings, and Environmental Review Board meetings, the recommended amendment was upheld, even though other options had been considered. Staff concerns continue to include the loss of the dry lake as a natural retention basin, the despoilment of groundwater and the water table by faulty sewage systems, the availability and quality of an adequate water supply, flood damage and the ensuing litigation, and the desire to designate, protect and improve open space areas for the public good.[6] Also at issue is the precedent set by the Federal Government's litigation against the County of Riverside for their policy of permitting smaller subdivisions. The Federal Government contended the County of Riverside used improper development procedures.[7]

The Planning Commission still holds to a 40 acre minimum lot size, but when the subject last came up before the Board of Supervisors in June, 1984, they seemed ready to strongly consider a compromise 10 acre minimum lot size. This seems acceptable to the developer of Tract 12422.

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5. Minutes, Board of Supervisors meeting, October 3, 1983.
6. May 14, 1984, Board of Supervisors, minutes of meeting.
   February 24, 1984, Environmental Review Board determination.
   April 19, 1984, Planning Commission hearing.
   June 7, 1984, Planning Commission hearing.
   August 6, 1984, Board of Supervisors, minutes of meeting.
   February 25, 1985, memo from Chuck Bell, Senior Planner.
7. Comment by Clark Alsop, Deputy County Counsel, during the Board of Supervisors meeting of August 5, 1984.

County staff requested additional continuance of the temporary "holding zone" to allow the County Flood Control District to contract a consultant to prepare Flood Control studies for the Apple Valley Dry Lake. This study will figure largely in the outcome of the General Plan Amendment Hearings. At this time the matter has yet to be resolved.

1.5. Use of Study

A Master Plan is a guideline to be used for planning purposes. This M.P.D., as developed here, is implementable, while at the same time being the most cost efficient alternative. It should be noted that this M.P.D. is a conceptual study which identifies facilities to effectively convey and control runoff in the Apple Valley area. However, this plan is not detailed enough for design functions, therefore, additional planning studies should be completed before any facilities are constructed.

This M.P.D. is a document to assist the County and the Town of Apple Valley in developing a flood control plan. In order to be useful the M.P.D. needs to be periodically updated to reflect new hydrologic modeling techniques, better rainfall-runoff data, and the construction of new facilities.

CHAPTER 2

HYDROLOGIC MODELING

2.1. Introduction

In this master plan of drainage two hydrologic models are utilized: the rational method, for smaller areas (less than two square miles), and the unit hydrograph method, for larger areas (greater than two square miles). These methods, described in the 1986 San Bernardino County Hydrology Manual, will not be explained here. Rather, the purpose of this chapter is to discuss the application of the methods to this storm drain master plan. One hundred year peak flow rates were calculated for the M.P.D. using AMC III per County policy. The calibration study of the hydrologic model may justify the use of AMC II if the County revises its present policy. The County is presently evaluating this policy as part of its Desert Rainfall Study.

2.2. Hydrologic Models

The successful development, calibration, and application, of all surface runoff hydrologic models is dependent, in part, upon subarea runoff parameters, channel flow routing uncertainties, and, most of all, the uncertainties in the precipitation distribution over the catchment area. The fact that a storm is a very complex event, having a beginning time, duration and variation in spatial extent and intensity precludes accurate predictions of runoff by any model all the time. This is especially true for severe storms of flood control interest. The uncertainty in rainfall distribution has given rise to the concept of a design storm, which is a synthetic storm based on a probabilistic analysis of previous rainfall. The rational method and the unit hydrograph method both use the design storm concept.

Subarea loss rates are also a source of modeling uncertainty. Many complex models attempt to carefully account for these losses, but the uncertainty in the effective rainfall distribution (rainfall less losses), being a combination of uncertainties, reveals that the rainfall-runoff relationship must be a probabilistic distribution. For this reason, in application, complex models have been shown to be no better at predicting runoff than the single area unit hydrograph, which uses a simple "loss" function. Therefore, the unit hydrograph method and the rational method (which can be shown to be a simplification of the unit hydrograph method when the peak flow rate is the criterion variable of interest) are used to develop this master plan of drainage. The ease with which these methods are applied when computerized make them logical choices for this task.

2.3. Rational Method Versus Unit Hydrograph Method

Based upon comparisons both in this and other studies, of the rational method and the unit hydrograph method, a general relationship has been observed. For watersheds with areas less than about two square miles, the unit hydrograph method will usually estimate higher peak flow rates than the rational method. For watersheds with areas larger than about two square miles, the unit hydrograph will generally estimate lower peak flow rates than the rational method. For this reason the unit hydrograph method was only applied to watersheds greater than two square miles in area and the rational method peak flow rates were only used for watersheds less than two square miles.

2.4. Rational Method

The entire Apple Valley Dry Lake watershed (excluding the dry lake) is divided into subareas for the rational method. For larger areas (greater than two square miles) the computed peak flow rates are not used, but the times of concentration are used to estimate lag in the unit hydrograph method. The model input parameters (precipitation and soil loss rates) are discussed in Chapters 5, 6, and 7 of this report.

The rational method for San Bernardino County recognizes that the peak flow rates generated by a storm often occur at some time prior to the time at which 100-percent of the watershed area is contributing runoff. If at a confluence of two streams, the larger of the two confluenced peak flow rates occurs at time, t_{c1}, when an effective area (i.e., some area, A_e, less than the total area, A_T) is contributing runoff, that time (t_{c1}) is chosen as the time of concentration. If the larger of the two confluenced peak flow rates occurs at the time, t_{c2}, when the total area is contributing runoff, and the stream is routed from the confluence point (A) to another point downstream (B), where it collects additional runoff, the peak flow rate at point B might correspond to time $t_{c1} + t_t$, where t_t is the travel time of the stream from point A to point B. Because this "switch" of the peak flow rate from one time of concentration to another can occur, all combinations of confluence results were analyzed and accounted for in this drainage master plan. Peak flow rate tables are included after every confluence, every "switch", and at the end of each file.

A peak flow rate table can be described as a ledger of all streams in the watershed routed to the point of concentration, in which their times of concentration and associated effective areas, loss rates, and flow rates are listed. This data can be used to plot time-area diagrams of the watersheds. A time-area diagram defines the cumulative area of the watershed contributing runoff to the point of concentration as a function of time. A flow rate versus time curve can also be plotted from the data in a peak flow rate table. These diagrams are helpful in analyzing watershed characteristics.

2.5. Unit Hydrograph Method

The unit hydrograph approach was used to develop peak flow rates for areas greater than two square miles. The model input parameters (precipitation and soil loss rates) and basic modeling assumptions are discussed in Chapters 5, 6, 7, and 8 of this report.

The unit hydrograph lag-time is calculated as (0.8) t_c, where t_c is from the rational method calculations. The t_c of the peak flow rate (Q_p) from the rational method analysis is not necessarily the one used in the calculation, however, since its effective area (A_e) may be significantly less than the total area (A_T). Since the total watershed area is needed to obtain the correct runoff volumes, this would yield a Q_p in the hydrograph that would be too high. Therefore, certain criteria was established to determine a more reasonable t_c.

Letting
- t_{cp} = time of concentration at Q_p.
- A_{ep} = effective area at Q_p.
- $t_{c'}$ = time of concentration used for calculation of lag.
- $A_{e'}$ = effective area at $t_{c'}$.

If $A_{ep} \geq 0.85\ A_T$, then use t_{cp} to calculate lag ($t_{c'} = t_{cp}$); otherwise, determine if there is an $A_{e'}$ and $t_{c'}$ such that $A_{e'} \geq 0.85\ A_T$ and $t_{c'} \leq 1.15\ t_{cp}$.

If $A_{e'}$ does not exist (i.e., A_{ep} is smaller than approximately 0.7 A_T) then a single area hydrograph should not be used. A smaller watershed subarea should be chosen upstream such that the above criteria is met. The flow should then be routed and a hydrograph of the downstream area added in.

The above criteria was established based on the peak flow rate tables of the rational method. The observation was made that of effective areas $\geq 0.85\ A_T$ that there is almost always an A_e such that its flow rate is at least 98-percent of Q_p.

An additional method was developed in the course of this study to verify the hydrograph routing model results. Realizing that the A_e of the Q_p for the rational method is inappropriate for the unit hydrograph, and yet the t_c of the total area is also often inappropriate, some common ground was sought. The goal was to find a t_c between the t_c at Q_p for the rational method and the longest t_c, and an area between A_e at Q_p and A_T, such that the peak flow rate from the hydrograph would closely approximate routed peak flow rates. The method is set forth as follows: assuming the time-area plot from the rational method is parabolic (as it often appears), find the centroid of the area bounded by the time-area plot, t_{cp}, and A_T (see Figure 2.1). The t_c and the A_e used for the hydrograph are then chosen as these centroid values, which can be mathematically expressed as

$$t_c = t_{cp} + 0.25\ (t_{c\ max} - t_{cp})$$

and

$$A_e = A_{ep} + 0.75\ (A_T - A_{ep}).$$

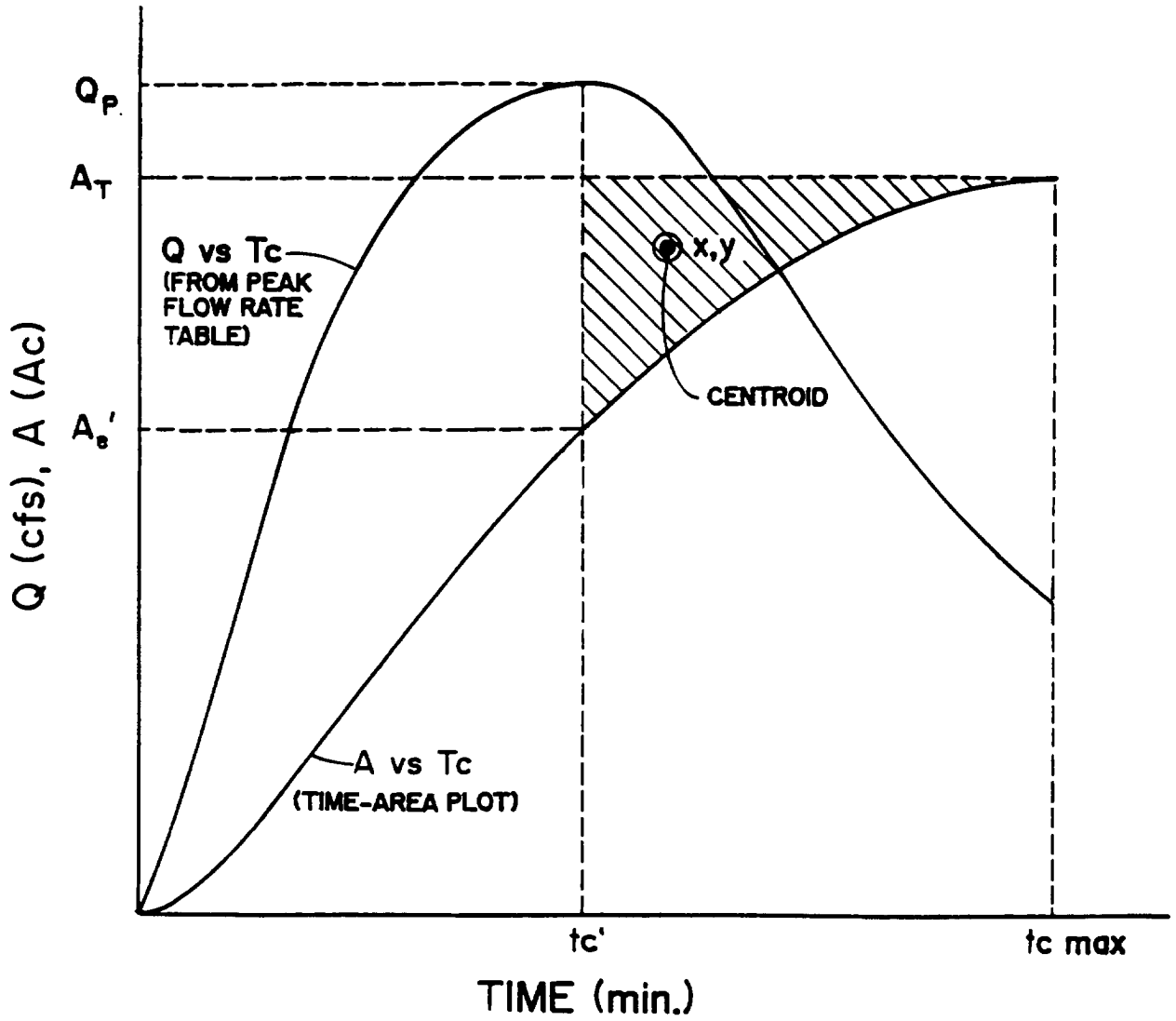
Figure 2.1.

CENTROID METHOD HYDROGRAPH DEVELOPMENT

SINGLE AREA HYDROGRAPH w/A, T_c @ CENTROID of AREA bordered by time-area plot, t_c @ Q_p, and total area.

For routed hydrographs get single area hydrographs using the following procedure:

1) get area-averaged rainfall
2) from Rational Method Study (100-year)
   a) find $t_{c'}$ + $A_{e'}$ corresponding to Q_p in the peak flow rate table
   b) find longest t_c and total area
3) assuming time-area plot is parabolic, find centroid as: $x,y = t_{c'} + .25\ (t_{c\ max} - t_{c'}),\ A_{e'} + .75\ (A_T - A_{e'})$
4) assume no change in loss rates from total area
   a) get area-averaged loss rates + S-graph proportions



The results of this method are compared with the routed results in Table 2.1. The results are within plus or minus 10 percent of the routed model for the majority of the watersheds modeled. This approach was presented to the County as an alternate to hydrograph routing for future studies, although the routed hydrograph approach was used to size facilities in this report.

Table 2.1.

COMPARISON OF RESULTS FOR HYDROGRAPHS
AT NODES WHERE ROUTING IS USED

		Peak Flow Rates (CFS)				
Community	Node	Routed Model	Single Area Model A_e, t_c @ Centroid	% Difference	A_e/A_T	A_T(Acres)
EAST	5122	8548	8422	-1.5	.91	9,656
	5126	8195	8307	1.4	.91	10,443
	5128	8243	8622	4.6	.91	10,895
	5132	8243	8448	2.5	.92	11,387
	5135	8319	8860	6.5	.89	11,783
	5139	8333	9660	15.9	.85	12,531
	5319	7508	7547	0.5	.90	6,845
	5321	6554	6825	4.1	.90	6,900
	5323	6916	7092	2.5	.89	7,593
NORTH	8316	689	914	32.7	.87	623
	8318	953	1144	20.0	.88	920
	8032 (WEST)	1244	1308	5.1	.91	1,291
	8032 (TOTAL)	2598	2636	1.5	.92	2,325
	8033	3046	3213	5.5	.89	2,752
	8034	4640	4365	-5.9	.91	3,938
	8035	4903	4549	-7.2	.91	4,343
	3831	5840	5581	-4.4	.91	6,258
	3832	5867	6087	3.7	.89	6,592
	3833	6157	6737	9.4	.90	7,518
	3835	6392	7546	18.1	.87	8,572
	3836	6484	7654	18.0	.88	8,745
	3837	6822	7714	13.1	.88	9,460
SOUTH	669	6607	6246	-5.5	.88	7,722

CHAPTER 3

EXISTING RIGHT-OF-WAY AND MAJOR UTILITIES

3.1. Existing Right of Way

Existing San Bernardino County Flood Control District rights-of-way, San Bernardino County Drainage Easements, and other drainage reservations were identified for possible use in the development of this master plan of drainage. The consultant compiled a list of Parcel Map numbers, and Final Tract Map numbers from wall map exhibits supplied by the County. The wall map exhibits include the entire Apple Valley watershed except for the catchment area (approximately 14 percent) in Township 6 North, Range 2 West and Township 5 North, Range 1 West. The District then reviewed the Parcel Map and Final Map list and supplied the consultant with all maps which had any drainage reservations. The drainage reservations include natural drainage courses, areas of channel overflow, and drainage easements.

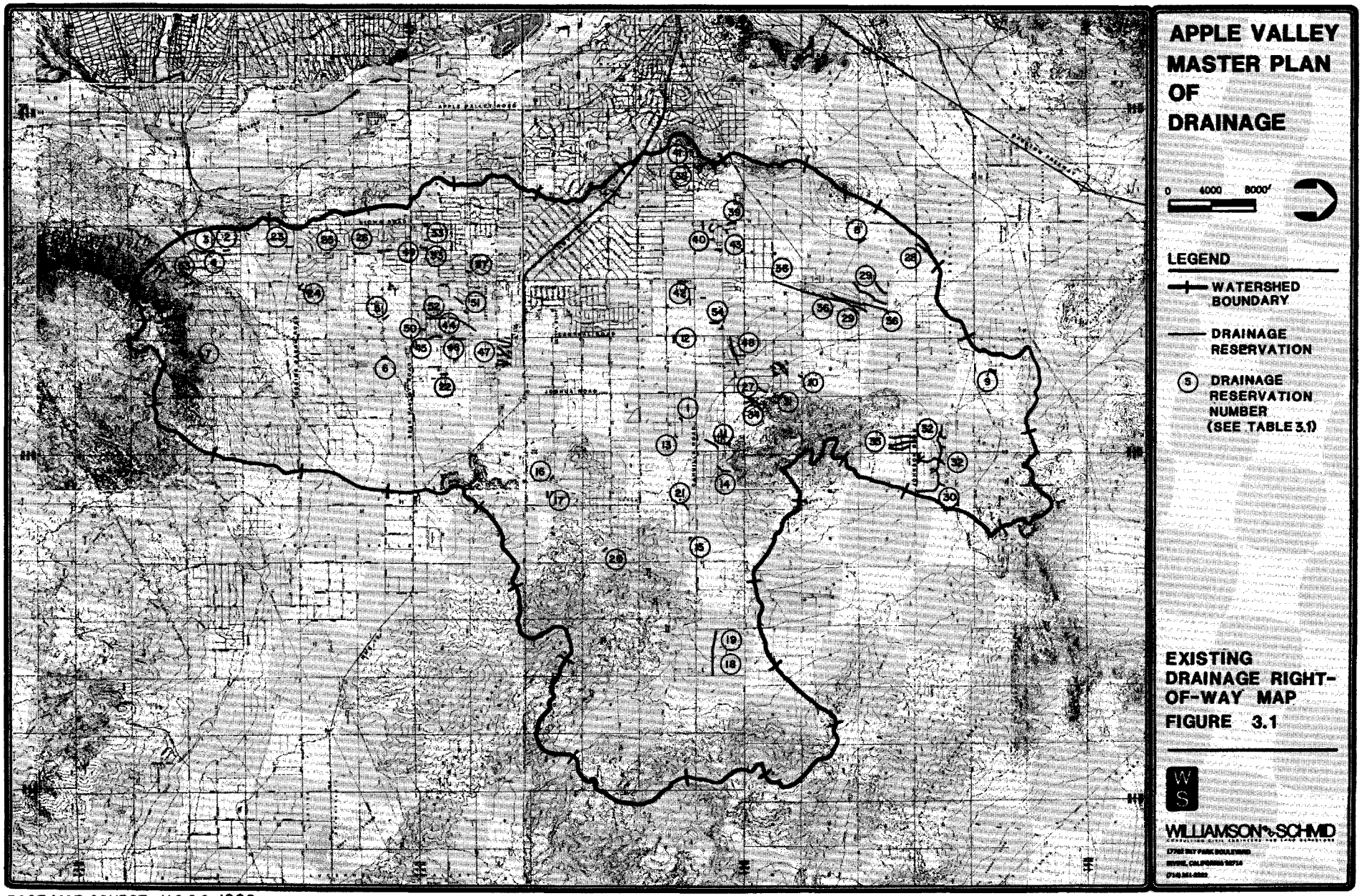
Additionally, the map listing (dated 01/06/87) from the Surveyors Master Index File was reviewed by the consultant. All Parcel Map numbers and Final Tract Map numbers shown in the Master Index File but not shown on the wall map exhibits were recorded and submitted to the County for their research process in locating drainage reservations. Figure 3.1 depicts the drainage reservations and Table 3.1 lists the Parcel Map numbers and Final Tract numbers corresponding to the drainage reservations. Table 3.2 describes each reservation. A larger version of Fig. 3.1 (scale of 1"=2000') is also available. It shows the locations, widths, and types of drainage reservations.

3.2. Major Utilities

Major utilities within the Apple Valley watershed were identified in the development of the master plan of drainage. Whenever flood control facilities are designed, consideration of conflicts with utilities is a necessity.

Research of major utilities consisted of identifying (1) water mains larger than 12 inches in diameter; (2) sewer mains 8 inches in diameter or larger; (3) gas lines 8 inches in diameter or larger. Electrical and telephone wires are, for the most part, above ground.

According to the Apple Valley Ranchos Water Company, there exist in excess of 40 separate water companies in and around Apple Valley, but their company supplies 90 percent of the services in the area. The only water mains larger than 12 inches that were identified in the watershed were three 14-inch lines. One 14-inch line exists on Waalew Road between Navajo Road and Ramona Road.



BASE MAP SOURCE: U.S.G.S. 1980

Table 3.1.

LIST OF PARCEL MAP NUMBERS AND TRACT NUMBERS
WITH DRAINAGE RESERVATIONS

1.	Parcel Map No. 6522	Parcel Map Book 65,	page 20
2.	Parcel Map No. 6632	Parcel Map Book 64,	page 68
3.	Parcel Map No. 5301	Parcel Map Book 50,	page 92
4.	Parcel Map No. 6181	Parcel Map Book 59,	page 6
5.	Parcel Map No. 8387	Parcel Map Book 90,	page 29
6.	Parcel Map No. 2150	Parcel Map Book 18,	page 73
7.	Parcel Map No. 7207	Parcel Map Book 71,	page 96
8.	Parcel Map No. 6738	Parcel Map Book 68,	page 1
9.	Parcel Map No. 3167	Parcel Map Book 29,	page 39
10.	Parcel Map No. 2122	Parcel Map Book 19,	page 8
11.	Parcel Map No. 2866	Parcel Map Book 25,	page 43
12.	Parcel Map No. 7216	Parcel Map Book 71,	page 58
13.	Parcel Map No. 8798	Parcel Map Book 91,	page 54
14.	Parcel Map No. 2337	Parcel Map Book 24,	page 4
15.	Parcel Map No. 2344	Parcel Map Book 21,	page 8
16.	Parcel Map No. 2206	Parcel Map Book 19,	page 57
17.	Parcel Map No. 6578	Parcel Map Book 73,	page 22
18.	Parcel Map No. 2033	Parcel Map Book 18,	page 48
19	Parcel Map No. 2034	Parcel Map Book 18,	page 30
20.	Parcel Map No. 8548	Parcel Map Book 90,	page 37
21.	Parcel Map No. 7575	Parcel Map Book 81,	page 70
22.	Tract No. 5197	Map Book 63,	page 90
23.	Tract No. 5605	Map Book 69,	page 94
24.	Tract No. 5780	Map Book 71,	page 27
25.	Tract No. 5883	Map Book 73,	page 24
26.	Tract No. 5884	Map Book 73,	page 62
27.	Tract No. 4363	Map Book 54,	page 95
28.	Tract No. 5526	Map Book 73,	page 80
29.	Tract No. 5966	Map Book 76,	page 100
30.	Tract No. 6437	Map Book 82,	page 48
31.	Tract No. 5602	Map Book 49,	page 35
32.	Tract No. 5649	Map Book 69,	page 72
33.	Tract No. 7994	Map Book 102,	page 1
34.	Tract No. 5788	Map Book 72,	page 29
35.	Tract No. 5920	Map Book 78,	page 84
36.	Tract No. 8094	Map Book 103,	page 67
37.	Tract No. 5803	Map Book 71,	page 79
38.	Tract No. 5745	Map Book 71,	page 38
39.	Tract No. 5678	Map Book 69,	page 31
40.	Tract No. 5436	Map Book 55,	page 41
41.	Tract No. 5402	Map Book 64,	page 9
42.	Tract No. 4649	Map Book 92,	pages 97-98

Table 3.1. (CONT.)

LIST OF PARCEL MAP NUMBERS AND TRACT NUMBERS
WITH DRAINAGE RESERVATIONS

43.	Tract No. 4286	Map Book 55,	page 41
44.	Tract No. 5215	Map Book 78,	page 53
45.	Tract No. 5523	Map Book 67,	page 28
46.	Tract No. 5214	Map Book 64,	page 84
47.	Tract No. 5048	Map Book 64,	page 7
48.	Tract No. 5579	Map Book 74,	page 77
49.	Tract No. 3997	Map Book 51,	page 40
50.	Tract No. 5742	Map Book 73,	page 8
51.	Tract No. 7804	Map Book 99,	page 22
52.	Tract No. 6008	Map Book 76,	page 13
53.	Parcel Map No. 9408	Parcel Map Book 103,	page 34
54.	Parcel Map No. 2648	Parcel Map Book 22,	page 89
55.	Parcel Map No. 2317	Parcel Map Book 20,	page 18

Table 3.2.

SIZES AND TYPES OF DRAINAGE RESERVATIONS

	Width (ft)	Length (ft)	Type
1.	80	300	San Bernardino County Drainage Easement
2.	120	300	San Bernardino County Drainage Easement
3.	120	300	San Bernardino County Drainage Easement
4.	120	280	San Bernardino County Drainage Easement
5.	100	790	San Bernardino County Drainage Easement
6.	100	320	Natural Drainage Course & Future S.B.C.D.E.
7.	90	320	San Bernardino County Drainage Easement
8.	200	730	San Bernardino County Drainage Easement
9.	100	430	Natural Drainage Course & Future S.B.C.D.E.
10.	70	160	Natural Drainage Course & Future S.B.C.D.E.
11.	50	1220	Natural Drainage Course & Future S.B.C.D.E.
12.	400 to 1210	600	San Bernardino County Drainage Easement
13.	90	220	San Bernardino County Drainage Easement
14.	80	1520	Natural Drainage Course & Future S.B.C.D.E.
15.	—	110	Natural Drainage Course
16.	130	370	Future S.B.C.D.E.
17.	130	630	San Bernardino County Drainage Easement
18.	270 to 470	2520	Future S.B.C.D.E.
19.	300	1700	Future S.B.C.D.E.
20.	100	370	San Bernardino County Drainage Easement
21.	180	680	San Bernardino County Drainage Easement
22.	15	540	San Bernardino County Drainage Easement
23.	30	520	San Bernardino County Drainage Easement
24.	—	650	Natural Drainage Course
25.	75	310	San Bernardino County Drainage Easement

Table 3.2. (CONT.)

SIZES AND TYPES OF DRAINAGE RESERVATIONS

	Width (ft)	Length (ft)	Type
26.	30	1100	San Bernardino County Drainage Easement
27.	—	750	Natural Drainage Course
28.	—	1370	Natural Drainage Course
29.	40,50,170	1500,3750, 3720	San Bernardino County Drainage Easement
30.	50,40	1000,770	San Bernardino County Drainage Easement
31.	—	—	Natural Drainage Course
32.	—	—	Natural Drainage Course
33.	20,20,40	150,230,160	San Bernardino County Drainage Easement
34.	—	—	Natural Drainage Course
35.	60,60,60	2580,2580, 1920	San Bernardino County Drainage Easement
36.	680	11,000	San Bernardino County Drainage Easement
37.	20	150	San Bernardino County Drainage Easement
38.	—	—	Natural Drainage Course
39.	—	—	Natural Drainage Course
40.	20,20	590,440	San Bernardino County Drainage Easement
41.	20	410	San Bernardino County Drainage Easement
42.	20,40	410,770	San Bernardino County Drainage Easement
43.	20,20, 20,15	360,180,180, 540	San Bernardino County Drainage Easement
44.	40	400	San Bernardino County Drainage Easement
45.	—	1270	Natural Drainage Course
46.	—	310,110	Natural Drainage Course
47.	—	—	Natural Drainage Course
48.	90,30	2740,700	San Bernardino County Drainage Easement
49.	15	260	San Bernardino County Drainage Easement
50.	30	330	San Bernardino County Drainage Easement
51.	180-620	1250	San Bernardino County Drainage Easement
52.	40	1110	San Bernardino County Drainage Easement
53.	110	2410	San Bernardino County Drainage Easement
54.	10 Acres		San Bernardino County Drainage Easement
55.	—	2600	Proposed S.B.C.D.E.

Another line starts at a water storage tank on the hill above the Apple Valley Inn and branches into two lines. One of the lines crosses Highway 18 at Standing Rock Avenue. The other line runs southeast to Rancherias Road.

The Apple Valley Water District confirmed that sewage systems in Apple Valley mainly consist of septic tanks. The Village area along Highway 18, however, is connected to a sewer main that proceeds northwest on the south side of Highway 18 and joins a main interceptor at Rancherias Road.

Southern California Gas Company maintains two 36-inch high pressure gas lines that run on Roundup Way from Bowen Ranch Road to Juniper Street and then southwest. These pipelines are identified on the Apple Valley South U.S.G.S. topographic quadrangle. Natural gas lines exist for most of Apple Valley, and are serviced by Southwest Gas Company. The only 8-inch line within Apple Valley runs east on Bear Valley Cutoff to Kiowa Road. This high presssure line is connected to a 6-inch high pressure line that runs south on Kiowa Road.

CHAPTER 4

WATERSHED BOUNDARY

4.1. Introduction

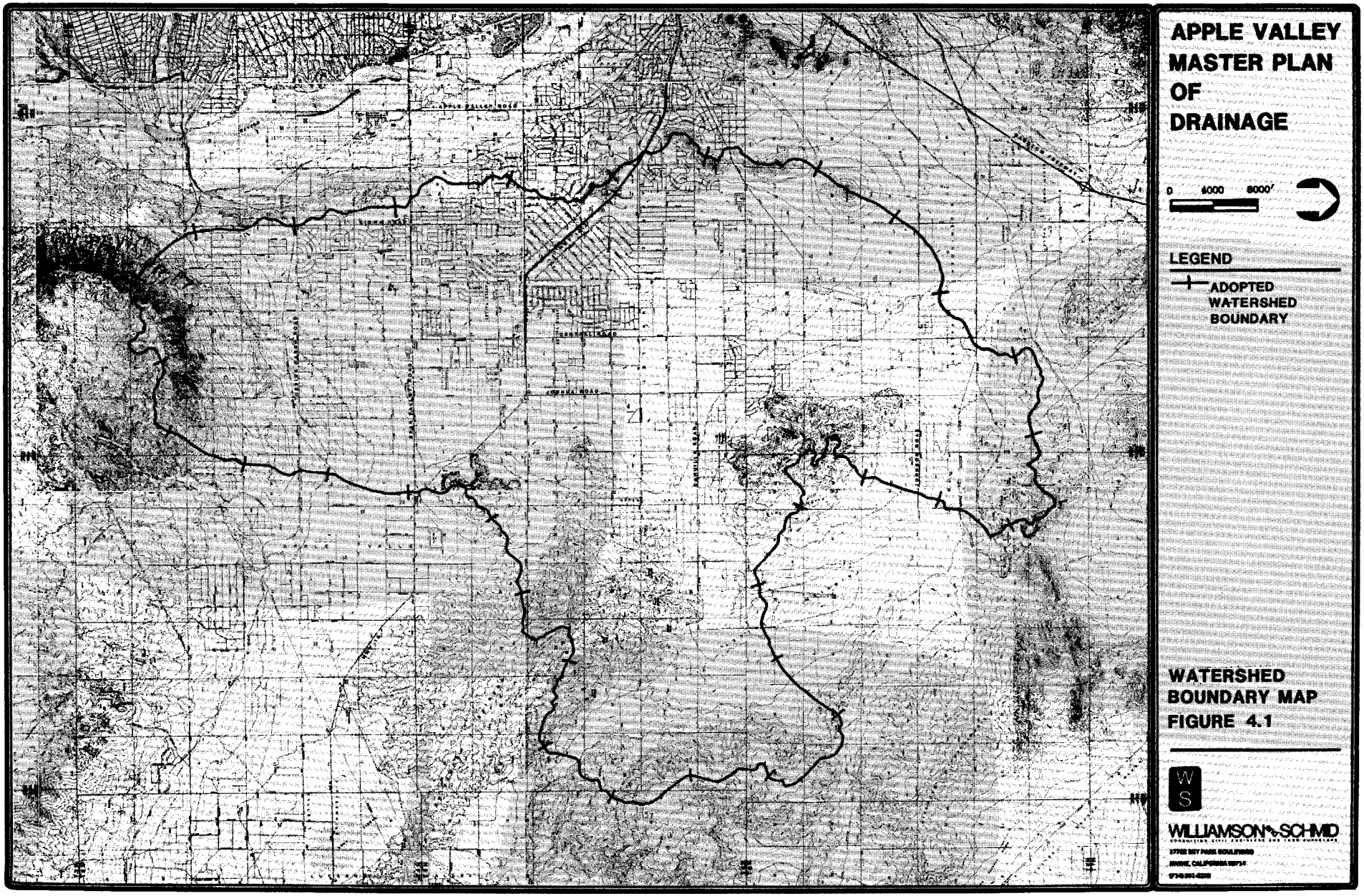
The watershed boundary of the catchment is generally defined by the Ord Mountains on the south, the Granite and Fairview Mountains on the east, and Black Mountain on the north. A portion of the westerly boundary is defined by Bell Mountain and Catholic Hill while the remaining westerly boundary follows an ill-defined ridge line between Apple Valley and Victorville. Figure 4.1 shows the watershed boundary as adopted by the District.

4.2. Watershed Boundary Development

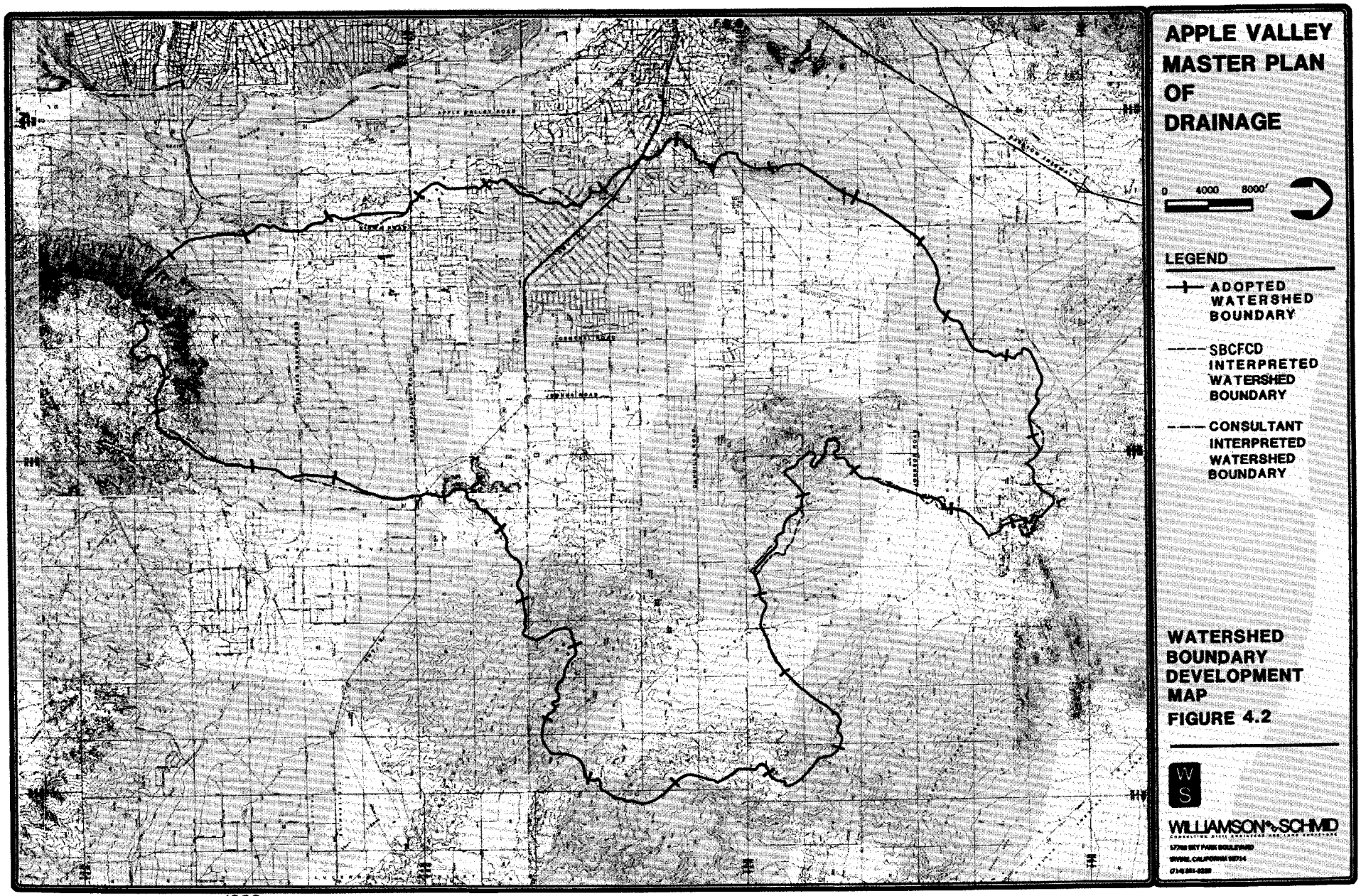
The watershed boundary of the approximate 98-square mile catchment was first defined by the consultant on U.S.G.S. quadrangle maps (Stoddard Well, Fairview Valley, Fifteen Mile Valley, Apple Valley South, Apple Valley North and Turtle Valley). These maps were prepared or photorevised between 1970 and 1980, are at a scale of 1 inch = 2000 feet and have elevation contour intervals of 20 or 40 feet. Field reviews were conducted to determine the relative accuracy of the U.S.G.S. maps. Except for an area in the vicinity of Yucca Loma Road at Redwing Road, the accuracy of the maps appeared to be adequate (there is a knoll extending northerly past Yucca Loma Road which is not apparent from an inspection of the U.S.G.S. maps). There were also several minor discrepancies in the southerly portion of the watershed.

Aerial photographs supplied by the Flood Control District were then reviewed to refine the watershed boundary for a portion of the catchment. The stereoscopic photographs (which are at an approximate scale of 1 inch = 1000 feet and were taken in August 1983) encompass approximately 85 percent of the entire catchment. The approximate 15 square miles not included in the aerial photographs lies to the east of Milpas Drive.

In a review of the watershed boundary defined by the consultant, the District arrived at a similar but slightly different watershed divide in several areas as shown in Figure 4.2. Subsequently a joint review by County staff and the consultant of the U.S.G.S. maps, the 1983 aerial photographs and earlier aerial photos resolved these discrepancies. Finally, a complete review of the 1983 aerial photographs was made and the resulting watershed boundary was reviewed and approved by the District.



BASE MAP SOURCE: U.S.G.S. 1980



BASE MAP SOURCE: U.S.G.S. 1980

4.3. Special Considerations

It is noted that a field inspection was made in an attempt to more accurately define the watershed boundary through the topographically flat pocket of development on the west side of the catchment which is generally bounded on the south by Bear Valley Cutoff and Highway 18 on the north. However, because of the numerous sumps in the area and the flatness of the area a more accurate delineation of the watershed boundary is not possible. It is also noted that while some of the sumps in this area are shown on the U.S.G.S. maps, the field inspection and review of the aerial photographs reveals the true number of sumps in this area.

An analysis of the spillover potential from other watersheds was also made. The two potential areas which could spill over into the study watershed are the Fairview Valley Dry Lake and the borrow pit immediately north of Highway 18 between Redwing Road projected and Milpas Drive projected. A cursory analysis for both sites (Appendix A) indicates a very low spillover potential for both areas during the 100-year event given the current level of development (predominately undeveloped).

CHAPTER 5

PRECIPITATION

5.1. Introduction

Significant precipitation occurs infrequently in Apple Valley. The average annual precipitation is 5 inches, of which 70 percent falls between October and March. These months usually produce general winter storms of low intensity and long duration, while the months of April through September usually yield thunderstorms of high intensity and short duration. Thunderstorms occur, on the average, three days a year.

The average seasonal snowfall is almost 2 inches. For the period of record (26 years) the greatest snow depth at any time in Victorville was 17 inches. Snowfall is not considered in the hydrologic analysis for Apple Valley.

5.2. Recent Historical Storms

The infrequency of significant rainfall in desert regions might lead some to the conclusion that flooding is not an issue in Apple Valley. Long-time residents of Apple Valley will, however, remember a few storms from recent history. A storm in July of 1956 generated runoff that filled much of the lake in less than one hour. A 20-minute storm on August 24, 1961 resulted in some homes around Bell Mountain being inundated with mud. Water was reported 12 feet deep in places. A two hour storm on August 7, 1963, caused flash floods that rushed into downtown sections of Apple Valley at a depth of three feet. Most of Apple Valley experienced power failures, and many roads were washed out. The storm left water ponded in the lake up to seven feet, according to one eyewitness. A cloudburst that lasted 45 minutes on August 1, 1974 sent one foot of water into streets and flooded homes and businesses. Other storms of consequence include winter storms such as the one occurring on February 7-9, 1976, which flooded streets, clogged storm drains, and resulted in several accidents in neighboring Victorville.

All of the storms mentioned were within a period of 20 years. It is not hard to see that flooding can be a real threat to both lives and property within Apple Valley.

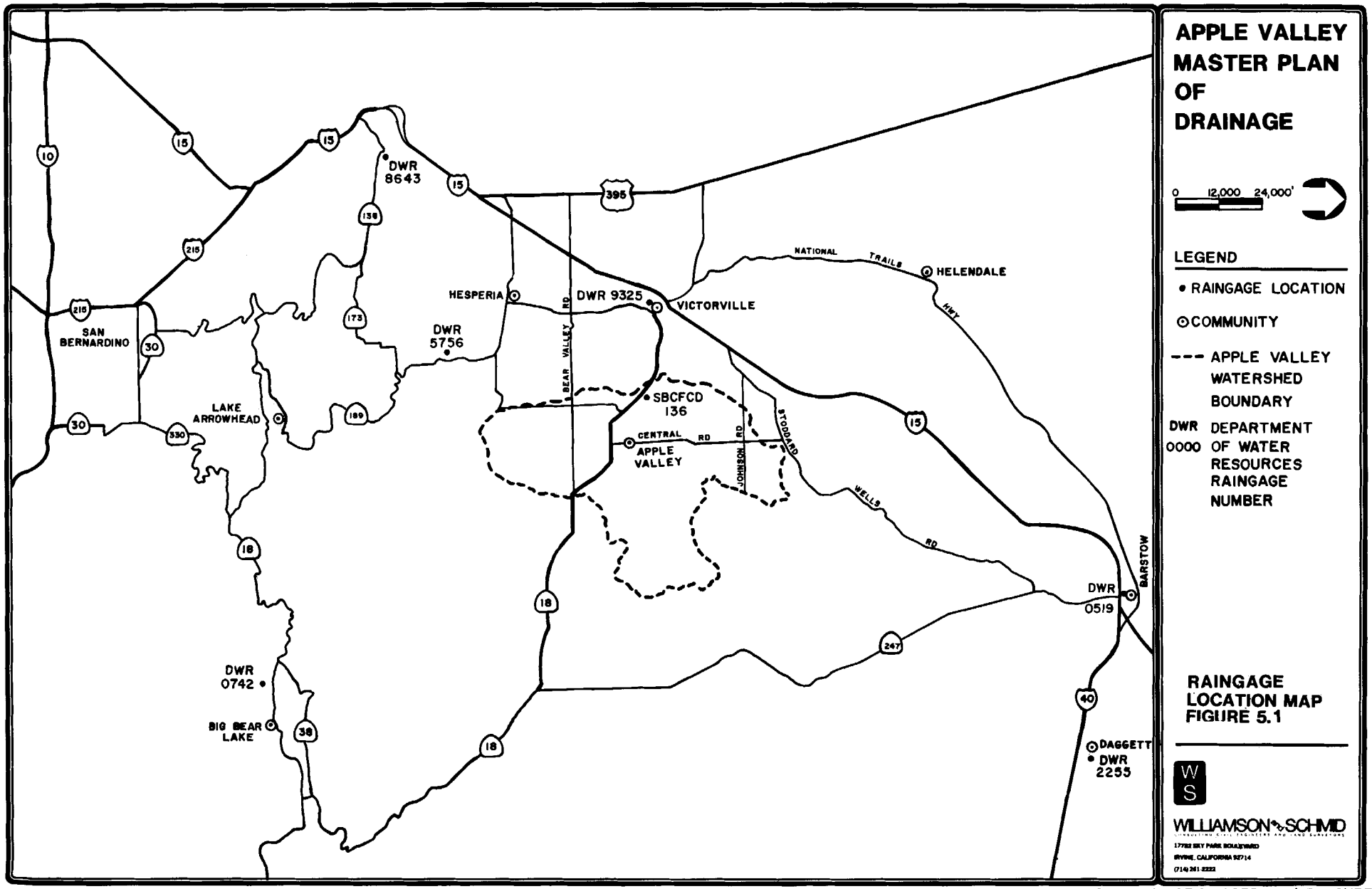
5.3. Precipitation Analysis

In order to determine which rainfall data base to use in the design of drainage facilities, data from surrounding raingages were analyzed and compared with the isohyetal maps found in the 1986 San Bernardino County Hydrology Manual. The Department of Water Resources of the State of California has performed depth-duration-frequency analyses for selected raingages throughout the State. The analyses of six of these recording raingages surrounding the Apple Valley watershed (see Figure 5.1) were used for further analysis and comparison with precipitation data and procedures adopted in the 1986 San Bernardino County Hydrology Manual. The isohyetal maps in this manual are based on the NOAA Atlas II, Precipitation - Frequency Atlas of the Western United States, Volume XI - California.

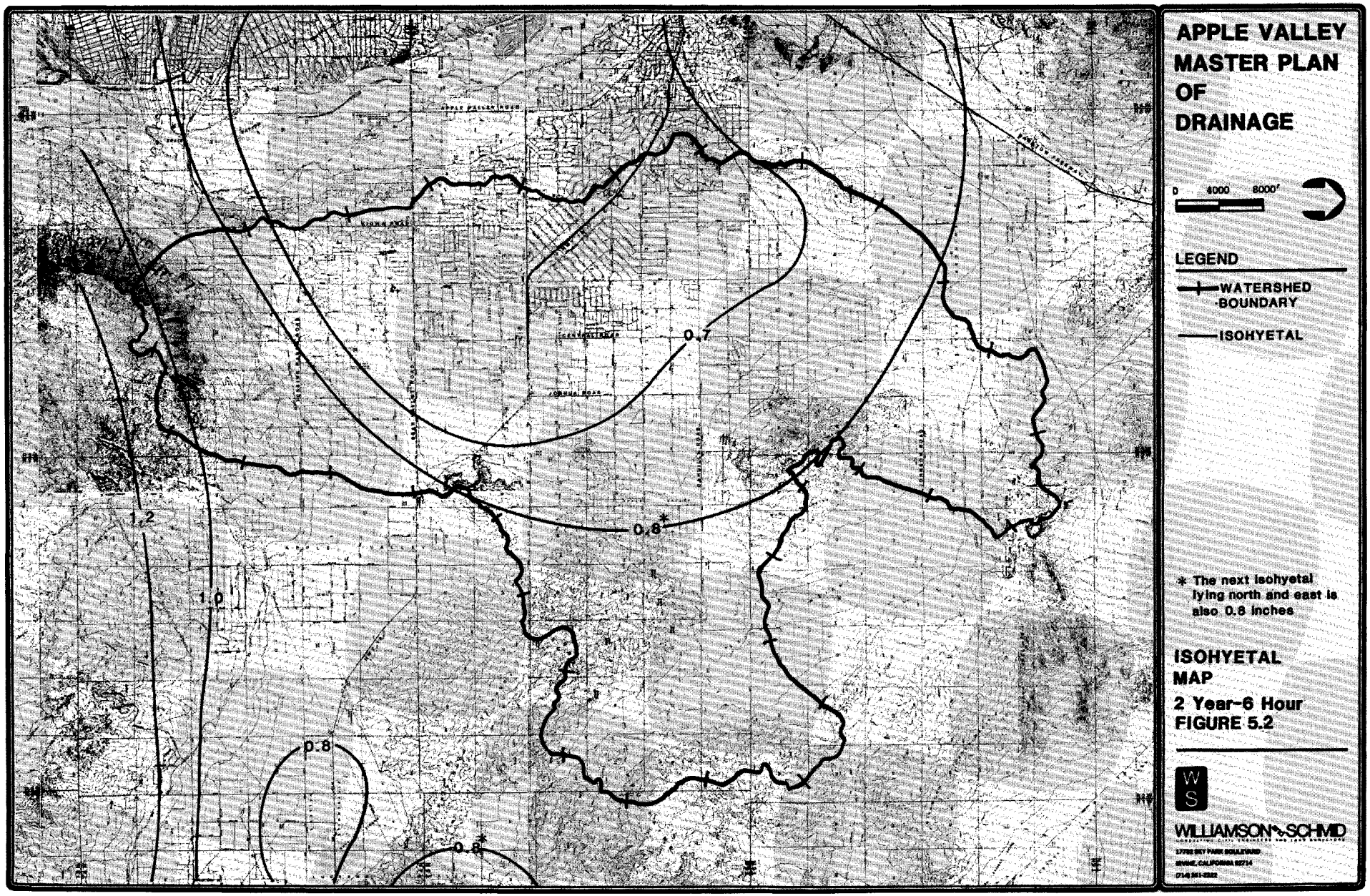
One raingage exists within the Apple Valley watershed, but since it is a standard gage, rainfall is only measured in 24 hour increments. Department of Water Resources (DWR) raingage 9325, located in Victorville, is the closest recording raingage to Apple Valley, and 39 years of data were available for a depth-duration-frequency analysis. DWR raingage 5756, located next to the Mojave River seven miles south of Bear Valley Road, was analyzed with 14 years of data. Other raingages analyzed, though not as representative or geographically close, include Summit (DWR raingage 8643), Big Bear Lake Dam (DWR raingage 0742), Barstow (DWR raingage 0519), and Dagget (DWR raingage 2255).

Comparison of the rainfall data bases revealed consistent differences between them. The DWR rainfall depths are, almost without exception, less than the rainfall depths obtained at the same locations using the San Bernardino County isohyetals and procedures. Field surveys have also revealed rainfall amounts in excess of those measured at the recording DWR raingage in Victorville. The intensity-duration curves from the NOAA Atlas II 100-year 1-hour isohyetal map and Table 12 of NOAA Atlas II, yield slopes of 0.50 and 0.51. The intensity-duration curves from the DWR data yield slopes between 0.37 and 0.59. A comparison of 100-year 1-hour rainfall at the six raingage locations reveals, at most, a 7 percent difference between the hyrology manual isohyetal map and the NOAA Atlas calculated results. The DWR rainfall depths were as low as 51 percent of the rainfall depths given by the hydrology manual isohyetal map.

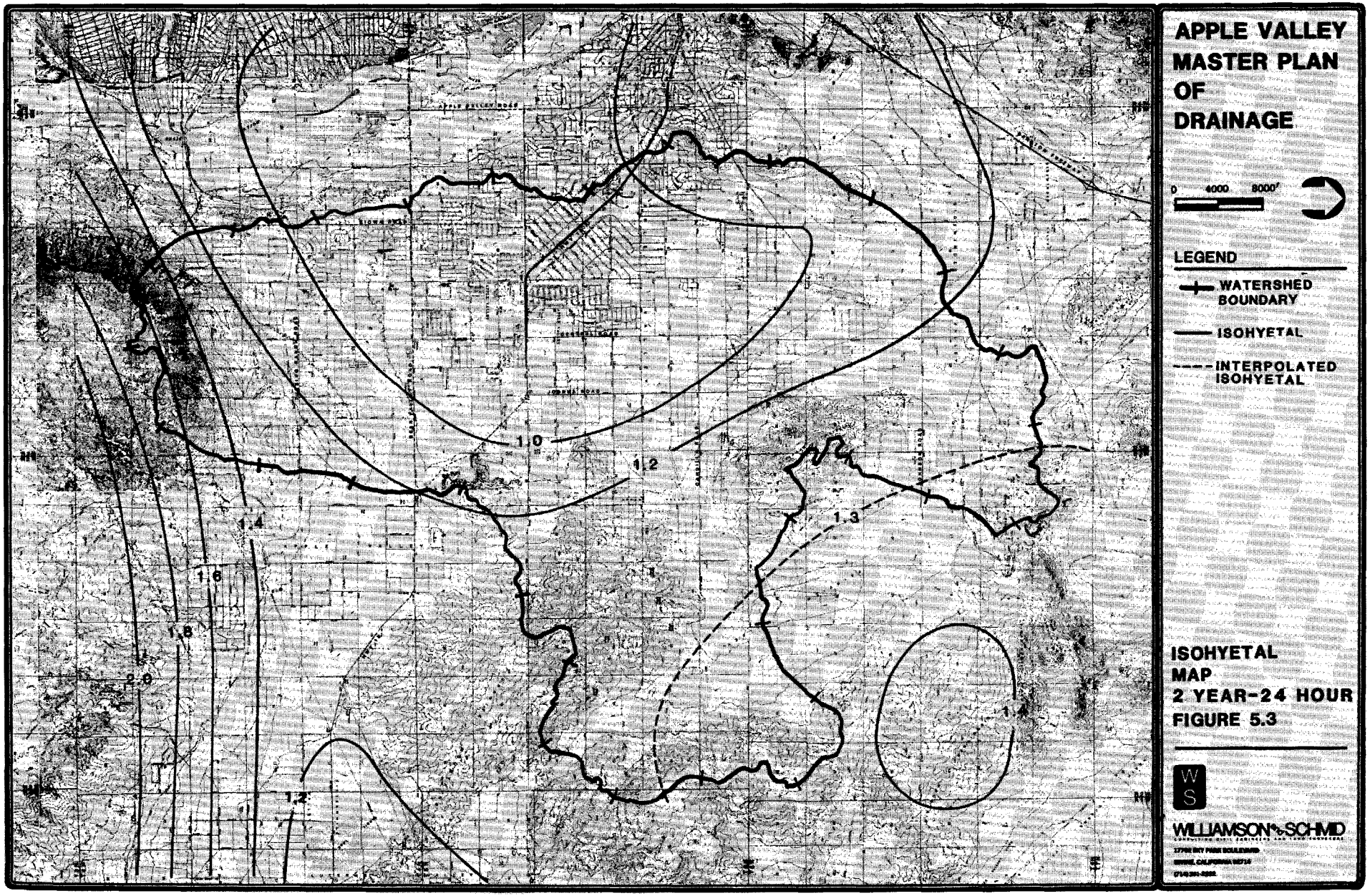
Due to the extreme differences between the DWR rainfall and the isohyetal map values, and the fact that the raingage data base was relatively poor (i.e., only one DWR gage near the watershed), the District opted to use the rainfall isohyetal maps in the hydrology manual and the corresponding intensity-duration curve slope of 0.7 (as required by the 1986 San Bernardino County Hydrology Manual) for the Apple Valley study. Based on this decision, the unadjusted area-averaged rainfall for the entire Apple Valley watershed, and portions thereof, are determined for durations of 5 minutes, 30 minutes, 1 hour, 3, 6, and 24 hours and for frequencies of 2, 5, 10, 25, 50, and 100 years. These rainfall depths are used in all of the hydrology calculations. Isohyetal maps covering the Apple Valley watershed are provided in Figures 5.2 through 5.7. These maps are enlargements of the hydrology manual isohyetal maps for the desert area.



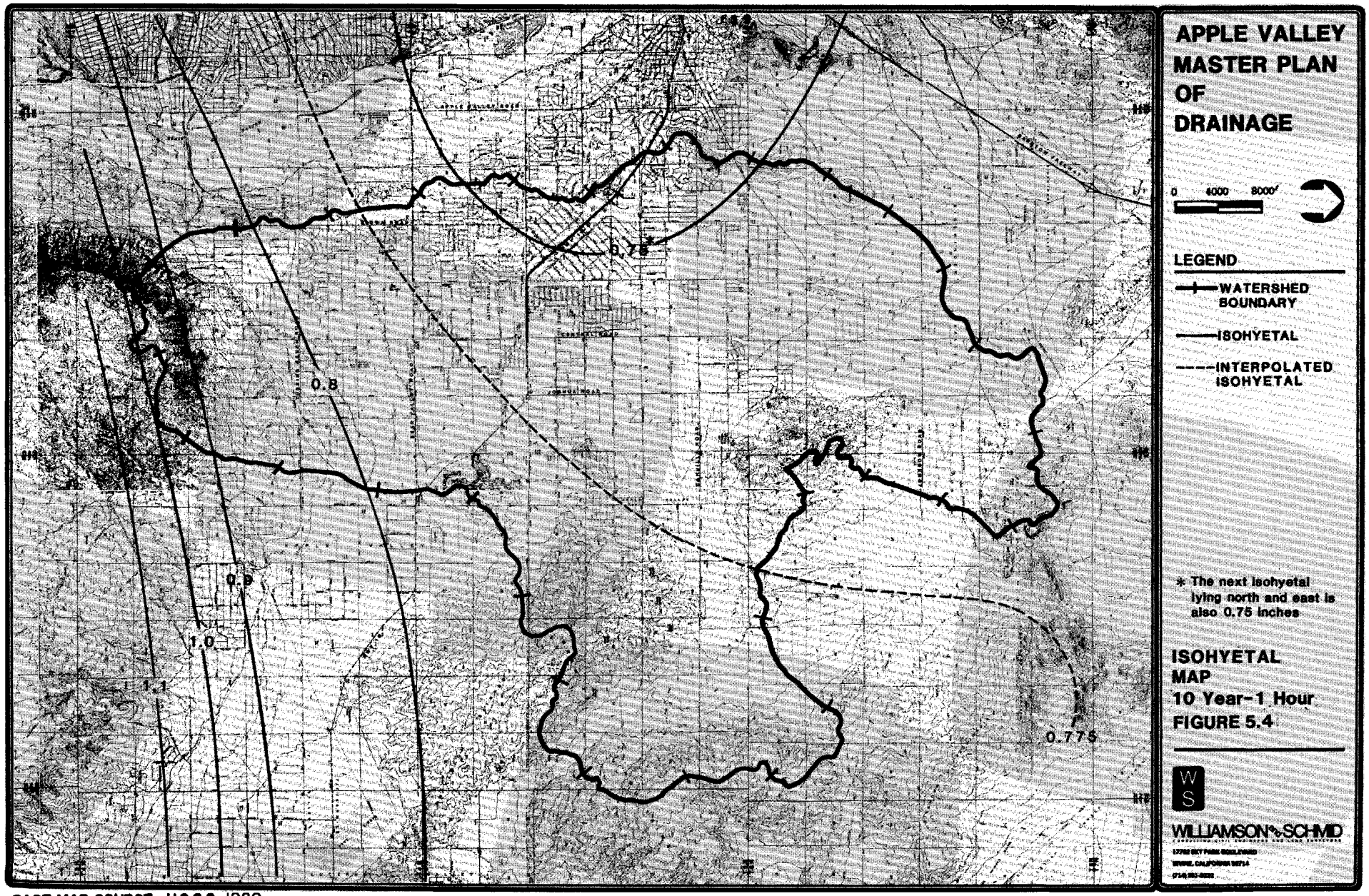
SEE VOLUME 2 FOR LARGER SCALE FIGURE



BASE MAP SOURCE: U.S.G.S. 1980



BASE MAP SOURCE: U.S.G.S. 1980



APPLE VALLEY MASTER PLAN OF DRAINAGE

0 4000 8000'

LEGEND

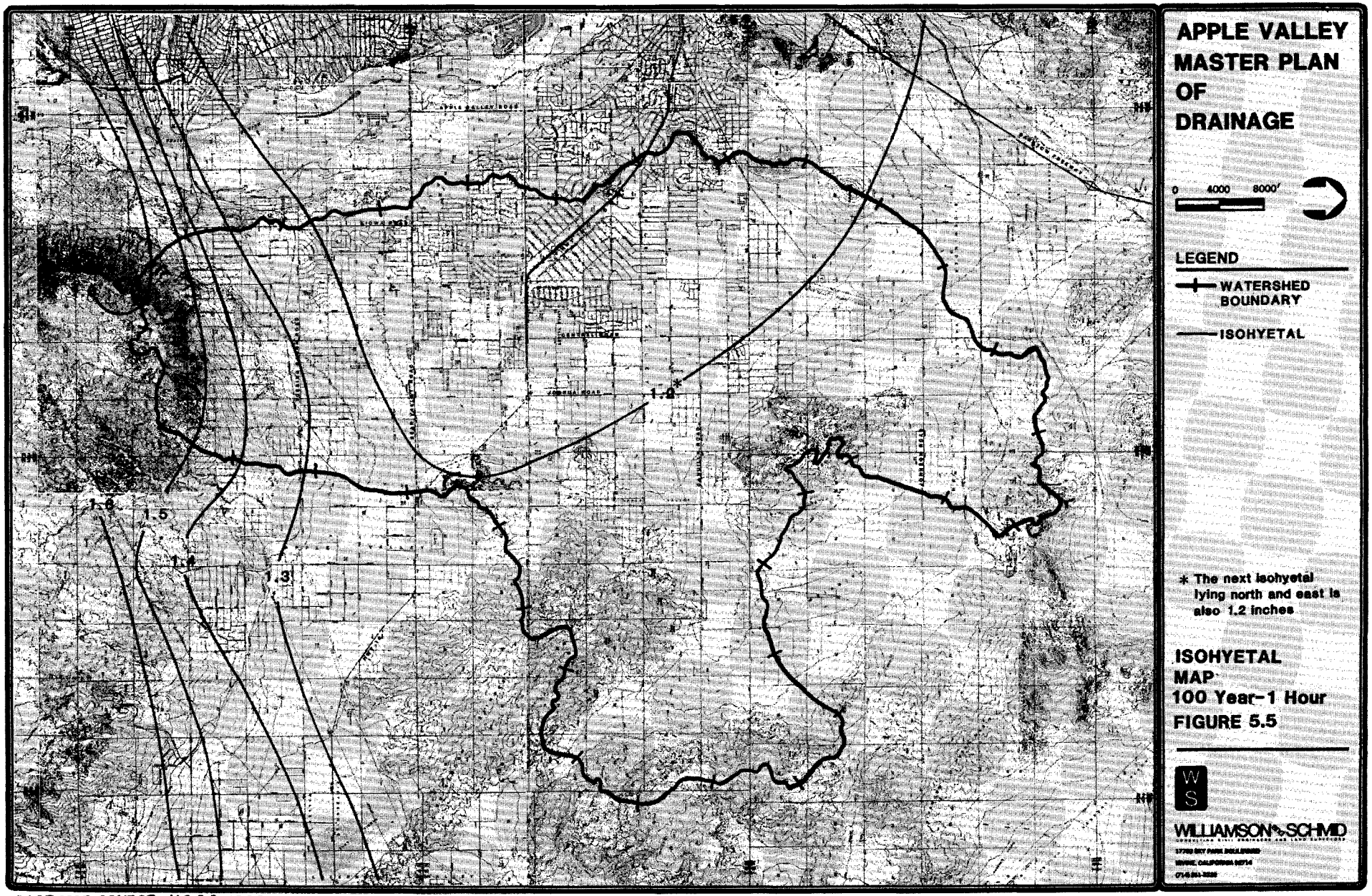
- WATERSHED BOUNDARY
- ISOHYETAL
- INTERPOLATED ISOHYETAL

* The next isohyetal lying north and east is also 0.75 inches

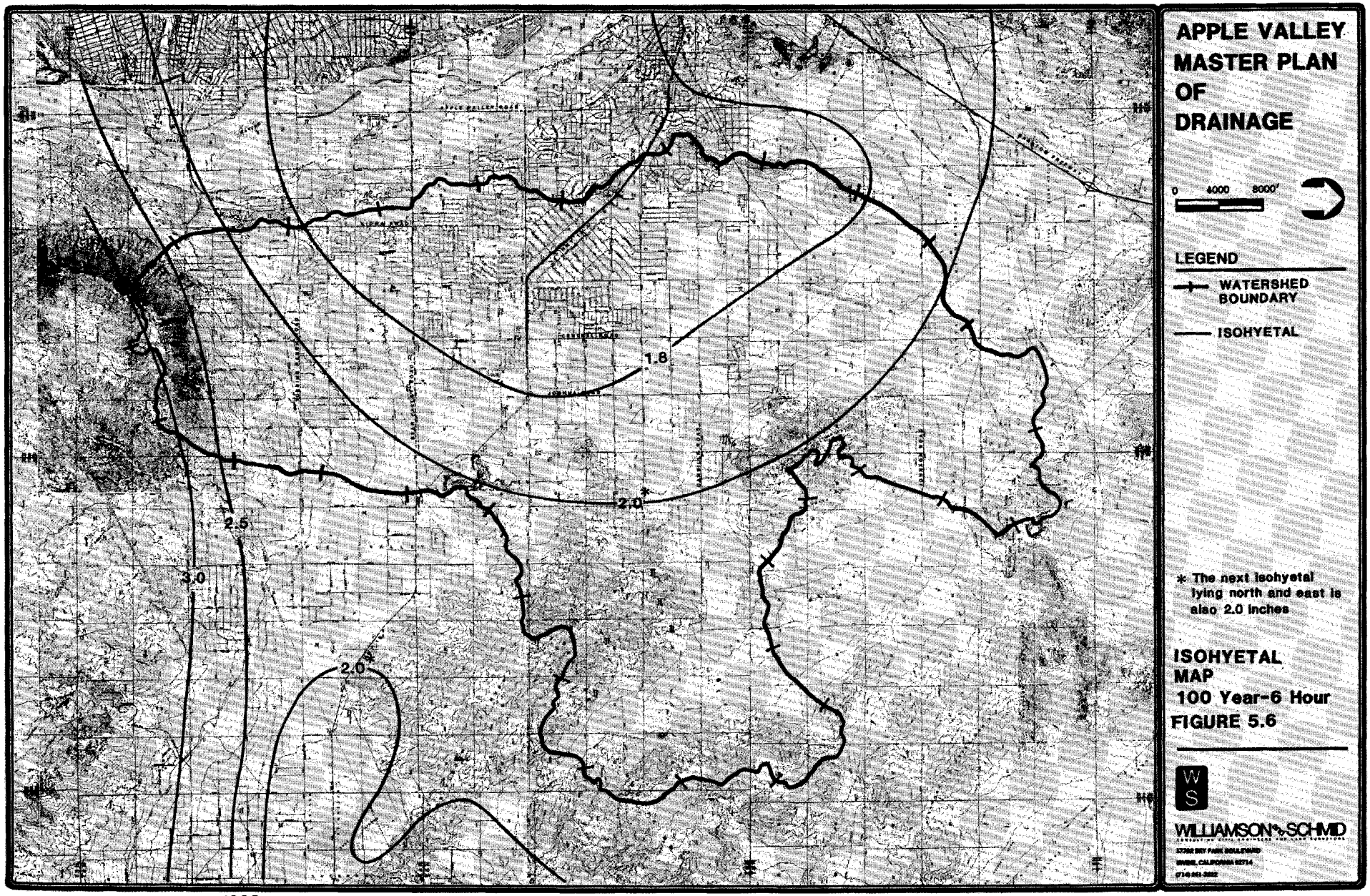
ISOHYETAL MAP
10 Year-1 Hour
FIGURE 5.4

WILLIAMSON & SCHMID

BASE MAP SOURCE: U.S.G.S. 1980



BASE MAP SOURCE: U.S.G.S. 1980



APPLE VALLEY MASTER PLAN OF DRAINAGE

0 4000 8000'

LEGEND

WATERSHED BOUNDARY

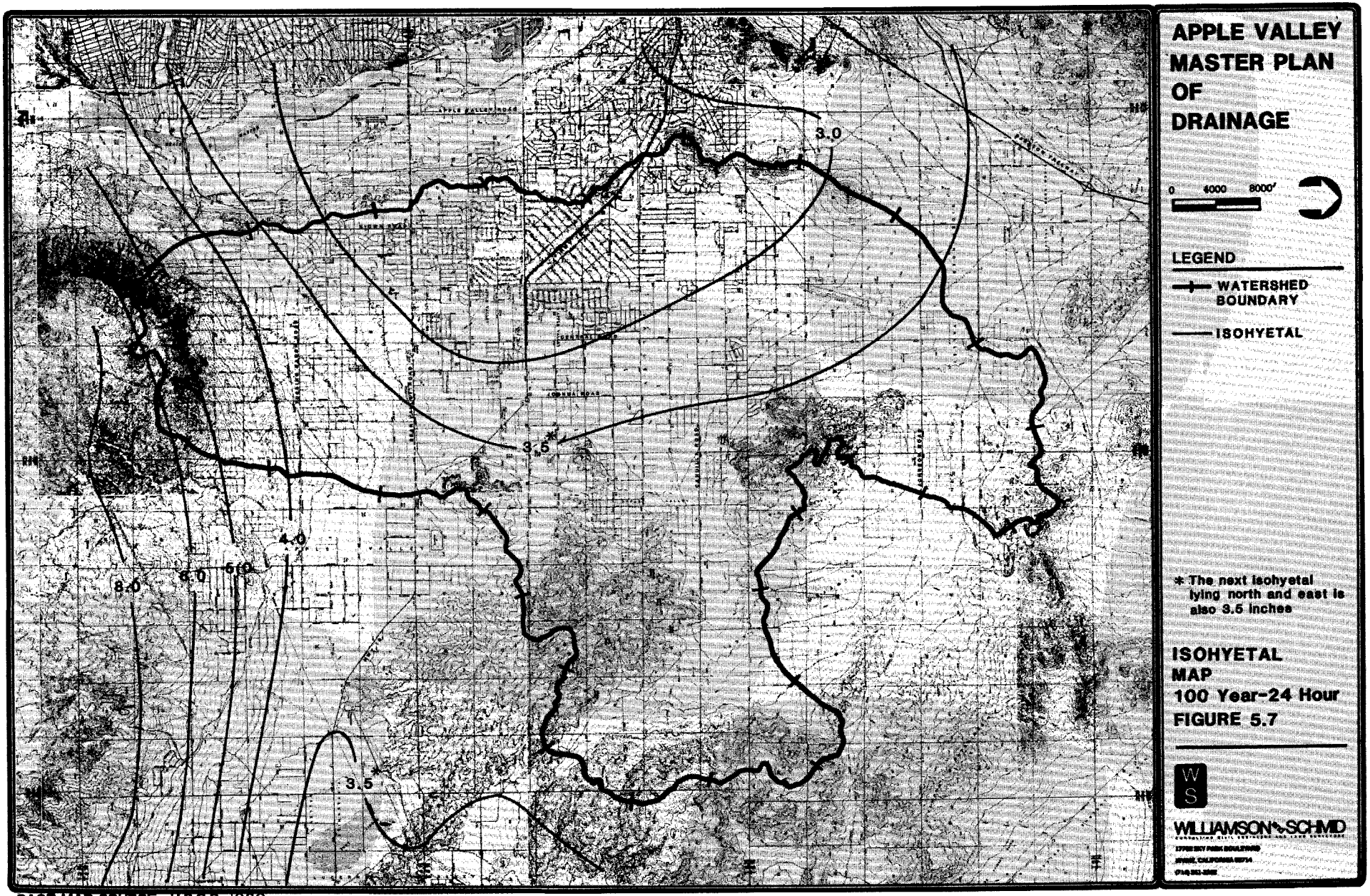
ISOHYETAL

* The next isohyetal lying north and east is also 2.0 inches

ISOHYETAL MAP
100 Year-6 Hour
FIGURE 5.6

WILLIAMSON & SCHMID

BASE MAP SOURCE: U.S.G.S. 1980



BASE MAP SOURCE: U.S.G.S. 1980

CHAPTER 6

SOILS

6.1. Introduction

The study watershed can generally be classified into two broad categories; the steep, impervious mountains with incised channels on the perimeter of the watershed catchment, and the remainder of the catchment valley floor which slopes gently to the dry lake. Both areas are a unique natural landscape with distinctive patterns of soils, relief, and drainage.

6.2. Description of Soils

The steep, incised Ord mountains forming the southern perimeter of the catchment are composed mainly of an Arrastre-rock outcrop complex. The Arraste-rock complex is composed of approximately 60 percent Arrastre sandy loam, 20 percent rock outcrop and 20 percent Crafton sandy loam, Sheephead gravelly sandy loam, and Cushenbury loamy sand. The Arrastre soil, which is moderately deep and well drained, is mainly found on hillsides, ridges, and side slopes of the rugged foothills. Its permeability is moderately rapid. The rock outcrop consists of exposed granitic rock and is found on ridges and hillsides.

The Granite and Fairview Mountains on the east of the watershed, Black Mountain on the north of the watershed, and Bell Mountain and Catholic Hill on the west of the watershed are mainly composed of a rock outcrop-Lithic Torriorthents complex. The rock outcrop-Lithic Torriorthents complex is composed of approximately 54 percent rock outcrop, 23 percent Lithic Torriorthents, and 17 percent Sparkhule gravelly sand loam. The remaining 6 percent is mostly Trigger gravelly sand loam. The rock outcrop is found on the mountain sides, ridges, and rugged hills and generally dominates the landscape. The rock outcrop consists of exposed areas of granitic rock. The Lithic Torriorthents are found between the areas of rock outcrop, in small depressional areas, and on relatively stable hillsides. Also included in these areas are small amounts of gravelly sandy loam. The Lithic Torriorthents are very shallow and formed in material weathered from granitic rock. Permeability ranges from rapid to very rapid.

A significant portion of the watershed valley floor is composed of Bryman loamy fine sand, Helendale loamy sand, and Helendale-Bryman loamy sand. These three soils are formed in alluvium derived from granitic material and are found on terraces and alluvial fans. The soils are very deep, well drained, and exhibit moderately slow to moderately rapid permeability.

The soils are generally fine graded ranging from clay to sand sizes and are readily eroded due to rainfall and weathering. As a consequence of the fine graded nature of the soils and the relatively flat valley floor, there is a tendency for suspended material to be deposited on the valley floor.

6.3. Hydrologic Soil Groups

For purposes of hydrologic analysis, the wide variety of soil types can be divided into hydrologic soil groups. The United States Department of Agriculture, Soil Conservation Service has defined four general soil groups for soils not protected by vegetation. They are grouped according to the intake when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four Hydrologic soil groups are:

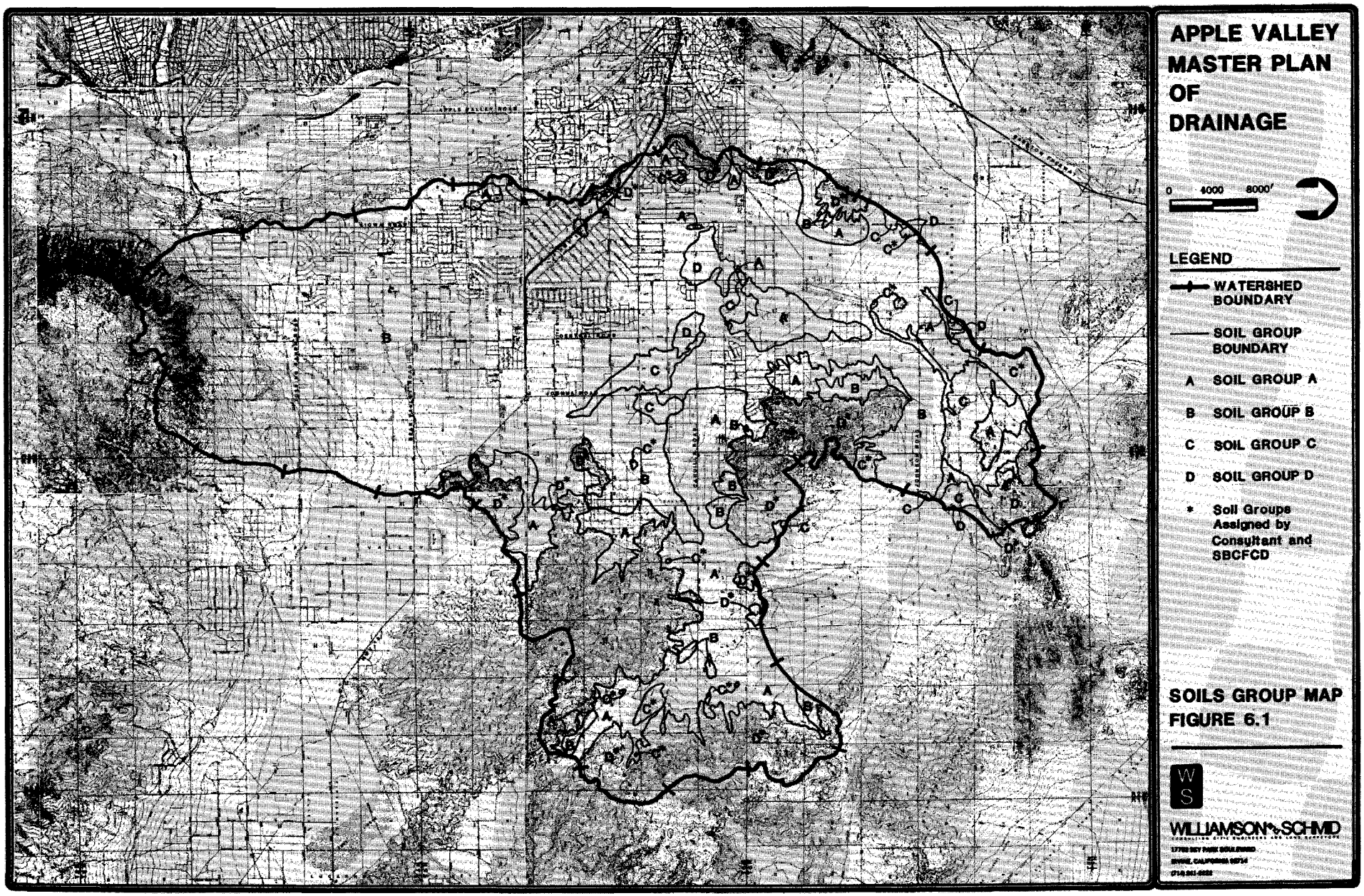
Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

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

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

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

The primary source of soil information for this report is the February, 1986 SCS Soil Survey of San Bernardino County, California, Mojave River area. The report provides maps delineating the detailed breakdown of the Apple Valley watershed into the four hydrologic soil groups as depicted in Fig. 6.1. It is noted that the Rock outcrop - Lithic Torriorthents complex, which constitutes approximately 19 percent of the Apple Valley watershed, was not assigned to a hydrologic group on the Soil Survey. Based on the Soil Survey description of the complex, the topography, and the vegetation, these areas were assigned to a hydrologic group.



BASE MAP SOURCE: U.S.G.S. 1980

CHAPTER 7

LAND USE AND LOSS RATES

7.1. Introduction

The land use or development type of the areas in Apple Valley cannot be classified into a general category, as they vary greatly within the study. The type of vegetative cover and the percent of impervious cover are estimated from the land use. The types of vegetative cover for a given soil group determines the infiltration rate, while the impervious cover translates the rainfall almost entirely into runoff.

7.2. Land Use and Loss Rates Criteria

Loss rates vary with each land use. The procedures and criteria used in this MPD for estimating these loss rates are established in the 1986 San Bernardino County Hydrology Manual. For each land use the recommended values of percent impervious are used throughout the study. One dwelling unit per 20 acres (1 D.U./20 Ac) is considered 100 percent pervious and undeveloped. The type of vegetative cover depends on the land use. In this study loss rates were chosen, both to match the development appropriate to the drainage plan, and to provide a sensitivity analysis of the loss rates.

There are three alternatives A1, A2, and A3 (explained in Chapter 11). In the rational method AMC II loss rates are used according to hydrology manual procedure. For alternative A2 loss rates were selected as follows:

1. For all developed land uses, an urban cover of residential or commercial landscaping is used. This type of cover corresponds to an urban development scheme with high property values and a tax base capable of supporting a drainage plan such as alternative A2. Typical residential landscaping with grass is common in prosperous desert communities.

2. For natural or undeveloped conditions a barren natural cover is used for two reasons:

    a. most of the land not zoned for development is in the barren, mountainous regions surrounding the watershed,
    b. the maximum loss rate, F_m is lower (except for soil A) than the maximum loss rate for desert brush (see Table 7.1).

Table 7.1.

AMC II CURVE NUMBER AND MAXIMUM LOSS RATES, F_m (in./hr.)
ALTERNATIVE A1 AND A3

DEVELOPMENT TYPE		SOIL TYPE							
	A_p	A		B		C		D	
	%	CN	Fm	CN	Fm	CN	Fm	CN	Fm
NATURAL BARREN	100	78	.41	86	.27	91	.18	93	.14
DESERT BRUSH	100	81	.36	81	.36	87	.26	90	.21
SF 1 DU/2.5 AC	90	81	.32	81	.32	87	.23	90	.20
(0.75)	80	81		81		87		90	
SF 1 DU/AC			.41		.37		.27		.18
(0.25)	80	32		56		69		75	
(0.50)	70	81		81		87		90	
SF 2 DU/AC			.47		.39		.29		.21
(0.50)	70	32		56		69		75	
SF 3-4 DU/AC	60	32	.58	56	.45	69	.34	75	.28
SF 5-7 DU/AC	50	32	.49	56	.38	69	.28	75	.24
SF 8-10 DU/AC	40	32	.39	56	.30	69	.22	75	.19
MF 11+ DU/AC	20	32	.19	56	.15	69	.11	75	.09
PARK	85	32	.82	56	.64	69	.48	75	.40
SCHOOL	60	32	.58	56	.45	69	.34	75	.28
MOBILE HOME	25	32	.24	56	.19	69	.14	75	.12
COMMERCIAL	10	32	.10	56	.08	69	.06	75	.05

All Curve Numbers are AMC II

Alternatives A1 and A3 present a drainage plan reflecting current development trends in Apple Valley. Most low density residential development will have, at most, residential landscaping in the front yard, while the back yard remains unlandscaped. With this in mind, new loss rates for the rational method were chosen as follows:

1. For natural or undeveloped conditions the barren natural cover is retained from alternative A2.

2. Land developed as 1 D.U./2.5 Ac is assumed to be covered with desert brush at 40 percent cover density. This reflects the fact that development occurs almost exclusively on the desert floor.

3. For land uses of 1 D.U./Ac and 2 D.U./Ac a combination of desert and urban loss rates is used. Residential landscaping covers 1/4 Acre with the remainder of each lot being covered with desert brush at 40 percent cover density.

4. Land uses of 4 D.U./Ac and more dense is assumed to be urban cover of residential or commercial landscaping.

AMC III loss rates are employed in the unit hydrograph calculations for each alternative, utilizing the procedures outlined above for alternatives A1 and A3.

For comparison of results, loss rates for seven areas were revised in alternative A2 hydrographs to reflect the "high property value" losses used in the rational method of alternative A2. The peak rates resulting from the higher losses are given in Table 7.2.

Table 7.2.

COMPARISON OF PEAK FLOW RATES WHEN A2 HYDROGRAPHS USE DIFFERENT LOSSES

WATERSHED AT NODE	Q_1 (ACCEPTED LOSS RATES)	Q_2 (A2 RATIONAL METHOD LOSS RATES)	Q_1/Q_2
4813	2384	2260	1.05
5120	8514	8273	1.03
3828	5238	4953	1.06
3826	2169	2146	1.01
657	2944	2867	1.03
7115	8369	7760	1.08
7000	5071	4921	1.03

7.3. Land Use Plan

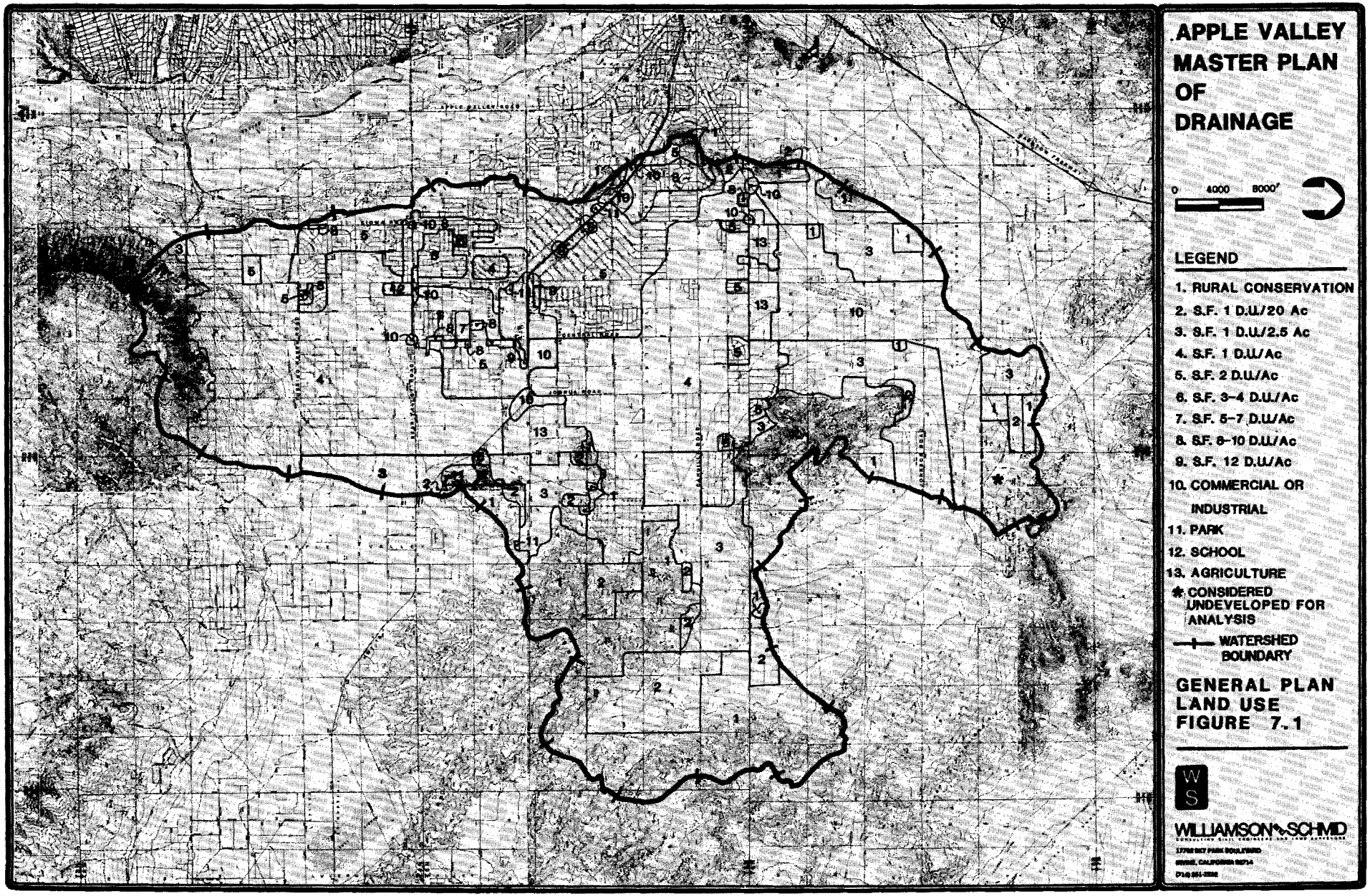
Two land use plans were considered in analysis for the MPD to the dry lake. A land use study of the dry lake is presented in Chapter 9 and will not be discussed here. The first land use plan considered was the general plan land use, as mapped out by the San Bernardino County Planning Department. The latest amendments on the map were made in 1986. This version of the map is illustrated in Fig. 7.1.

The second land use considered was a revision of the general plan. The Consultant met with the District and the Planning Department in Victorville to determine a likely ultimate development pattern beyond what is shown on the general plan. Some of these possible future changes that were discussed include more commercial development along Highway 18 and Bear Valley Road. Some areas currently zoned for 1 D.U./Ac could be changed to 2 D.U./Ac. Areas most likely to change would be areas surrounding the current denser development, the southwest portion of the watershed, and an area northeast of Highway 18. The areas just south of the airport that are zoned for agriculture could be changed to commercial, and the agriculturally zoned area just east of Joshua Road at Highway 18 could change to 2 D.U./Ac. The input from the District and the Planning Department was compiled and plotted on the general plan. This ultimate projected development plan is shown in Fig. 7.2. Tables 7.3, 7.4, and 7.5 list the acreages of each land use for the East, North, and South Communities, respectively.

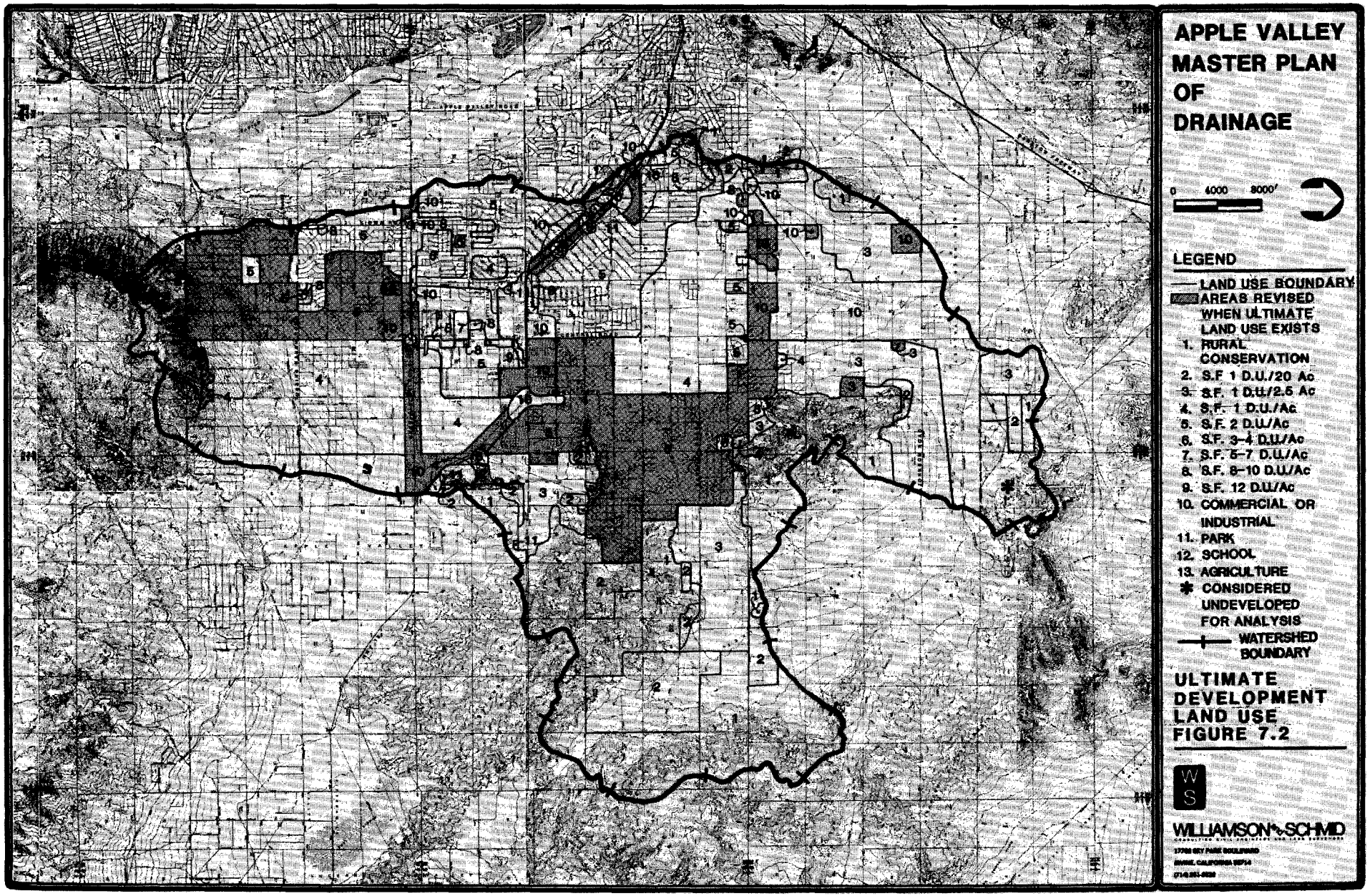
Table 7.3.

APPLE VALLEY EAST
LAND USE

TYPE	GENERAL PLAN LAND USE (AC)	ULTIMATE PROJECTED LAND USE (AC)
RCN	8969	8943
AGRICULTURE	658	0
PARK	12	12
1U/20 AC	3035	3035
1U/2.5 AC	3594	2980
1U/AC	3010	76
2U/AC	42	4252
4U/AC	55	55
COMMERCIAL	0	22
WASTE DISPOSAL	55	55
TOTAL	19,430	19,430



BASE MAP SOURCE: U.S.G.S. 1980



BASE MAP SOURCE: U.S.G.S. 1980

Table 7.4.

APPLE VALLEY NORTH
LAND USE

TYPE	GENERAL PLAN LAND USE (AC)	ULTIMATE PROJECTED LAND USE (AC)
RCN	2350	2140
AGRICULTURE	545	0
1U/20 AC	970	970
1U/2.5 AC	5100	5390
1U/AC	1810	925
2U/AC	296	1075
8U/AC	72	72
INDUSTRIAL	4500	4500
COMMERCIAL	131	702
AIRPORT	484	484
TOTAL	16,258	16,258

Table 7.5.

APPLE VALLEY SOUTH
LAND USE

TYPE	GENERAL PLAN LAND USE (AC)	ULTIMATE PROJECTED LAND USE (AC)
RCN	1850	1570
PARK	130	130
1U/20 AC	106	106
1U/2.5 AC	1020	700
1U/AC	10750	5770
2U/AC	6950	10900
4U/AC	159	159
5U/AC	76	76
8U/AC	1530	1360
12U/AC	163	163
SCHOOL	63	43
INDUSTRIAL	466	466
COMMERCIAL	420	2240
TOTAL	23,683	23,683

CHAPTER 8

DRY LAKE STUDY

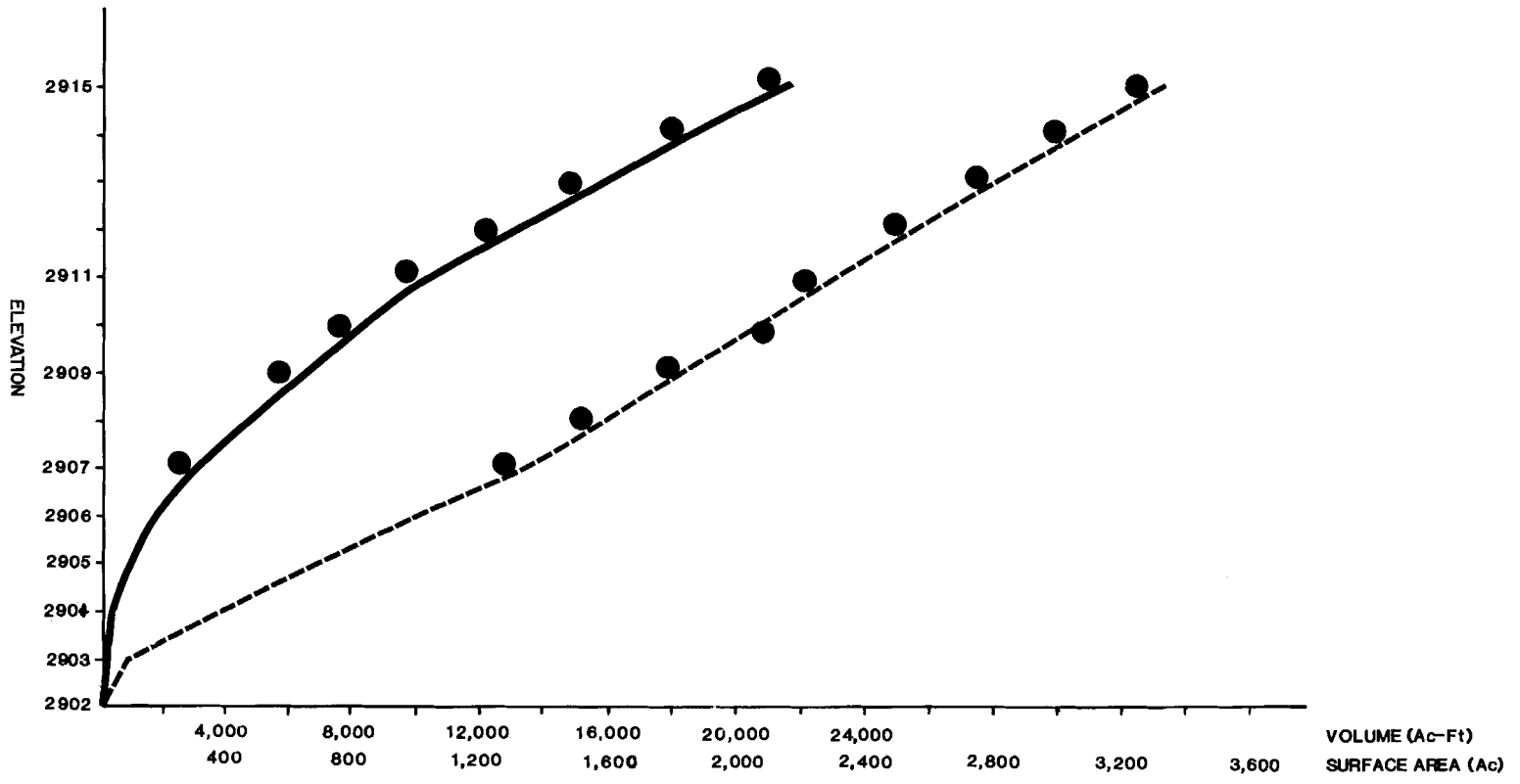
8.1. Purpose

Although the occurrence of runoff from the entire desert catchment reaching the dry lake is infrequent, the potential for damage is significant. The dry lake is the terminus of the enclosed Apple Valley Dry Lake watershed which encompasses approximately 98 square miles.

The purpose of the dry lake study is to determine the economic feasibility of reclaiming the dry lake from the 100-year flood plain. The approach used for this study is to determine conservatively low, cursory cost estimates of various drainage scenarios. By using cost estimates that are conservatively low, the consultant is able to evaluate several drainage scenarios to reclaim the dry lake from the 100-year flood plain in order to identify the "best plan" candidates. Then, if one or more of the scenarios appear economically feasible, a detailed study and refined cost estimate of those scenarios would be made. Cost estimates for items which are required to complete each of the drainage scenarios (for example connector channel berms, terrace drains, down drains and benching) have been omitted. Also not included are engineering and contingency costs. Tasks normally included in the category of engineering are: planning studies, rate studies, appraisals, assistance in financial matters, surveying, mapping, geotechnical services, design and construction inspection. Costs for engineering services generally range from 5 to 15 percent of construction costs, while contingencies at this report level of planning generally range from 10 to 20 percent of construction costs.

8.2. Dry Lake Topographic Low Point

A review of the County's 1961 topographic map of the dry lake indicates that the lowest contour of the dry lake is at elevation 2903. The 1 foot contour interval map shows two adajcent locations of the 2903 contour: the largest area (which encompasses over 60 acres) is generally located at the southwest corner of the Navajo Road/Otoe Road intersection, while the second and smaller area is generally located northwest and southeast of the intersection of Comanche Road projected and Otoe Road. The smaller area encompasses over 5 acres. Figure 8.1 depicts the dry lake elevation - storage - surface area relationship.



APPLE VALLEY MASTER PLAN OF DRAINAGE

LEGEND

- VOLUME
- SURFACE AREA
- PER FLOOD-HAZARD STUDY --100 YEAR FLOOD STAGE FOR APPLE VALLEY DRY LAKE: SAN BERNARDINO COUNTY, CA (U.S. GEOLOGICAL SURVEY, 1975)

DRY LAKE STORAGE-ELEVATION-SURFACE AREA CURVES

FIGURE 8.1

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8.3. Dry Lake High Water Elevation

8.3.1. Prior Studies

Two earlier reports addressing the Apple Valley Dry Lake have been reviewed; the 1966 San Bernardino County Flood Control District (SBCFCD) "Apple Valley Dry Lake Study" and the 1975 United States Geological Survey (USGS) "Flood-Hazard Study -- 100-year Flood Stage for Apple Valley Dry Lake San Bernardino County, California."

The 1966 SBCFCD hydrologic report used a rational method approach to model its 95 square mile catchment. The report assumed a 100-year, 1-hour rainfall intensity of 1.09 inches/hour and a runoff coefficient of 0.65. It is noted that the 1986 SBCFCD Hydrology Manual requires the unit hydrograph procedure be used to model watersheds larger than 1 square mile. Also the precipitation data used for the current study indicates that the 100-year, 1-hour rainfall intensity is 1.22 inches per hour. The report indicated that the 100-year, 1-day peak flow rate is 18,300 cfs and the runoff volume is 3,700 acre-feet which corresponds to an elevation of approximately 2908. The report concluded that an elevation of 2910 is recommended for freeboard consideration.

The 1975 USGS hydrologic report, which was prepared in cooperation with the SBCFCD, reflected existing land use. The study of the flood hydrology of Apple Valley was undertaken to develop the 100-year flood stage for the Apple Valley Dry Lake. A synthetic hydrologic technique (channel geometry) was used to estimate the 100-year flood elevation for the existing land use. The study assumed a watershed area of only 60 square miles tributary to the dry lake because "...runoff originates in the mountains surrounding the valley, but little generally reaches the dry lake" and "...that which does comes only from the northern half of the basin." The study found that during the 100-year, 1-day storm event the peak flow rate is 35,300 cfs and the runoff volume is 5,750 acre-feet, which corresponds to an elevation of 2909 feet. The report concluded that the true 100-year flood stage should probably be within the range of 2908 ft. to 2910 ft. and that the information given is considered to be the best available at the time of preparation of the report, but when more data or new techniques become available, better results should be possible.

8.3.2. Watershed Response to Urbanization

The occurrence of runoff from the entire desert catchment reaching the dry lake is infrequent. This is due to low, infrequent precipitation coupled with a relatively high soil infiltration rate for a significant portion of the catchment. In the future, however, precipitation which had infiltrated into the ground, might appear as runoff at the dry lake due to urbanization. The effect of urbanization on a watershed is to change its response to

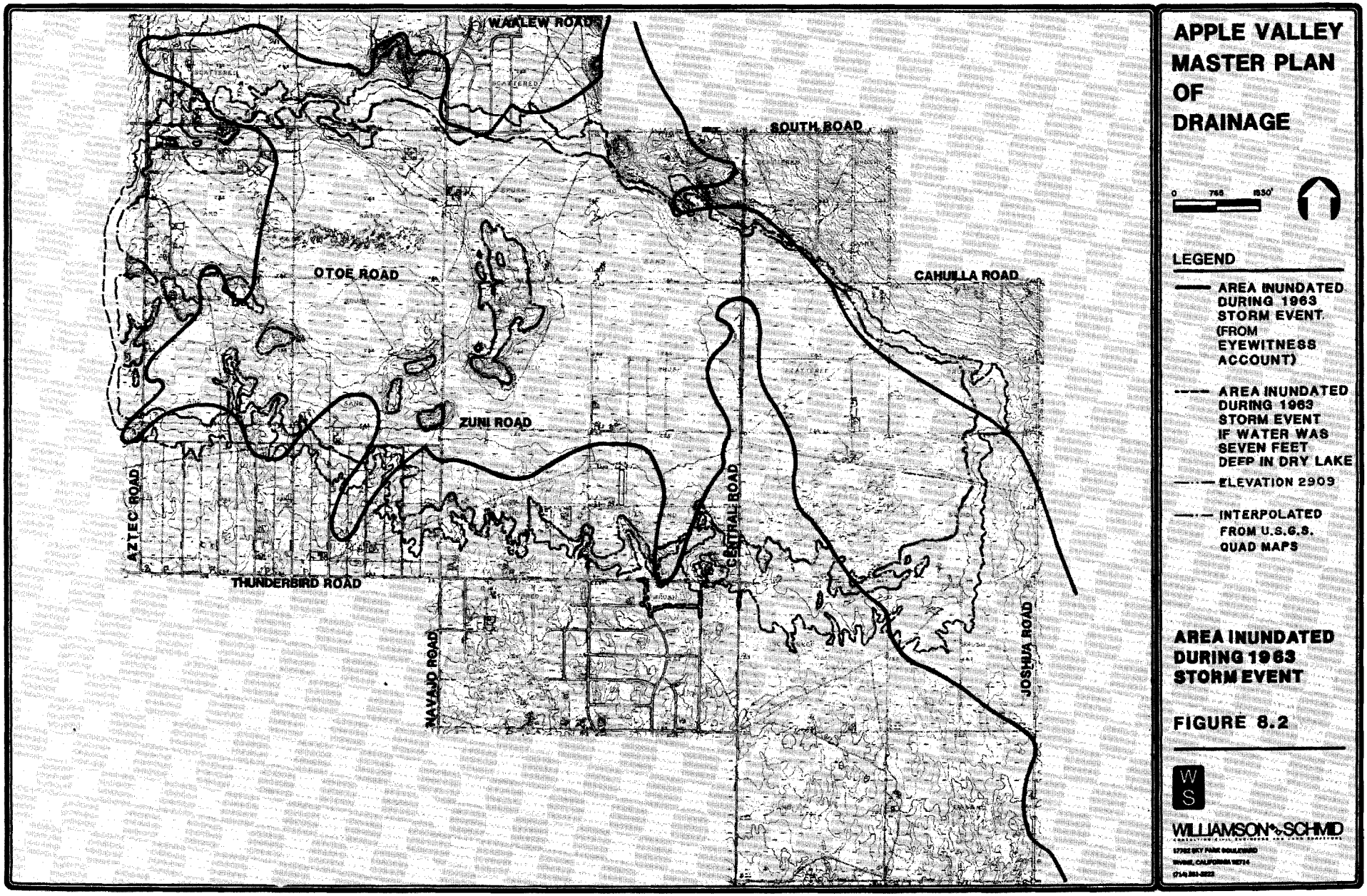
precipitation. The most common results are reduced infiltration and decreased travel time, which yield significantly higher peak rates of runoff and greater runoff volumes. The volume of runoff is determined primarily by the amount of precipitation and by infiltration characteristics related to soil type, antecedent rainfall, type of vegetal cover, impervious surfaces, and surface retention. Because of the limited percolation capacity of the dry lake area, an increase in runoff volume due to urbanization would be more significant to the dry lake than higher peak rates of runoff.

While development will usually increase runoff potential, this is not always the case. Low density residential development can decrease the runoff potential by replacing mostly barren desert cover with lawns, shrubs, and trees. The amount of impervious cover associated with the development may not yield enough runoff to compensate for this decrease, so the net effect is a decrease in runoff potential. Based on the General Plan land uses and the assumed landscaped areas (see Table 8.2), this was found to be the case for Apple Valley. The computed volume of runoff reaching the dry lake in the developed condition is slightly less than in the existing condition (see Section 8.3.5).

8.3.3. Prior Flooding of Dry Lake

In spite of the low, infrequent precipitation characteristics of the watershed, the dry lake has flooded several times in recent history. A review of newspaper articles reveals that the dry lake experienced significant flooding in 1956, 1961, 1963, and 1974. Details of all the flooding events are limited. The 1956 flooding was reported in a July 26, 1974 article regarding the dry lake and is the most noteworthy. The Victorville Daily Press reported that the United States Geological Survey determined the 100-year flood plain would reach an elevation of 2909 and that "long time residences of the area recalled at the meeting that in July 1956, floods did fill that area with water in less than an hour and because the silt lake bed is so impermeable, much of the water was still there weeks later. Roads through the area, including Navajo and Central, were impassable for days. The few houses then built were flooded." The newspaper accounts of the remaining flood events provided sketchy details of flooding in Apple Valley with flow depths ranging from 1 to 3 feet at various locations.

Additionally, during the first public information meeting on March 11, 1987 an anecdotal account given by a member of the audience indicated that after the storm event of 1963, the ponded water in the dry lake was approximately seven feet deep. The person also submitted a schematic map showing the observed flooding limits and is reproduced on Fig. 8.2. A water depth of seven feet encompass an area in excess of 1,600 acres.



BASE MAP SOURCE: S.B.C.F.C.D. 1961 TOPOGRAPHIC MAP

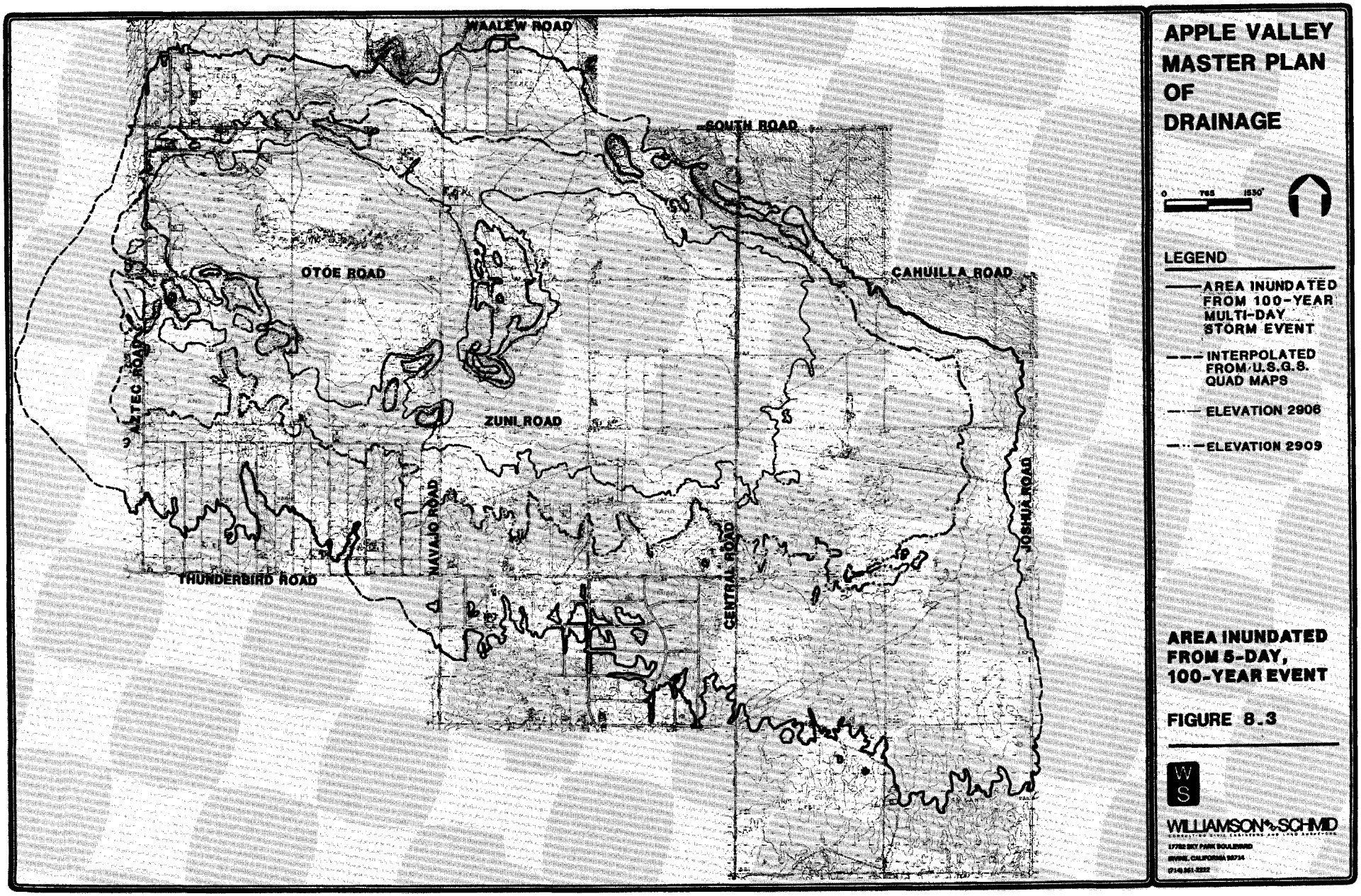
8.3.4. Hydrologic Parameters

Ideally, hydrologic studies to determine runoff volumes and flow rates should be based on long-term stationary rain gage and stream gage records for the area being investigated. Such records are seldom available for small drainage areas, as is the case of Apple Valley. There is one rain gage in the entire 98-square mile catchment, and the closest stream gage is located near Victorville on the Mojave River. Although the one standard rain gage in the catchment has a relatively long record (since 1955), the precipitation data of greatest significance, the short duration characteristics, are unavailable from the gage data. A continuous recording (automatic) rain gage is needed to obtain rainfall information for small increments of time. The standard rain gage in Apple Valley measures rainfall depths in time increments of 24-hours.

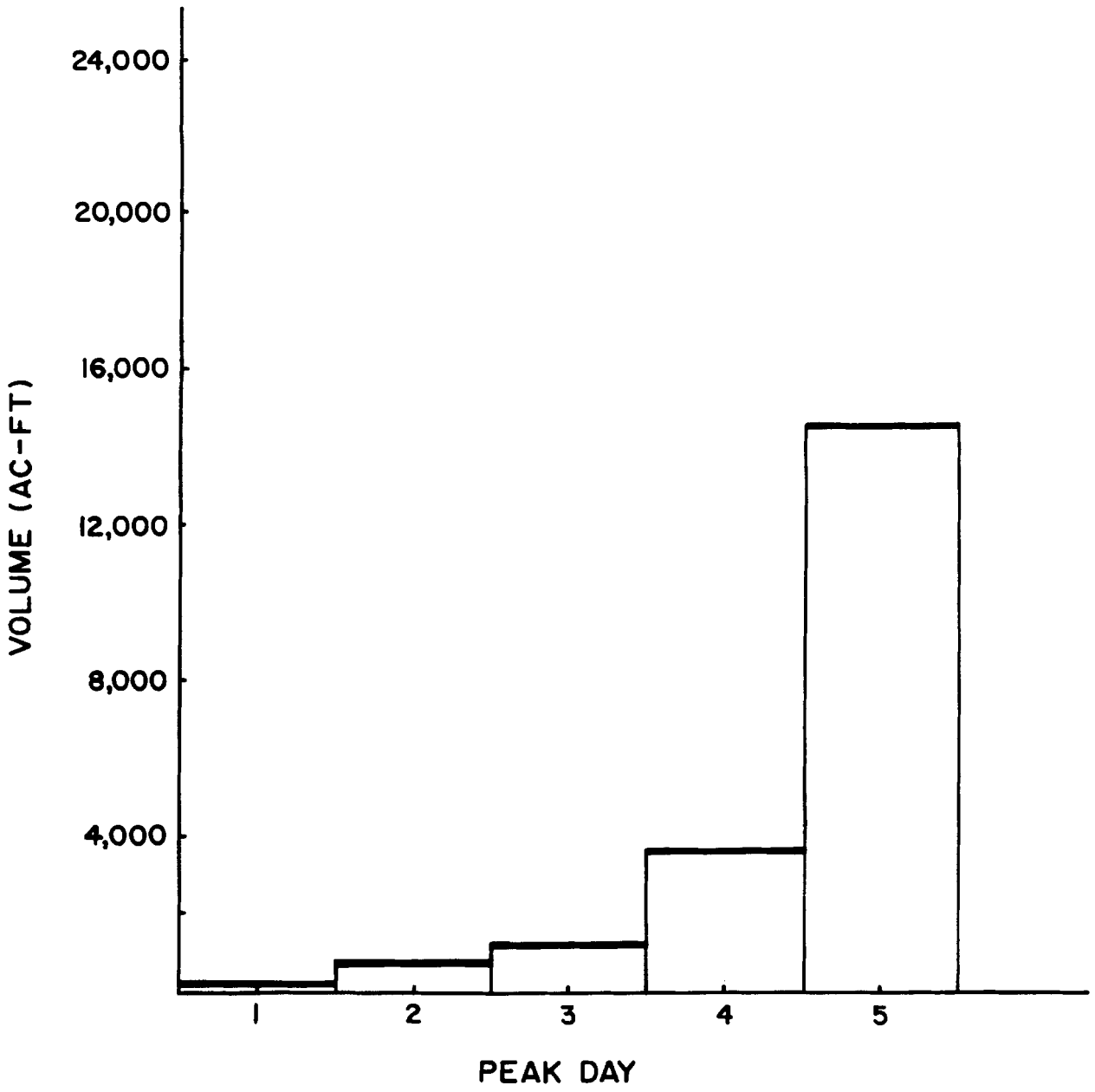
The lack of short duration data within the catchment affects the hydrologic calculations by forcing the hydrologist to consult regional rainfall data bases such as the California Department of Water Resources (DWR) or the National Oceanic and Atmospheric Administration (NOAA). Following a review of the consultant and the District of the DWR and NOAA data bases, it was concluded that the NOAA data best reflects the study watershed. It is noted that the NOAA data is specified in the San Bernardino County Hydrology manual.

The dry lake high water elevation was first determined using the runoff volumes from a 1-day, 100-year storm event assuming the watershed is fully developed according to the County's General Plan. The runoff volume was used in preparing the Dry Lake Reclamation Scenarios. It must, however, be realized that all hydraulic structures will fail once their capacities are exceeded. Because large areas of the dry lake bed would be susceptable to flooding when any of the reclamation drainage scenarios (see Section 8.4) failed, a level of protection higher than a 100-year 1-day event may be appropriate. A cursory analysis was made of the flooding that would occur from a 1-day, 200-year storm event assuming the runoff volume from a 1-day, 100-year event was contained via any of the studied scenarios. The area encompassed by the excess flooding is approximately 1,000 acres and corresponds to an elevation of 2906 as shown in Fig. 8.3.

The 100-year, multi-day storm event runoff volume was determined to establish the maximum dry lake high water line according to the County Hydrology Manual procedures. The dry lake bed is composed of loamy fine sand, sandy clay loam and clay. Consequently, only evaporation from the dry lake was considered as outflow in the analysis (see Fig. 8.4). The multi-day storm pattern was arranged in ascending order of runoff volume, thereby resulting in a minimum amount of evaporation and maximizing the inundated area. The five day, 100-year storm event resulted in a total runoff volume of approximately 20,400 acre-feet which corresponds to an elevation of 2915. The area inundated by this multi-day storm is shown in Fig. 8.3.



BASE MAP SOURCE: S.B.C.F.C.D. 1961 TOPOGRAPHIC MAP



LEGEND

EVAPORATION PER PAN EVAPORATION DATA FOR SAN BERNARDINO

RUNOFF

APPLE VALLEY MASTER PLAN OF DRAINAGE

100-YEAR, MULTI-DAY STORM PATTERN

FIGURE 8.4

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8.3.5. Runoff Hydrographs

The runoff volume and high water line calculations were prepared for AMC conditions I, II and III and for both existing development within the watershed and General Plan land uses. Existing development was determined from aerial photography. The ultimate projected land use described in Chapter 7 was not evaluated as part of the Dry Lake Study. A 25-year hydrograph was also prepared for comparison purposes and the 25-year high water line was used in the development of the dry lake inlet channel design. All runoff hydrographs were calculated following the procedures in the 1986 San Bernardino County Hydrology Manual. A summary of the calculated dry lake volumes and high water elevations are shown in Table 8.1. A detailed description of the analysis and detailed calculations are contained in the Technical Appendix.

Table 8.1.

DRY LAKE HIGH WATERLINE ANALYSIS

Return Period(Yr)	Duration	Land Use	AMC	Volume Ac-ft	Elev. ft
25	Multi-Day	General Plan	II	5360	2909
100	24-Hour	Existing	I	4910	2908
100	Multi-Day	Existing	I	5210	2908
100	24-Hour	General Plan	II	10120	2911
100	Multi-Day	General Plan	II	12740	2912
100	24-Hour	Existing	II	10810	2911
100	Multi-Day	Existing	II	14000	2913
100	24-Hour	General Plan	III	13640	2913
100	Multi-Day	General Plan	III	20370	2915
100	24-Hour	Existing	III	14460	2913
100	Multi-Day	Existing	III	23850	2916

Table 8.2.

DRY LAKE RUNOFF HYDROGRAPHS

Condition	peak flow rates (cfs)	runoff volume (acre-feet)
existing land use	19,500	14,500
general plan land use	19,000	13,600

The 24-hour existing and General Plan land use AMC III hydrograph volumes were compared to determine the impacts of development within the watershed. A comparison of the data in Table 8.2 indicates that the runoff volume decreases slightly with development. The peak flow rate

also decreased from 19,500 c.f.s. to 19,000 c.f.s. As stated before, the volume of runoff is primarily a function of four parameters; the amount of rainfall, type of vegetal cover, impervious surfaces, and surface retention. It is reasonable to assume that only the last three items will change for the general plan land use. Because the impervious surfaces within the watershed will increase with development, it appears contradictory that the runoff volume will decrease. However, a comparison of the loss rates (F_m & $\overline{Y}$) of the runoff hydrographs indicate that while the impervious area does increase with development, the increased percolation efficiency of the assumed type of vegetal cover associated with urbanization compensates for the decreased pervious area.

Peak flow rates of runoff are based on the relationship of the volume parameters as well as decreased travel time, increased flow velocities due to decreased conduit roughness, and concentrating runoff. However, because a limited number of channels to the dry lake are anticipated to be improved (and hence offset peak flow rate timing), and because the runoff volume is expected to remain approximately the same for both existing and ultimate land uses, the peak flow rate for the entire catchment is not expected to change significantly.

The following is a list of some salient features used in developing the runoff hydrographs.

- AMC III was chosen (for the 100-year storm event) to correspond to SBC Hydrology Manual requirements.
- Lag is based on the U.S. Army Corps of Engineers, Los Angeles District Office formula.
- Baseflow is considered zero for all hydrographs.
- Percentages of S-graphs were chosen based on topography and land use; the Foothill S-graph was chosen roughly above the most abrupt changes in grade, the Valley Developed S-graph was used in areas of residential density 4 D.U./Ac or more, the Valley Undeveloped S-graph was chosen where the residential land use density was less than 4 D.U./Ac. The choice of the Valley Undeveloped S-graph in lieu of the desert S-graph was considered to better reflect the planned sparse development in this area. The S-graph boundaries are shown on Fig. 8.12.
- Loss rates were calculated as described in chapter 7.
- AMC II curve numbers were used to find F_p values on Fig. C-6, San Bernardino County Hydrology Manual. On this figure, the AMC III curve was used.
- The F_m and $\overline{Y}$ for each development type and soil type were area-averaged to produce the composite values.
- The rainfall depths represent area-averaged rainfall for the entire watershed, from the isohyetals in the San Bernardino County Hydrology Manual, Fig. B-7 through Fig. B-12.
- Sierra Madre depth-area factors were used.

8.4. Evaluation of Alternatives

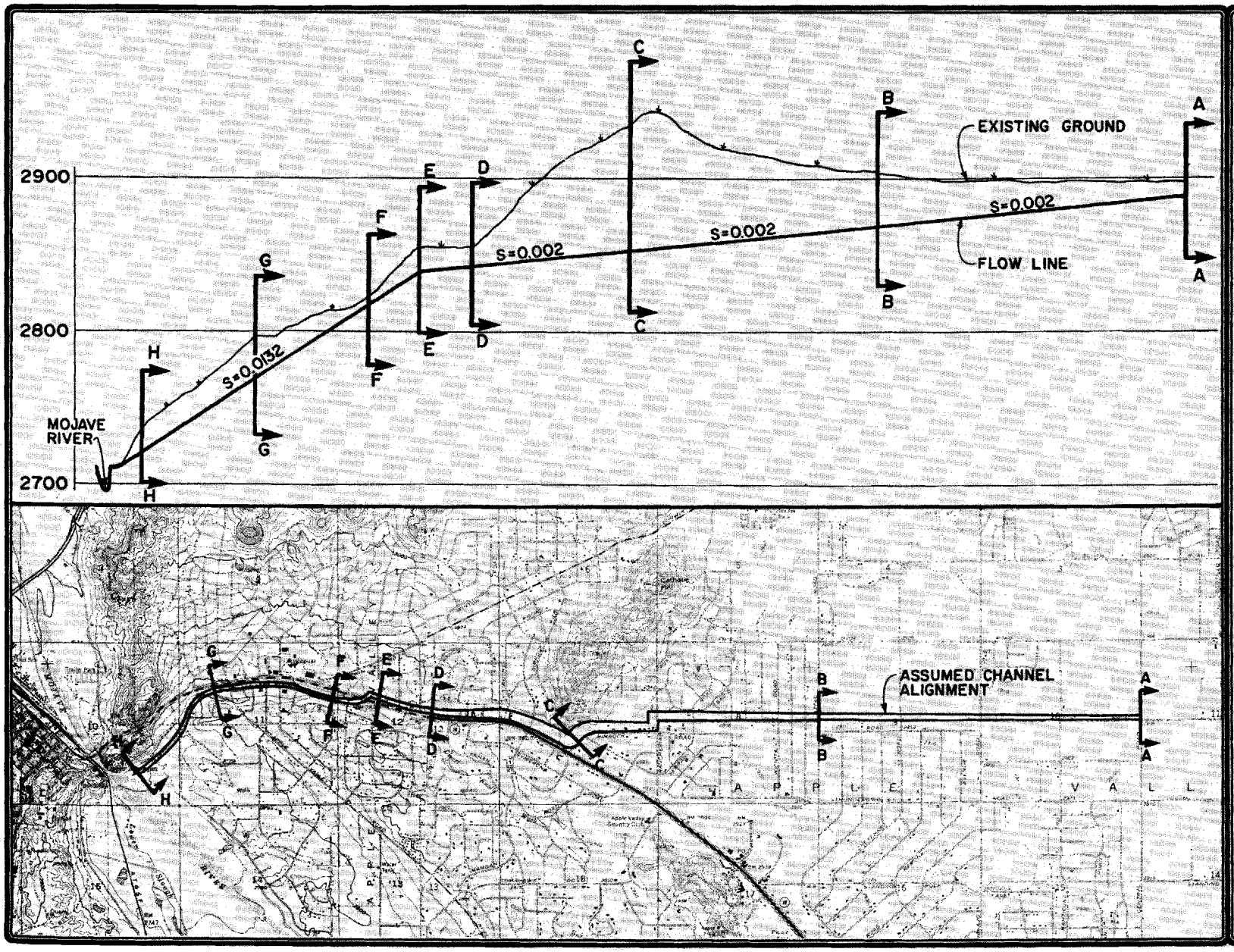
Six possible scenarios of reclaiming the dry lake from the 1-day 100-year floodplain were investigated: i) a drainage channel to the Mojave River; ii) a single 40 ft. deep retention basin in the dry lake; iii) a single 100 ft. deep retention basin in the dry lake; iv) a dual retention basin in the dry lake; v) a 500 cfs pump station draining the dry lake to the Mojave River; and vi) a 3000 cfs pump station draining the dry lake to the Mojave River. Preliminary plans and cost estimates were developed for the six scenarios. The cost estimates are very preliminary and are only intended for evaluating the feasibility of reclaiming the dry lake from the 1-day 100-year floodplain.

8.4.1. Scenario #1: Drainage Channel to the Mojave River Option

The first scenario investigated in reclaiming the dry lake from the 100-year floodplain is a drainage channel to the Mojave River. The channel parallels Highway 18 from the Mojave River where it outlets. The drainage channel then parallels Rimrock Road and Zuni Road to the intersection of Central Road and Zuni Road (Fig. 8.5). Although the Zuni Road/Central Road intersection elevation is two feet higher than the dry lake low point, existing channels entering the dry lake from the east and the south coincide with this point. Consequently, it is chosen as the origin of the drainage channel to the Mojave River.

The trapezoidal drainage channel has side slopes of 2:1 (horizontal to vertical) and uses two different base widths along its approximate 6.5 mile reach. The downstream reach of the trapezoidal channel is approximately 1.7 miles long and has a slope of 0.0132 ft./ft. The base width assumed for the this reach is 10 feet and results in a 13 ft. normal depth of flow during the 100-year event peak runoff. The 10 ft. base width in this reach represents a more hydraulically efficient channel cross section than the upstream reach cross section. The upstream reach of approximately 4.8 miles utilizes a base width of 50 feet, and results in a 13 ft. normal depth of flow during the 100-year peak runoff. The base width of 50 feet was arbitrarily chosen for the upstream reach in order to minimize the amount of excavation required. Because the drainage channel is sloped adversely in relation to the ground profile until reaching the ground profile crest adjacent to Highway 18, a minimum channel slope of 0.0020 ft/ft was assumed for this reach. Utilizing the large 50 ft. base width coupled with the minimum channel slope results in excavation ranging from 12 ft. to over 80 ft. (see Fig. 8.6) and excavation top widths ranging from 99 ft. to almost 400 ft. It is noted that the maximum depth of excavation (80 ft.) occurs near Catholic Hill, a rock outcropping. Consequently, the excavation costs for this reach should be viewed as highly speculative. Because of the rock outcropping and great excavation depth for the reach of the drainage channel, a tunnel may be a viable alternative. However, the option of constructing a tunnel is not explored in this study.

Velocities during the peak runoff of the 100-year event (peak Q = 19,000 cfs) in both reaches of the drainage channel for both lined and unlined conditions are shown in Table 8.3.



APPLE VALLEY MASTER PLAN OF DRAINAGE

0' 1500' 3000'

LEGEND

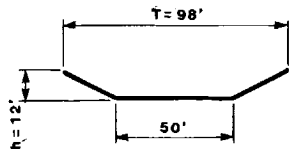
NOTE: OPTION USED FOR COST ESTIMATION PURPOSES ONLY (SEE TEXT)

SCENARIO #1: DRAINAGE CHANNEL TO THE MOJAVE RIVER OPTION

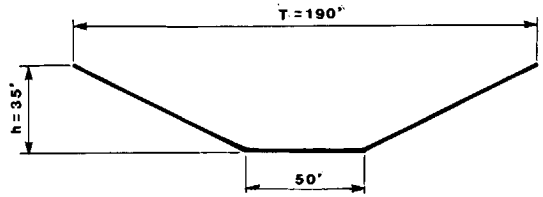
FIGURE 8.5

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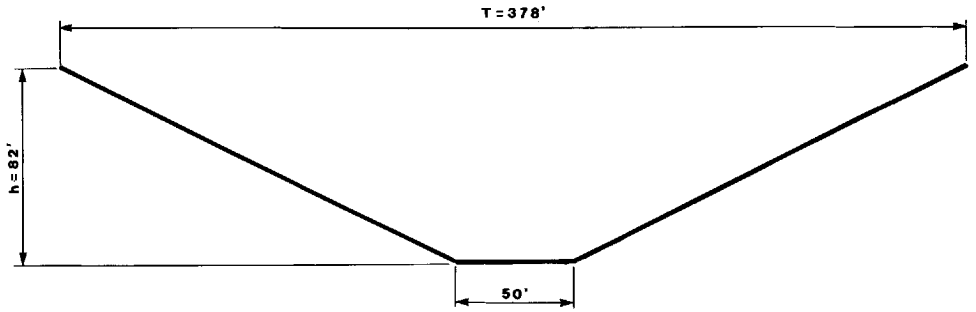
BASE MAP SOURCE: U.S.G.S. 1980



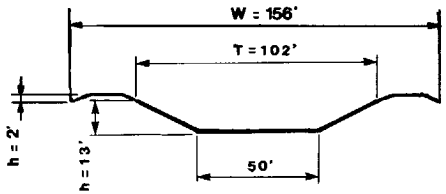
SECTION A-A



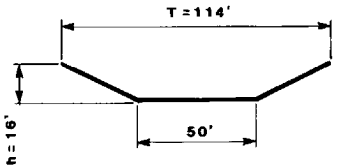
SECTION B-B



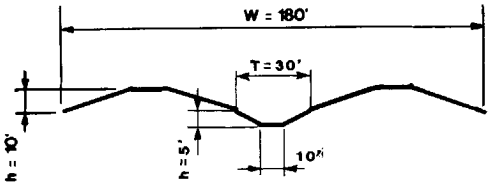
SECTION C-C



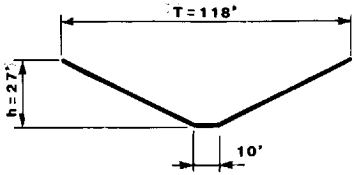
SECTION D-D



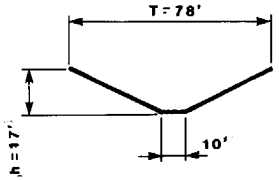
SECTION E-E



SECTION F-F



SECTION G-G



SECTION H-H

APPLE VALLEY MASTER PLAN OF DRAINAGE

EXCAVATION AND DRAINAGE CHANNEL CROSS SECTIONS

FIGURE 8.6

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Table 8.3

DRAINAGE CHANNEL VELOCITIES

	unlined channel Manning's n = 0.030	lined channel Manning's n = 0.015
downstream reach (b = 10', s = 0.0132 ft./ft.)	24 fps	41 fps
upstream reach (b = 50', s = 0.0020 ft./ft.)	12 fps	19 fps

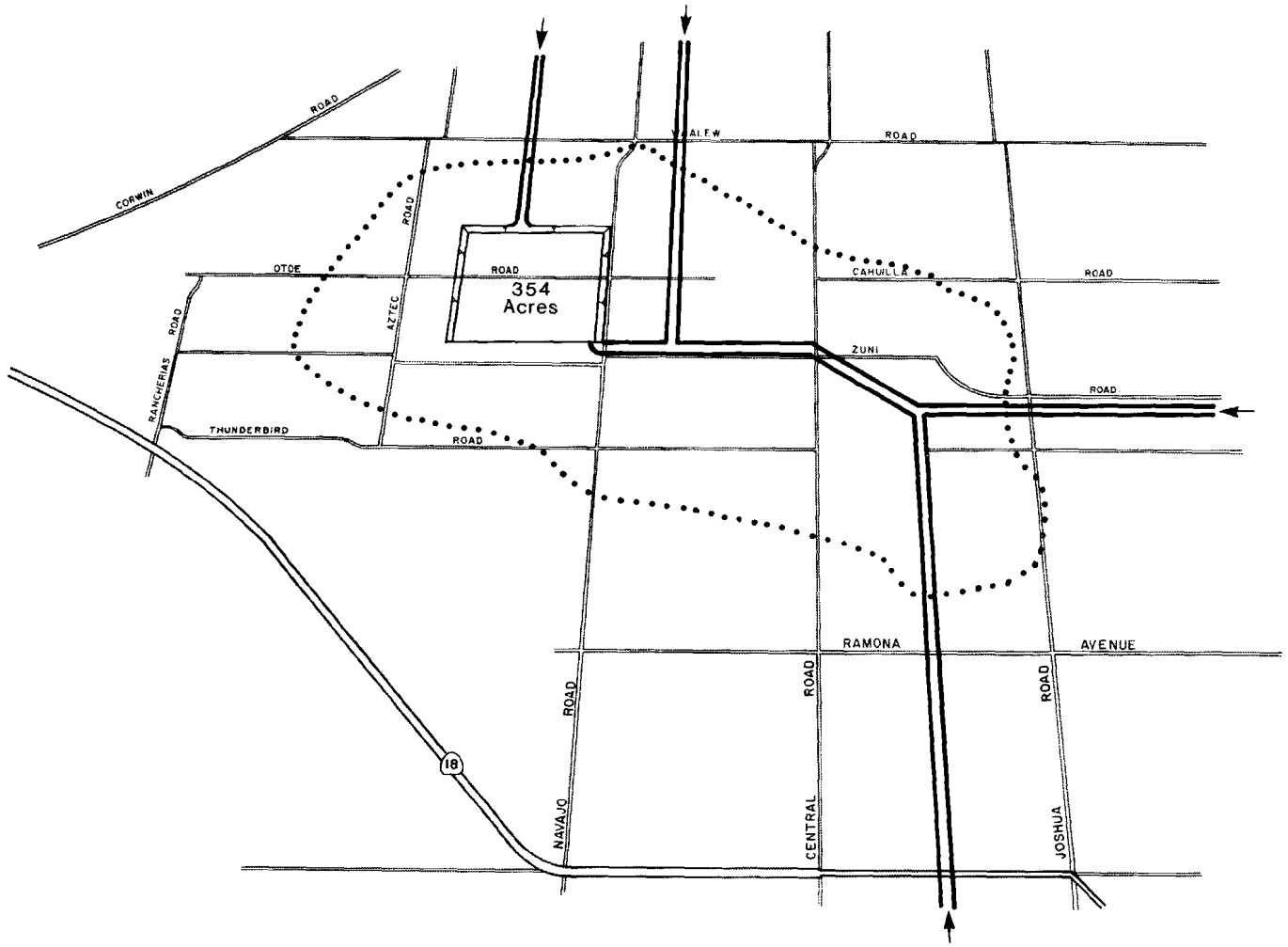
Because of the high channel velocities for the unlined condition, it is assumed in this study that the channel will be lined with concrete for its entire reach.

8.4.2. Scenario #2: Dry Lake Single 40 ft. Deep Retention Basin Option

The second scenario investigated in reclaiming the dry lake from the 100-year floodplain is a single 40 ft. deep retention basin in the dry lake. A reasonable basin depth of 40 ft. was chosen to reflect the groundwater table and construction feasibility. The retention basin is sized to store the 1 day runoff from the 100-year design storm event which results in approximately 13,600 acre-feet for the entire 98 square mile catchment. Using the basin depth of 40 ft., the runoff volume of 13,600 acre-feet results in a retention basin requiring approximately 354 acres of surface area (assuming 2:1 side slopes). As shown in Fig. 8.7, the retention basin could be located at the southwest corner of the Navajo Road/Otoe Road intersection, which, at elevation 2903, is the lowest point in the entire 98 square mile catchment. A review of the 1983 aerial photographs indicates there is one residence approximately in the middle of this area. It is assumed that this residence would be purchased by the county if the scenario is chosen to recover the dry lake from the 100-year flood-plain, although the cost estimate does not include an item for purchasing the residence.

8.4.3. Scenario #3: Dry Lake Single 100 ft. Deep Retention Basin Option

The third scenario investigated in reclaiming the dry lake from the 100-year floodplain is a single 100 ft. deep retention basin in the dry lake. A maximum basin depth of 100 feet was chosen in order to minimize the surface area requirements and right of way costs of the retention basin and to maximize the area reclaimed from the dry lake. The retention basin is sized to contain the 1 day runoff from the 100-year design event which results in approximately 13,600 acre-feet for the entire 98 square mile catchment.



APPLE VALLEY MASTER PLAN OF DRAINAGE

LEGEND

- CONCEPTUAL CHANNEL ALIGNMENT
- RETENTION BASIN
- DIRECTION OF FLOW
- DRY LAKE HWL

NOTE: OPTION USED FOR COST ESTIMATION PURPOSES ONLY (SEE TEXT)

SCENARIO #2: DRY LAKE SINGLE 40 FT. DEEP RETENTION BASIN OPTION

FIGURE 8.7

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Using the basin depth of 100 feet, the runoff volume of 13,600 acre-feet results in a retention basin requiring approximately 159 acres of surface area, (assuming 2:1 side slopes). As shown in Fig. 8.8, the retention basin could be located at the southwest corner of the Cahuilla Road/Navajo Road intersection, which, at elevation 2903, is the lowest point in the entire 98 square mile catchment. A review of the 1983 aerial photographs indicates there are no structures in the area, although some structures are located nearby.

8.4.4. Scenario #4: Dry Lake Dual Retention Basin Option

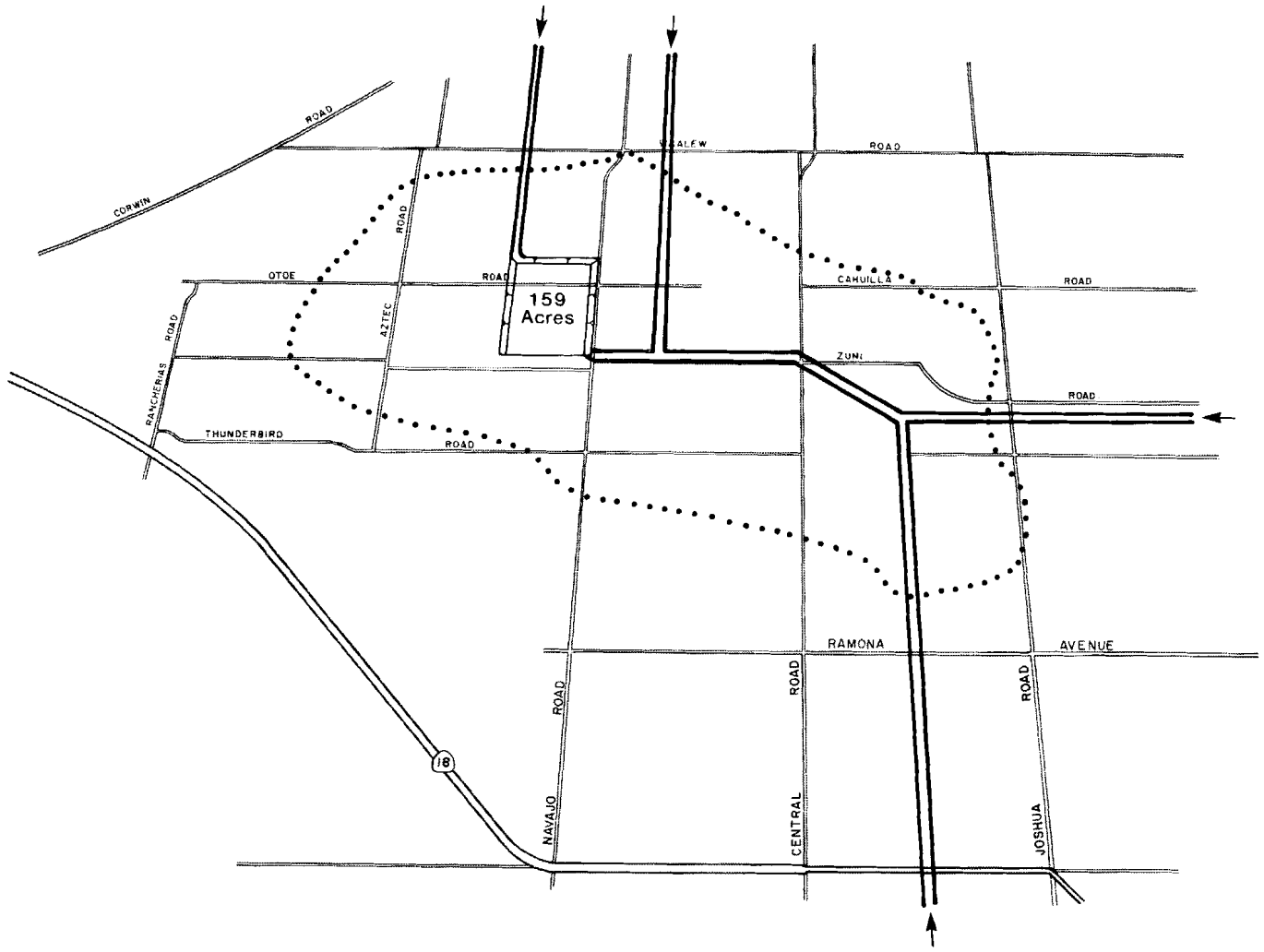
The fourth scenario investigated in reclaiming the dry lake from the 100-year floodplain is a system of two independent retention basins located in the dry lake. The first (and largest) retention basin is bermed six feet above the existing ground and extends 94 feet below ground. This concept attempts to reduce excavation costs by utilizing a low-profile dam to store flood waters. Because the water surface in the first retention basin will be above the existing ground during the 100-year storm event, a second retention basin below ground is required in order to drain the local tributary area within the dry lake.

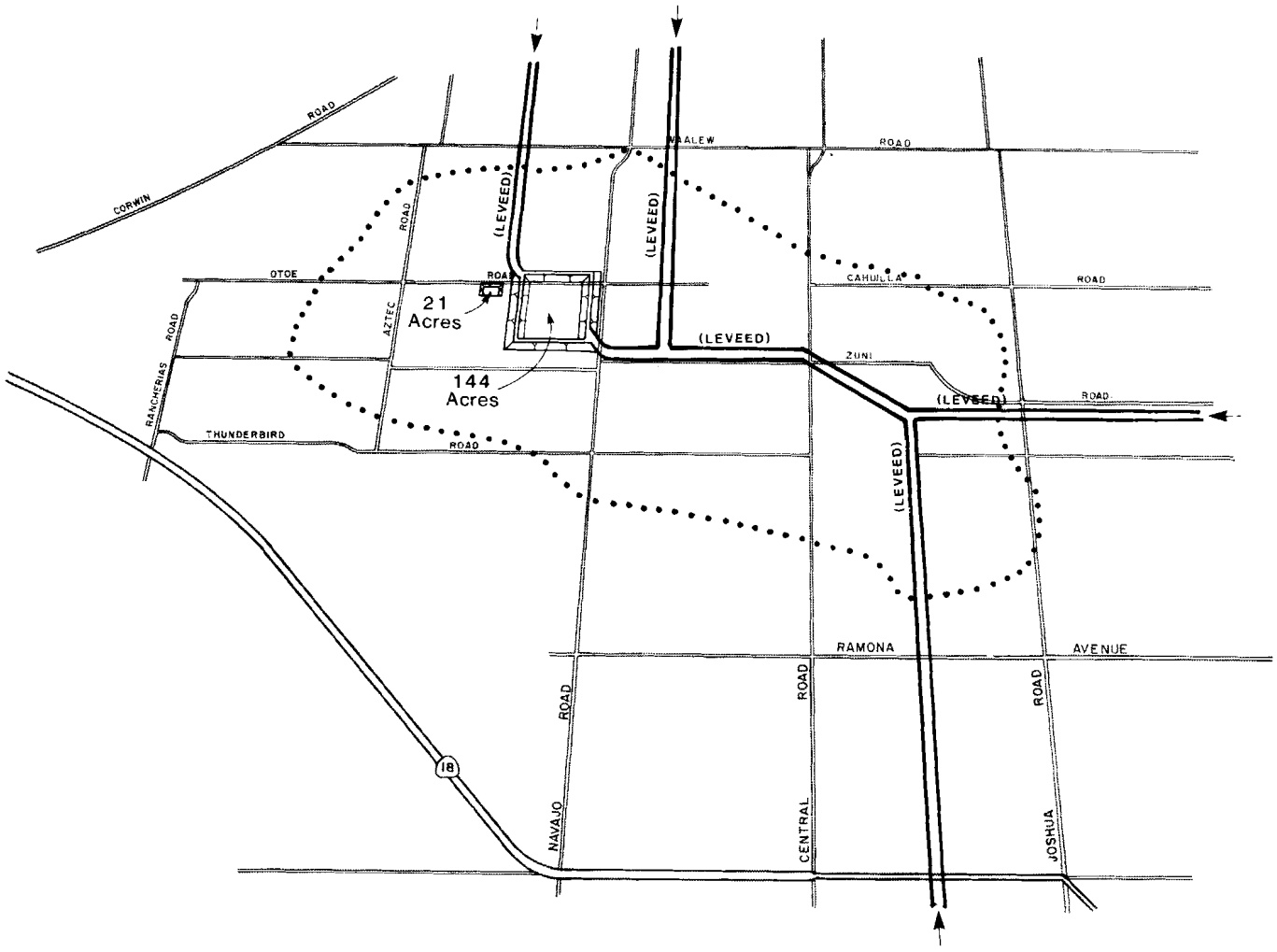
As depicted in Fig. 8.9, the large regional retention basin would require approximately 144 acres of surface area (assuming side slopes of 2:1), while the below ground retention basin would occupy approximately 21 acres, again assuming 2:1 side slopes. It is anticipated that the two retention basins could be located at the southwest corner of the Cahuilla Road/Navajo Road intersection. However, it may be desirable to locate the small, local retention basin further away from the large, regional retention basin in order to facilitate connector channel alignments.

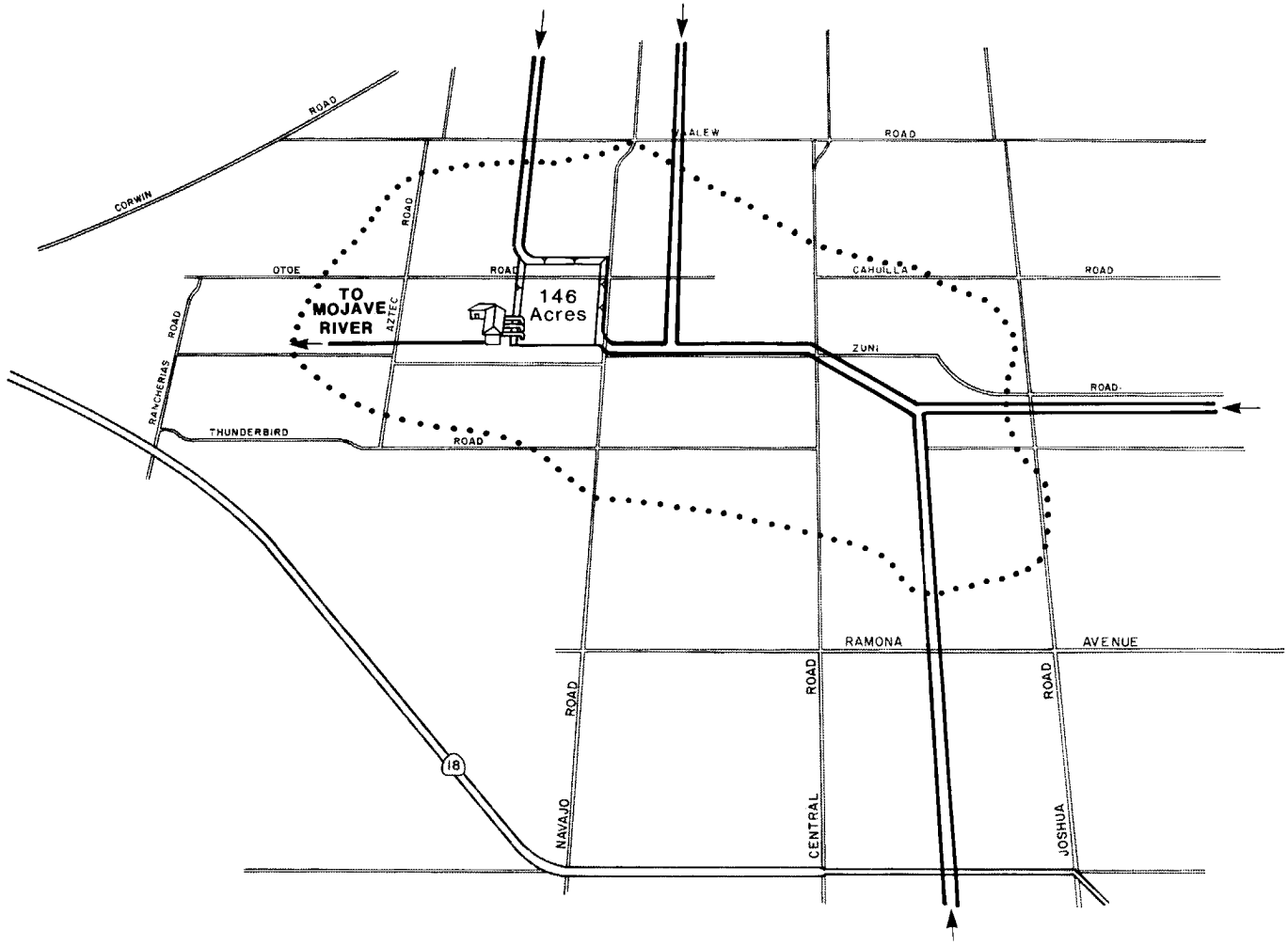
8.4.5. Scenario #5: 500 cfs Pump Station Option

The fifth scenario investigated in reclaiming the dry lake from the 100-year floodplain is a 500 cfs pump station which discharges to the Mojave River (Fig. 8.10). This scenario includes an outlet pipe to the Mojave River, a pump station, and a detention basin.

The outlet pipe conveying 500 cfs is assumed to be a 7 ft. diameter pipe. One advantage of using a pipe for the entire reach is that the right of way costs are reduced. Although an open channel could be utilized once gravity flow is established, it is anticipated that minimal cost savings could be gained by using an open channel because of added right of way costs and channel lining costs due to erosive flow velocities. The outlet pipe alignment parallels Highway 18 from the Mojave River. It then parallels Rimrock Road and Zuni Road from Highway 18.


CORWIN ROAD
OTOE ROAD
ROAD
ROAD


CORWIN ROAD
OTOE
ROAD
AZTEC ROAD
RANCHERIAS ROAD
THUNDERBIRD ROAD
(LEVEED)
(LEVEED)
(LEVEED)
(LEVEED)
(LEVEED)
21 Acres
144 Acres
ROAD
ROAD
ROAD



APPLE VALLEY MASTER PLAN OF DRAINAGE

LEGEND

- CONCEPTUAL CHANNEL ALIGNMENT
- RETENTION BASIN
- PUMP STATION
- DIRECTION OF FLOW
- DRY LAKE HWL

NOTE: OPTION USED FOR COST ESTIMATION PURPOSES ONLY (SEE TEXT)

SCENARIO #5: 500 cfs PUMP STATION OPTION

FIGURE 8.10

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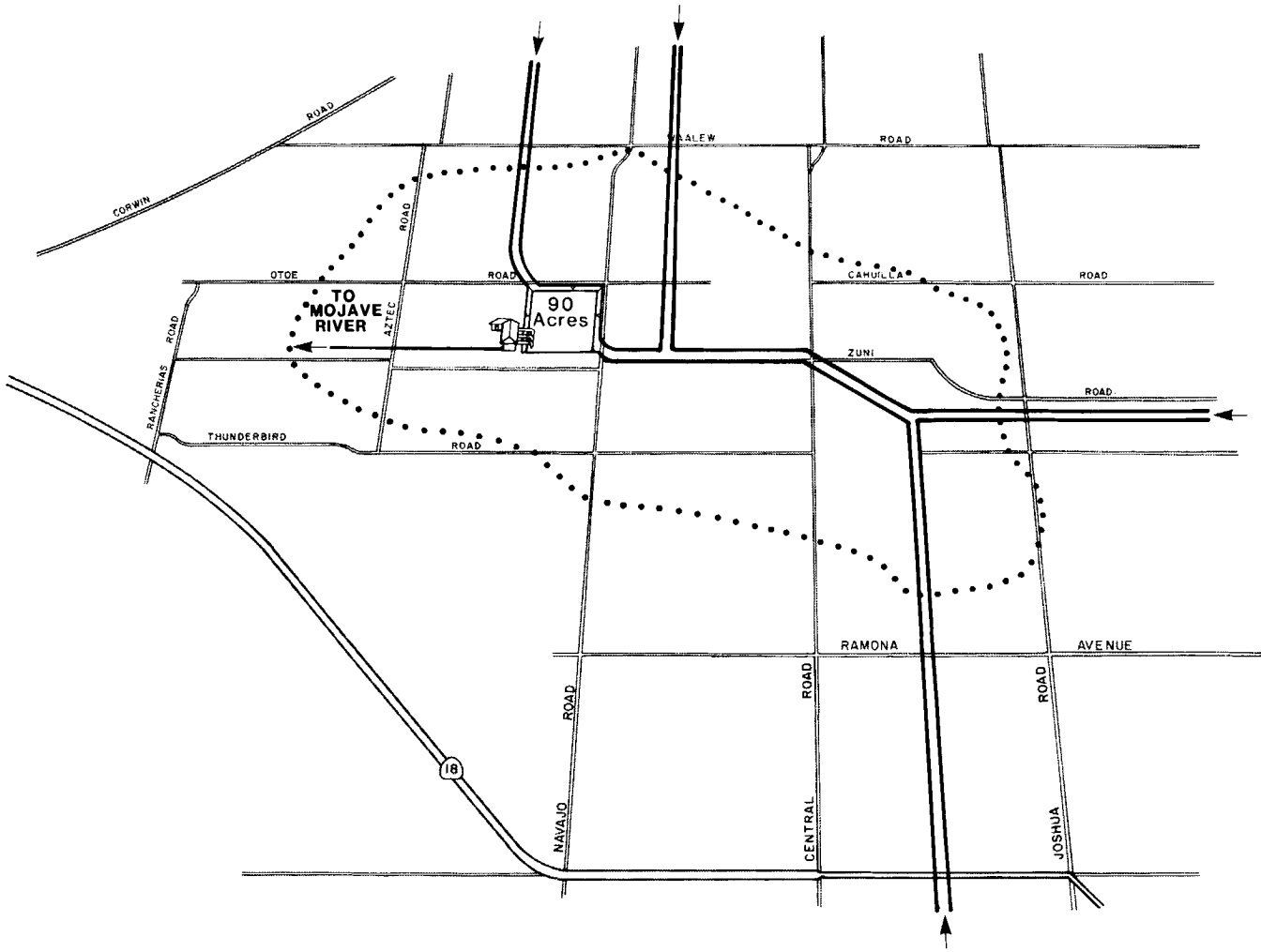
The pump station and discharge line are sized to convey 500 cfs; consequently, the detention basin is sized to store the remaining runoff volume untilit can be pumped. As in the second scenario, the detention basin for the pump station is assumed to be 100 feet deep so that right of way costs and surface area requirements can be minimized. Also the detention basin is sized to temporarily contain the excess 1 day runoff from the 100-year event until it can be pumped to the Mojave River. The excess volume is approximately 12,300 acre-feet. Assuming the detention basin has 2:1 side slopes the 100 ft. deep basin will occupy approximately 146 acres.

8.4.6. Scenario #6: 3,000 cfs Pump Station Option

The sixth and last scenario investigated in reclaiming the dry lake from the 100-year flood plain is a 3,000 cfs pump station which discharges to the Mojave River (Fig. 8.11). This scenario includes an outlet pipe which follows the alignment of Scenario #5 to the Mojave River, a pump station, and a detention basin. The pump station and outlet pipe are sized to convey 3,000 cfs; consequently, the detention basin is sized to accommodate the remaining runoff volume until it can be pumped. As in the second scenario, the detention basin for the pump station is assumed to be 100 feet deep so that right of way costs and surface area requirements can be minimized. As with the previously described retention and detention basins, this one is sized to contain (temporarily) the excess 1 day runoff from the 100-year event. The excess volume is approximately 7,300 acre-feet. Assuming the detention basin has 2:1 side slopes, the 100 ft. deep basin will occupy approximately 90 acres.

8.5. Cost Estimates

Shown in Table 8.4 are the summary cost estimates for the six scenarios studied to reclaim th dry lake from the 1-day 100-year flood plain. Also shown is the assumed land value of the dry lake which would be inundated during the 1-day 100-year storm event. Appendix B contains the detailed cost estimates.



APPLE VALLEY MASTER PLAN OF DRAINAGE

LEGEND

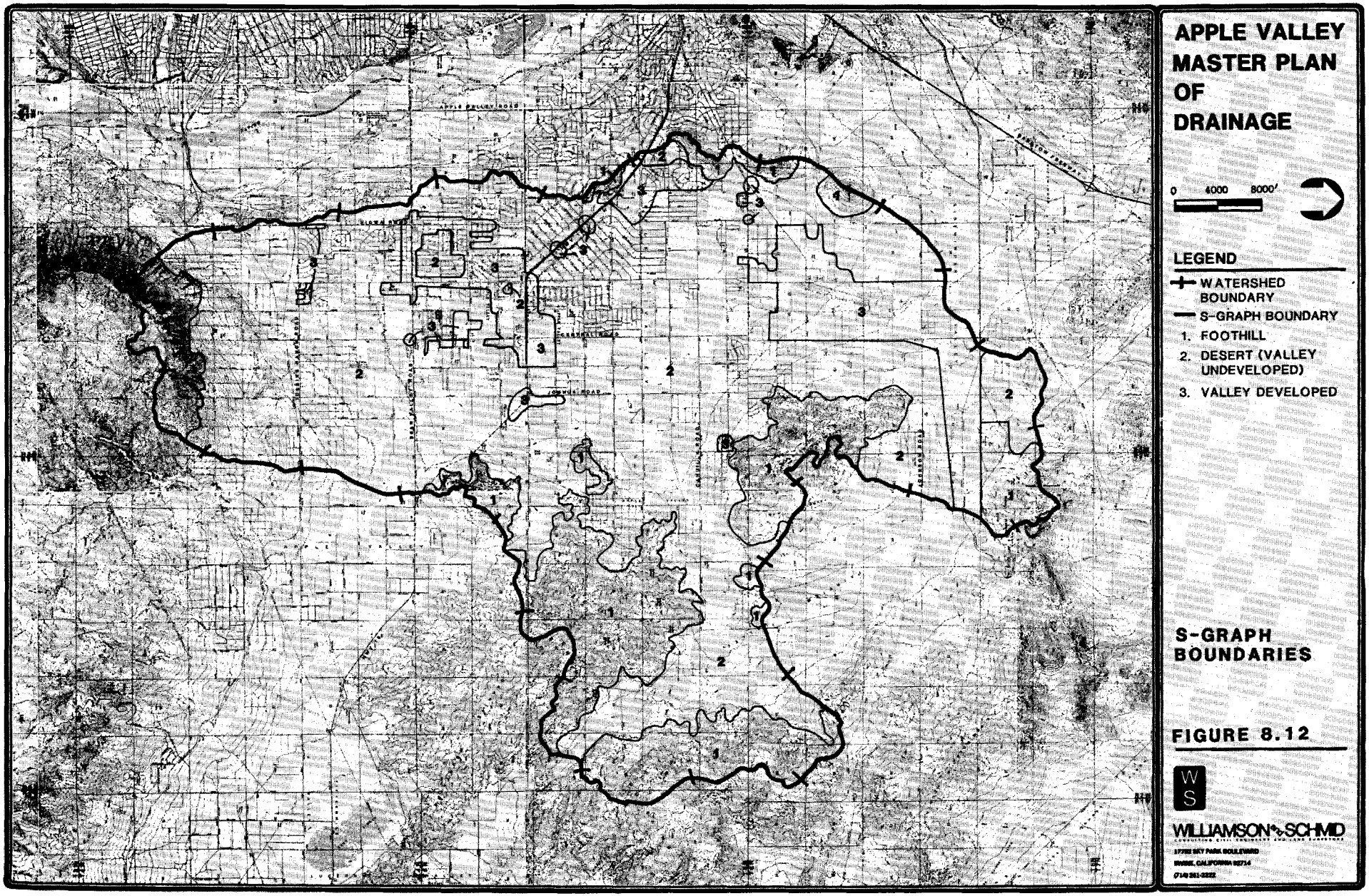
- CONCEPTUAL CHANNEL ALIGNMENT
- RETENTION BASIN
- PUMP STATION
- DIRECTION OF FLOW
- DRY LAKE HWL

NOTE: OPTION USED FOR COST ESTIMATION PURPOSES ONLY (SEE TEXT)

SCENARIO #6: 3,000 cfs PUMP STATION OPTION

FIGURE 8.11

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BASE MAP SOURCE: U.S.G.S. 1980

Table 8.4.

PRELIMINARY COST ESTIMATE SUMMARY FOR DRY LAKE RECOVERY FROM 100-YEAR FLOODPLAIN
(COSTS IN MILLIONS OF DOLLARS)

OPTION NO.	PUMP PLANT	PUMPS	PIPES	R/W	CHANNEL LINING	EXCAVATION	TOTAL COST
1	0	0	0	1.9	15.3	9.6	27
2	0	0	0	1.8	0	33	35
3	0	0	0	0.8	0	33	34
4	0	0	0	0.8	0	31	32
5	2.6	0.4	6.0	0.8	0	30	40
6	7.9	7.2	11.6	0.5	0	18	46

Desription of Options

1 drainage channel to Mojave River
2 dry lake single 40 ft. deep retention basin
3 dry lake single 100 ft. deep retention basin
4 dry lake dual retention basin
5 500 cfs pump station
6 3000 cfs pump station

Notes:
- runoff volume = 13,600 Ac-ft.
- elevation corresponding to runoff volume = 2912
- area corresponding to runoff volume = 2,600 Ac
- land value of dry lake occupied by 1-day, 100-year flood = $13 million

8.5.1. Unit Costs

Excavation: A unit cost of $1.50/CY was used for all excavation work. The assumptions of this unit cost are: the haul distance is less than 1000 feet; rock outcroppings are ripable (no blasting required); the rock is not sharp and therefore does not destroy tires quickly; the cost of excavating material at a depth of 100 feet is the same as excavating material relatively close to the surface. (It is noted that it may be possible that the excavated material could be sold.)

Berms: A unit cost of $4.00/CY was used for estimating the cost of all embankments. This is probably below the true unit cost in light of the fact that most of the material in the area is cohesionless and would require some type of soil amendment.

Channel Lining: A unit cost of $350/CY was used for channel lining. It is assumed that the 4-inch thick reinforced concrete channel shown in the San Bernardino County standard plates would be specified. Also included in the unit cost is the assumption that it costs the same to line a channel 80 feet below existing round as it does to line a channel 12 feet below existing ground.

Right-of-way: Right of way unit costs for this study reflect property values inside the dry lake (@ $5,000/Acre) and property outside the dry lake (@ $15,000/Acre) based on a limited survey of realtors and appraisors in the Apple Valley area. Not included are costs associated with any affected existing structures.

It is noted that construction costs for the dry lake area are generally less than those for the other communities because construction is confined to a much smaller area. These estimates reflect the fact that excavation should be relatively simple because the dry lake is composed mainly of sandy deposits and that the excavated soils could be used as material for berms. Therefore the haul distances of the excavated soil are virtually nothing, however, as stated above, the soil would require some type of amendment in order to be used as berm material.

8.5.2. Scenario #1: Drainage Channel to Mojave River

The preliminary cost estimate for Scenario #1 includes costs for right of way, excavation, and channel lining (due to the anticipated erosive flow velocities). Items not included are costs associated to existing structures, possible blasting during excavation (note that the channel alignment shown in Fig. 8.5 passes by Catholic Hill, a rock outcrop), culverts, extension of channels in the dry lake to convey runoff to the upstream terminus of the channel, benching and terrace drains, and downdrains for the channel where its depth below existing round requires an outlet structure, operation and maintenance costs, engineering and contingency costs.

8.5.3. Scenario #2: Dry Lake Single 40 ft. Deep Retention Basin Option

The preliminary cost estimate for Scenario #2 includes excavation and right of way. Items not included are benches, terrace drains and down drains in the 40 ft. deep retention basin, extension of channels in the dry lake to convey runoff to the retention basin, operation and maintenance costs, engineering and contingencies.

8.5.4. Scenario #3: Dry Lake Single 100 ft. Deep Retention Basin Option

The preliminary cost estimate for Scenario #3 includes excavation and right-of-way. Items not included are benches, terrace drains and down drains in the 100 ft. deep retention basin, extension of channels in the dry lake to convey runoff to the retention basin, operation and maintenance costs, engineering and contingencies.

8.5.5. Scenario #4: Dry Lake Dual Retention Basin Option

The preliminary cost estimate for Scenario #4 includes excavation, basin embankment, and right of way. Items not include dare benches, terrace drains and down drains in the large retention basin, emergency spillway for the large retention basin, extension and embankment of channels in the dry lake to convey runoff to the retention basin, operation and maintenance costs, engineering and contingencies.

8.5.6. Scenario #5: 500 cfs Pump Station Option

The preliminary cost estimate for Scenario #5 includes costs for the pump plant, pumps, outlet pipe, and a retention basin. Items not included are right of way for the outlet pipe, benching, terrace drains and down drains for the retention basin, extension of channels in the dry lake to convey runoff to the retention basin, operation and maintenance costs, engineering and contingencies.

8.5.7. Scenario #6: 3,000 cfs Pump Station to Mojave River Option

The preliminary cost estimate for Scenario #6 includes costs for the pump plant, pumps, outlet pipe and a retention basin. The preliminary cost for the pump plant and pumps are based on the recently constructed Great Salt Lake pump station, although this cost appears to be low. Items not included are right of way for the outlet pipe, benching, terrace drains and down drains for the retention basin, extension of channels in the dry lake to convey runoff to the retention basin, operation and maintenance costs, and engineering and contingencies.

8.6. Conclusions

The Apple Valley Dry Lake maximum high water line (HWL) was determined to be elevation 2915, 12 feet above the deepest point in the dry lake. This elevation corresponds to the 100-year multi-day storm event volume using AMC III conditions per existing County policy. Similarly, the 25-year multi-day storm HWL has an elevation of 2909 which corresponds to a depth of 6 feet at the deepest point. The single 100-year storm results in a HWL elevation of 2913.

The calibration study of the hydrologic model may justify the use of AMC II for establishing the maximum high water line elevation if the County revises its present policy. The County is presently evaluating this policy as part of its Desert Rainfall Study.

Of the six scenarios considered, the most cost effective method of reclaiming the Apple Valley dry lake from the 1-day, 100-year flood plain is scenario #1; a drainage channel to the Mojave River. This scenario has a preliminary "minimal" cost estimate of $27 million. However for reasons mentioned earlier in this study, this cursory cost estimate is known to be unrealistically low, and yet is still nearly twice the cost of the current land value of the dry lake.

The net value of the dry lake is equal to the land value of the dry lake when it is reclaimed from the flood plain minus the cost of reclaiming the dry lake from the flood plain. Using the land value estimate of $15,000/Ac (land value outside of the dry lake), the 2,600 acres encompassed by the flood plain has a maximum total value of $39 million. If scenario #1 were chosen to reclaim the 2,600-acre dry lake from the 1-day, 100-year flood plain, then the net value of the dry lake equals $39 million minus $27 million or $12 million (assuming 0% interest). The total net value of the reclaimed dry lake ($12 million) spread over the 2,600 acres equals a net value of $4,600/Ac. Consequently, the dry lake does not increase in net value if it is reclaimed from the flood plain (at current land values of $5,000/Ac within the dry lake). In other words, the reclaimed dry lake net value is slightly less than the inundated dry lake value. If the land values increase significantly in the future, these and other options should be reevaluated.

Therefore, it would not be economically desirable to reclaim the entire 2,600-acre dry lake area. It would be feasible, however, for the higher elevations of the dry lake to develop with relatively minor flood protection measures (e.g., raised pad elevations, berms, etc.). A more detailed dry lake development feasibility study is contained in Chapter 9.

A study was also completed to determine the effect of upstream retention on reclaiming the dry lake and is contained in Appendix C. This study showed that upstream retention is not economically feasible. Land values would need to be at least $48,000/Ac in order to recoup costs of excavation. Presently the land values are approximately $5,000/Ac, approximately one-tenth the value required to make the basins economically desirable.

CHAPTER 9

DRY LAKE LAND USE STUDY

9.1. Introduction

The Apple Valley Master Plan of Drainage dry lake land use study approach focuses upon the necessary course of action in the event major development of the lake bed becomes economically feasible. The primary focus of this chapter is to identify the necessary additional studies required to establish proper planning and engineering policies, and to develop approximate costs of residential development at one dwelling unit per acre (1 D.U./Ac), based upon the location of the development within the dry lake, and with respect to the magnitude of the developmennt project (i.e., a large-scale land development versus a few lot subdivision). Due to the estimated dry lake 100-year return frequency high water elevation of 2915, without offsite stormwter permanent storage, any anticipated development within the dry lake boundaries would require considerations which are unusual elsewhere in the Apple Valley watershed. Such considerations include, (1) elevating all roadways and lot pads a minimum of 1-foot above the 100-year high water elevation; (2) requiring an in-place sewer system before issuance of building permits (such as sewer system would transport wastes offsite to a regional sewer collection main, or a sewage treatment site); (3) water system protection measures to negate any possible systems; (5) provisions for circulation of the flood waters within the dry lake area; (6) dry lake flood water storage requirements, whereby all elevated pads and roadways provide offsetting volumes for flood water storage; among other factors.

Intermittent development within the dry lake area can have considerable impact on the entire dry lake flood plain; hence careful planning and controlled development is necessary. Arbitrary development schemes can lead to undue economic duress to other land holdings in their attempts to develop. In order for development to be feasible and proceed in a safe, economic, and reasonable manner, several additional studies are recommended prior to issuance of any building permits. With the completion of the recommended studies, the key engineering and environmental issues can be appropriately addressed. The development of the dry lake area needs to be treated as a modern planned community, where the entire area is master planned for all systems. A controlled growth policy is recommended whereby all development within the dry lake area is required to satisfy all engineering and planning measures adopted by the San Bernardino County authorities.

9.2. Study Approach

The approach used to evaluate necessary planning and engineering policies for development within the dry lake flood plain is to consider a hypothetical residential development concept within the central portion of the dry lake, and another at the perimeter, shallow water portions. These two hypothetical development concepts each involve approximately 80-acres of land, and are studied with the goal of obtaining a 1-dwelling unit per acre density. The central dry lake hypothetical development is located within one of the deepest flood water areas of the lake, and due to symmetry, provides an in-depth look at one-fourth of a possible 320-acre development scheme. Similarly, the dry lake perimeter 80-acre hypothetical development scheme provides a generalized look at how a shallow water elevated development might proceed. Both development studies provide a relative range of anticipated development costs for the 1 D.U./Ac density. Additionally, both development studies provide the motivation for establishing engineering and planning criteria and additional study needs in order to properly provide for the safety of dry lake flood plain area inhabitants.

9.3. Dry Lake Flood Plain Development Considerations

The dry lake flood plain area development study identifies engineering and planning needs drawn from other types of development. When the dry lake stores flood waters at the 100-year return frequency, engineering and planning considerations must include issues related to other lake residential developments, such as safety, flood protection, protection of systems (e.g., sewer, water, electricity, etc.), roadway drainage and safety, flood water circulation, among others. When dry, the dry lake flood plain development study needs to consider safety issues such as those due to the heights anticipated for elevating the pads safely above the 100-year flood plain, trash, nuisance flows, vectors, among other factors. Intermittently, occasional saturation of slopes due to more frequent storm events can cause differential settlement and uneven expansion of soils. Offsite drainage considerations include the safe release of leveed flood waters into the dry lake area where developed land may be anticipated.

Based on the two hypothetical development studies, it is recommended that several additional studies be conducted prior to issuance of any building permits within the dry lake flood plain area. Upon completion of the recommended studies, and upon approval by the County, all development would conform to the adopted engineering and planning criteria for development in this region. The recommended criteria and studies are summarized in Table 9.1 and are itemized in the following:

Table 9.1

SUMMARY OF RECOMMENDED DRY LAKE DEVELOPMENT CRITERIA AND STUDIES

A. MASTER PLAN OF ROADWAYS
   1) Roads elevated 1 foot above H.W.L. of 2915
   2) Side slopes not to exceed 4:1
   3) All development has two means of access

B. MASTER PLANS OF WATER AND SEWER
   1) Protective encasement of both water and sewer pipelines
   2) Systems are located in roadway fill

C. MASTER PLANS OF TELEPHONE AND ELECTRICITY
   1) Wires should be above ground where possible
   2) Wires in roadway fill should be in a sealed encasement

D. MASTER PLAN OF STORM WATER CIRCULATION

E. DRY LAKE FLOOD PLAIN AREA SOIL SURVEY AND GEOLOGY REPORT
   1) Development should be on best available soils
   2) Building pads elevated 2 feet above H.W.L. of 2915
   3) Cut and fill slopes not to exceed 8:1
   4) Imported fill equals exported soil below H.W.L. of 2915

F. MASTER PLAN OF OPEN SPACE
   1) Multiple uses for open space should be considered whenever possible.
   2) Designated ponding areas should be covered by some form of drainage reservation or offer of dedication.
   3) A vector maintenance district should be established.

9.3.1. Master Plan of Roadways

This study would identify all major and secondary roadways within the dry lake flood plain area. Included in this study is the identification of roadway fill slopes, right-of-way requirements, utility system access, roadway slope maintenance, and drainage of storm water to the dry lake floor.

9.3.2. Master Plans of Water and Sewer

This study would locate all water and sewer main lines, with special detail given to protected encasement of both water and sewer pipelines. Detail is also needed to provide accommodation for construction of these systems in roadway fill.

9.3.3. Master Plans of Telephone and Electricity

For any area subject to flooding, utility wires should be located either in the air or underground in sealed encasements.

9.3.4. Master Plan of Storm Water Circulation

A detailed study is required of all development plans to verify that the 100-year return frequency, multi-day design storm flood, can deliver flood flows throughout the dry lake area in a safe manner. Such a master plan of storm water circulation would identify general flow paths for the flood waters. Roadway bridges and equalizing culvert systems would be identified in order to deliver the flood water volume throughout the dry lake area and realize the necessary volume for storage. Special concerns include slope erosion due to flowing waters, and slope collapse due to ponding of waters. This master plan would provide general flow circulation paths away from the leveed channel release points at the dry lake boundary. In order to properly estimate flow velocities and unsteady flow back-water effects, a two-dimensional dynamic flow model such as the U.S.G.S. Diffusion Hydrodynamic Model (D.H.M.) is recommended for study purposes. All development proposals should evaluate the floodwater circulation impacts from the development, and ascertain what influence on undeveloped properties may result. The arbitrary placement of an island-type subdivision may impact neighboring lands such that extraordinary measures are needed to circulate the flood plain waters with further development.

9.3.5. Dry Lake Flood Plain Area Soil Survey and Geology Report

The structural integrity of the in-situ soil is not known on a site specific basis. Such a detailed soils and geology report is recommended in order to adequately adjust development patterns to best accommodate water infiltration potential (for water conservation and reduction of standing water impacts such as vectors and odors), access to useable fill material, access to land area with desirable soil properties for construction of elevated pads, among other factors. Because the roadway and flood water circulation needs to serve the entire dry lake flood plain area, it is recommended that the results of the soils/geology study be used to master plan the residential development concentrations to take advantage of the best available soils material, in order to reduce excavation and import costs. For example, it may be preferable to relocate a roadway in order to take advantage of a more favorable soils condition, requiring less excavation and import of off-site soils. If import of fill material is required, an equal amount of lake material must be exported. Regardless of the origin of the fill material, the placement of fill shall not adversely effect the dry lake H.W.L.

9.3.6. Master Plan of Open Space

This study will identify possible multiple uses for the connected open space which serves as the flood water storage area. It is anticipated that 1 D.U./Ac density can be achieved by creation of "islands" within the dry lake flood plain area, with elevated roadways connecting the several islands, and density transfers whereby a higher density is achieved within the islands in exchange for open space allocation elsewhere. This open space can be used for recreational purposes. Due to the desert environment, it may be feasible to establish golf course features throughout the anticipated dry lake flood plain lowland areas. Such a recreational use would aid in consuming nuisance flows from development, and aid in reducing the undesirable impacts of trash, vectors, and undesired use of the open space.

9.3.7. Additional Recommended Studies

Beyond those Master Plan of Development studies just recommended, other planning studies would be necessary prior to development. Particularly, but not limited to: an urban management plan, zoning studies and an environmental impact report.

9.3.8. Timing of Recommended Studies

From the above itemization of additional study needs, it is seen that properly planned and engineered development within the dry lake flood plain area may be possible. It is recommended, however, that the above studies be completed and accepted by the County before any development proceeds within the dry lake flood plain area. This report is not intended to be a substitute for any of these specific analyses.

9.4. Current Land Use of Dry Lake Flood Plain Area

Until development proceeds within the dry lake flood plain area, the land use is recommended to remain as storage for flood waters. The surface water hydrology studies indicate that at the 85 percent confidence level, the variation in flood water volumes between the current level of development and a fully developed watershed is negligible. This effect is due to the high runoff factors associated with the desert environment during severe storm conditions, as represented by high SCS curve numbers for desert soils and covers. Consequently, further development will not significantly impact the 100-year return frequency flood water elevation. Lower return frequency floods may generate higher volumes of runoff, more frequently, due to development, however. Use of offsite multiple use flood control/water conservation basins will aid in offsetting this increase in flood flows for the frequent floods, and also help to offset the introduction of nuisance flows to the dry lake flood plain area.

9.5. Hypothetical Development Study for Dry Lake Flood Plain Area

In this analysis, two 80-acre hypothetical development studies are considered for the purposes of identifying anticipated costs of development. These two studies were also used to identify the additional study needs listed in the previous sections. These additional studies are assumed completed in the following, and the costs for these studies are lumped as a simple percentage item of the total estimated costs for development. It is noted that the two hypothetical development studies are provided for relative cost estimation purposes, only. Neither the assumed development patterns used nor the resulting cost estimates are to be interpreted as being recommended for engineering or planning purposes.

9.6. Apple Valley Dry Lake Development: I. Hypothetical 80 Unit Development in Central Dry Lake Flood Plain

9.6.1. Introduction

An 80-acre site is analyzed for a hypothetical 80 dwelling unit subdivision. From this scenario, safe and prudent engineering and planning concerns can be evaluated and considered in light of an actual possible residential development. Additionally, estimated construction costs can be developed for comparison purposes.

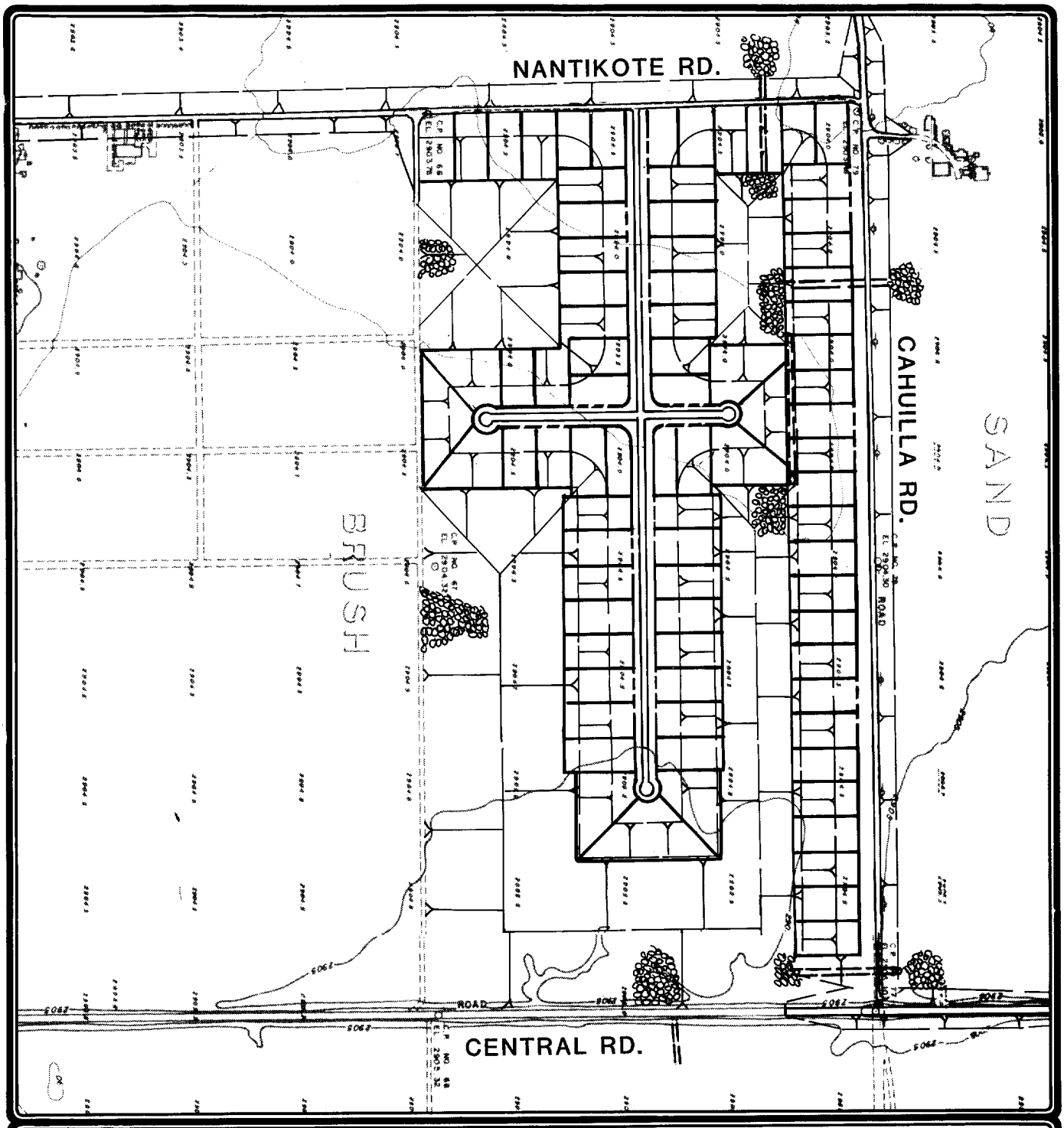
9.6.2. Grading and Earthwork

The location of the hypothetical 80-acre development is shown in Fig. 9.1. Also shown are lines of the 85 percent confidence interval estimate of 100-year flood depths. The development is considered as an island unto itself, with roadway connections to the existing roadway system.

Road earthwork quantity estimates for this Apple Valley Dry Lake Development Study have been determined based upon the following criteria: road layouts are established with a right-of-way width of 80 feet and a pavement width of 26 feet. Elevations have been set at elevation 2916.0, which is 1 foot above the 100-year flood water surface elevation (without offsite detention).

Two points of access are considered, each 1 foot above the 2915.0 water surface elevation. The northerly access point is located along Central Road, between South Road and Cahuilla Road. New construction would begin at the existing elevation of 2916.0. The southerly access point is located along Nanticoke Road between Thunderbird Road and Standing Rock Avenue. New construction would also begin at the existing 2916.0 elevation of Nanticoke Road, located approximately 400 feet north of the Nanticoke and Standard Rock Avenue intersection. Total road length is approximately 15,000 linear feet. The road is assumed to be constructed entirely upon fill. The total fill quantity estimated for this road work is approximately 385,000 cubic yards (C.Y.). The side slopes of this fill are assumed to not exceed 4 feet horizontal to 1 foot vertical, and are asumed to be provided with side slope planting for erosion control. Over-excavation of roadbed area to a depth of 1 foot yields an over-excavation quantity of approximately 57,500 C.Y. For purposes of this study, it is assumed that the existing soil at all roadbed locations is of adequate quantity to be replaced and recompacted as road fill material. Possibly, the well-known clay mixture soils onsite may be unacceptable for fill, and will require replacement with offsite soils. This consideration is evaluated separately from our initial estimates in order to obtain a reasonable "lower bound" cost etimate for comparison to the shallow-water development scheme cost considered in the following section. The final determination of the structural adequacy of all soils should be made by a licensed soils engineer after detailed analyses, including soil-water percolation tests and expansion characteristics evaluation, as a minimum.

Earthwork quantities for an 80-acre, single family residential subdivision, were determined separately from the road earthwork requirements. Pad elevations for each hypothetical residential lot, were set 2 feet above the 100-year flood water surface elevation (2915). Existing grades in the subdivisiion areas were typically at elevation 2904±, thereby necessitating 13 feet of fill, to achieve a pad elevation of 2917.0. The prospect exists for ponded water wave erosion acting upon the lot fill slopes, which lead to th establishment of an 8-foot horizontal to 1 foot vertical, maximum slope criteria. The 8:1 maximum slope



LEGEND

Y BERM

BASE MAP SOURCE: S.B.C.F.C.D. 1961 TOPOGRAPHIC MAP

APPLE VALLEY MASTER PLAN OF DRAINAGE

DEVELOPMENT CONCEPT I
CENTRAL DRY LAKE

FIGURE 9.1

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CONSULTING CIVIL ENGINEERS AND LAND SURVEYORS
17782 SKY PARK BOULEVARD
IRVINE, CALIFORNIA 92714
(714) 261-2222

criteria is recommended; however, a detailed soils analysis may suggest that the existing soils are stable only at milder slopes. The final criteria for fill and borrow slopes are recommended to be made by the county's agency authority, after the appropriate soils tests are obtained.

Total fill volumes for building lots are approximately 557,000 C.Y. The necessary lot fill volume is found to be available within the 80-acre subdivision for the assumed scenario. Borrow cuts should also conform to the 8:1 maximum slope requirement. Holding to these contraints, the available excavation has been determined to be approximately 689,000 C.Y. It is noted that the additional 132,000 C.Y. of material available onsite may be used to offset some onsite road fill volume requirements.

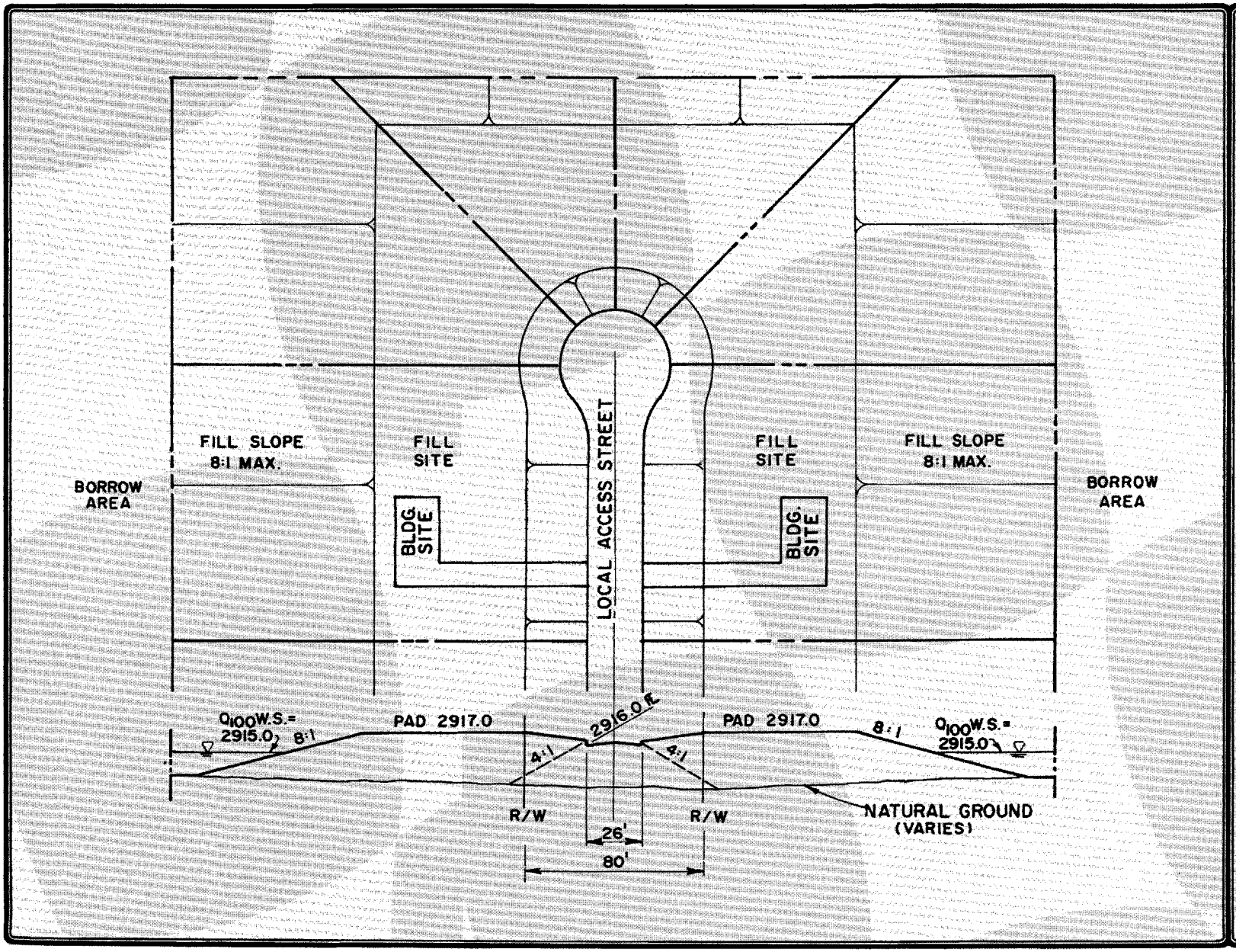
In the cases where road fill base widths extend beyond the established 80-foot right-of-way (i.e. where existing natural grades are lower than elevation 2909.75), lot quantities were adjusted to reflect the true volume of material required after roads had been constructed (see Fig. 9.2).

This study makes no recommendation as to the best available source for the estimated 253,000 C.Y. required of additional road borrow, but approximates a cost of $1,138,500 for borrow material brought from offsite.

Over-excavation of building pad areas to a depth of 1 foot yields onsite lot over-excavation volume of approximately 50,090 C.Y. As with road excavation, no determination as to the structural integrity of existing soils has been made, and a soils analysis would ultimately be required.

An additional estimate of soil excavation, is made by evaluating costs based upon the removal of the top 3-foot layer of assumed unsuitable lake bed material, and replacing that excavated quantity with suitable material obtained offsite. The available onsite borrow quantity would be reduced to 516,000 C.Y., requiring a total offsite borrow of 426,000 C.Y. at an additional cost of $2,263,000.

Onsite earthwork costs are determined by evaluating lot and roadway costs separately. Roadway costs associated with onsite development include the local streets to interior parcels, as well as one-half of the cost of those portions of Nanticoke and Cahuilla Roads which respectively form the westerly and northerly boundaries of the hypothetical subdivision area.



APPLE VALLEY MASTER PLAN OF DRAINAGE

LEGEND

▽ DRY LAKE 100-YEAR WATER SURFACE

TRACT DEVELOPMENT GRADING

FIGURE 9.2

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Typically, onsite streets are constructed on fill material above a natural grade elevation of 2904 ±. Street gutter flowline elevations are set 1 foot above the 100-year water surface, to a fixed elevation of 2916.0. The length of roads involved are approximately 2650 L.F. of Cahuilla Road, 1300 L.F. of Nanticoke Road, and 2620 L.F. of local interior access roads. One-half of the development cost of those portions of Cahuilla and Nanticoke Road forming the subdivision boundaries are attributed directly to the subdivision development cost. The volumes of earthwork involved, for the onsite portions of Cahuilla and Nanticoke Roads, is 69,490 C.Y., plus the local streets volume of 93,241 C.Y., for a total onsite roadway volume of 162,731 C.Y. with 132,000 C.Y. available onsite. Total estimated subdivision street earthwork cost is $335,858.

Development I Earthwork Cost Estimate Summary

Onsite:	Clearing & demolition	77.59 AC	$500.00 AC		$38,795.00
	Lot fill	557,000 C.Y.	1.50 C.Y.		835,500.00
	Lot over-excavation	50,090 C.Y.	1.50 C.Y.		75,135.00
	Finish Pads	80 EA	200.00 EA		16,000.00
	Onsite street fill	162,731 C.Y.			335,857.00
	(Onsite borrow)	(132,144 C.Y.)	1.50 C.Y.		
	(Import)	(30,587 C.Y.)	4.50 C.Y.		
	Onsite street over-excavation	21,443 C.Y.	1.50 C.Y.		32,165.00
	TOTAL ONSITE EARTHWORK				$1,333,452.00
					(16,668.00/unit)
Offsite:	Clearing & demolition	35.87 AC	$500.00 AC		$17,935.00
	Road fill (Import)	222,269 C.Y.	4.50 C.Y.		1,000,210.00
	Road over-excavation	23,023 C.Y.	1.50 C.Y.		34,534.00
	TOTAL OFFSITE ROAD EARTHWORK				$1,052,679.00
					(13,159.00/unit)
	TOTAL EARTHWORK				$2,386,136.00
					(29,826.50/unit)

9.6.3. Roadway Surfaces

Paving for local and collector roads was calculated based upon a pavement width of 26 feet. Proper structural section determination requires soils testing, but for estimating purposes, a section of 3 inches asphalt concrete (A.C.) over 6 inches aggregate base (A.B.) was selected for local streets and 4 inches A.C. over 6 inches A.B. for collector roads.

Concrete driveway estimates for 80 individual lots have been developed using a 10 feet x 27 feet configuration.

Intersections with existing roads and proposed roads will require transitioning from the 2916.0 road surface to existing road surface elevations. Transition grades were estimated at 5 percent, yielding a length of transition road surface removal of 48,200 S.F.

A 3950 L.F. portion of Cahuilla and Nanticoke collector roads forms the northerly and westerly boundary of the development site. One-half of the roadway surfacing cost for this portion of these collector roads has been attributed to the onsite development cost.

Development I Roadway Surfaces Cost Summary

Concrete driveways	21,600 S.F.	$3.00 S.F.	$64,800.00
Onsite streets paving			
Local streets	72,930 S.F.	1.33 S.F.	97,000.00
1/2 Cahuilla & Nanticoke	51,350 S.F.	1.33 S.F.	68,300.00
Existing road surface removals	51,350 S.F.	1.50 S.F.	77,000.00
TOTAL ONSITE SURFACING COST ESTIMATE			$307,100.00
			(3,838.75/unit)
Offsite			
Collector roads	265,200 S.F.	1.33 S.F.	$352,716.00
Existing Road surface removals	263,850 S.F.	1.50 S.F.	395,775.00
TOTAL OFFSITE SURFACING COST ESTIMATE			$748,491.00
			(9,356.00/unit)
TOTAL SURFACING COST ESTIMATE			$1,055,591.00
			(13,195.00/unit)

9.6.4. Onsite Sewers

Rural areas commonly rely upon private onsite septic systems for sewage disposal; however, due to large fill quantities and subsequent difficulty with access to "in-situ" soil as well as the tendancy for adjacent natural soils to be subject to runoff inundation, the availability of proper leaching facilities would be limited. Any development concept needs to consider the prospect of transporting wastewater offsite by joining an existing trunk system and treatment facility by means of an adequately designed onsite sewer system.

Design factors for estimating onsite subdivision sewers were based upon proposed dwelling units and population densities. Low density estimates of one dwelling unit per gross acre, with 3.6 persons per unit, yields a design population of 288 residents. A use factor per person of 85 gallons per day, results in an estimated average daily sewage flow of 24,480 gpd. The design peaking factor for 288 people is 3.25, therefore, the design peak flow for the 80-unit subdivisioin becomes 79,560 gpd. Based on these design criteria, a 6 inch VCP or PVC sewer line at a slope of 1 percent would provide the adequate capacities and suspension velocities required for the proposed subdivision.

For purposes of this study, sewer facility quantities have been estimated for onsite locations only. Access to existing sewer trunk systems and the availability of additional capacities of that system, are obvious factors affecting the ultimate development of any subdivision onsite system.

Costs for concrete encasement of 6-inch sewer lines is provided for, in the event a long term, high flood water elevation infiltrates into the road fill. The encasement is designed to prevent any leaks of the sewer from escaping and presenting a potential environmental health hazard or water supply contamination hazard.

A lump sum cost of $160,000 for a sewage pumping station has been included in the estimate. The study area is in the geographical low point of the region, therefore, some cost provision has been made for pumping facilities.

Four inch VCP or PVC laterals are assumed for each lot; extended from mainline to 5 feet beyond right-of-way.

Development I Onsite Sewers Cost Summary

4" VCP or PVC	144	L.F.	$14.00	L.F.	$20,160.00
6" VCP or PVC	6600	L.F.	$16.00	L.F.	105,600.00
Concrete encasement	6600	L.F.	$15.00	L.F.	99,000.00
Manholes @ 300 feet	22	EA	$2800.00	EA	61,600.00
Cleanouts	80	EA	$100.00	EA	8,000.00
Pumping station	1	EA	$160,000	EA	160,000.00
TOTAL ONSITE SEWERS COST ESTIMATE					$454,360.00
					(5,679.50/Unit)

9.6.5. Onsite Water Facilities

Domestic water facilities for onsite service extends from the intersection of Central and Cahuilla Road, east to Nanticoke and southerly along Nanticoke for 1300 feet. For estimating purposes it is assumed that a water main with adequate service capacity exists at Central Road and Cahuilla Road. The onsite system would "hot-tap" into the line at Central, for service to the subdivision.

A PVC water line was selected to supply the onsite system. Control valves and fire hydrants as well as domestic service meters have also been included in the estimate. Valves would be spaced so that not more than two fire hydrants would be cut out of service at any one time.

The proposed system is currently shown as a dead end system, so the minimum size was determined to be an 8-inch line, to the last fire hydrant.

Development I Onsite Water Cost Summary

8" PVC SDR21 waterline	6770	L.F.	$20.00	L.F.	$135,400.00
Water meters and service	80	EA	$500.00	EA	40,000.00
8" Gate Valves	16	EA	$100.00	EA	1,600.00
Fire Hydrant Installations	18	EA	$1,000.00	EA	18,000.00
"Hot Tap" Sleeve & Valve	1	EA	$500.00	EA	500.00
Thrust Blocks	16	EA	$100.00	EA	1,600.00
Detector Checks	17	EA	$500.00	EA	8,500.00
TOTAL ONSITE WATERLINE COST ESTIMATE					$205,600.00
					(2,570.00/unit)

9.6.6. Onsite Electric and Gas

Electrical power service currently exists adjacent to the hypothetical subdivision area. Supplying the site with electrical service is assumed to consist of extending lines from a convenient existing source on Cahuilla Road south on Nanticoke and east for 1300 feet as well as onto local lot access streets. Power poles with street lights would be added along Nanticoke and local streets. Installation and start up costs are expected to be carried by the local power company.

Natural gas services in rural areas are commonly of a private onsite bottled type. Our estimate makes no provision for constructing an underground natural gas supply pipeline.

9.6.7. Onsite Flood Water Circulation and Drainage

The prospect of multi-year storm event runoff inundating the areas around and immediately adjacent to the hypothetical development site, has been a major consideration in our development scenario and cost estimating procedures. Consequently, flood water circulation and drainage concepts have been developed based upon expected multi-year storm event runoff volumes.

The excavation anticipated for development scheme one would result in onsite borrow pits as deep as 28 feet, although the depth could be reduced by excavating beyond the assumed 80 acre site boundary. These pits would act as localized drainage basins, and provision must be made for drainage by means of percolation, as well as providing for evapo-transpiration, water circulation, cleaning, and vector control. It is recommended that a vector maintenance district be formed as required by the county to deal with the problems associated with a drainage basin.

Successful drainage, by means of percolating surface water through a porous soil medium, requires a clear understanding of the permeability of soil that exists in the area as well as the depth from surface to existing groundwater. The soil must have an acceptable percolation rate, without interference from groundwater or an impervious strata. Soils testing for drainage would be required with as a minimum, soil-water percolation rates testing and expansion characteristics evaluations. A percolation test is the only known means for obtaining a quantitative appraisal of soil percolation capacity.

Proper circulation around and through the development site would be of major concern to ensure proper drainage as well as minimizing slope erosion. Providing for proper circulation will also aid in reducing potential vector sources, by reducing the amount of standing and stagnant water.

The hypothetical subdivision layout concept includes the construction of a 2-foot high temporary earthen berm to exclude low flows into the site, along the east boundary roads of Central Avenue and the existing gravel road which forms the southerly boundary line. Riprap lined openings in the berm are provided to concentrate flood event flows into the sites at specific points. This concept is favored over the natural sheet flow drainage course, because of the slightly higher surface flow velocities that would result. Flow line surfaces at the toe of each proposed berm would be scour protected and sloped toward the riprap berm cut to ensure proper drainage to the site. Within the borrow areas, the flow line of each pit would slope toward the deepest portion of the cut areas, possibly, the southeast corner of the site. Concentrating runoff to one portion of the site accomplishes the goals of more rapid percolation into the soil through increased head, isolating the temporary nuisance of onsite water to a remote spot, as well as facilitating the removal of silt and debris.

Funding the removal of silt and debris is recommended by means of an assessment district or homeowners association funding mechanism. Proper cleaning of pits in dry weather is essential to ensure adequate percolation for flood control and to prevent development of vector sources.

The ultimate design of flood routing and erosion control, would require mathematical flood modeling similar to that of the U.S.G.S. D.H.M. program. Flow velocities within the dry lake stored flood flows are recommended to be maintained to less than 3 fps, for the 100-year design flood, with the possible exceptions of those locations which have been identified as scour resistant by a County approved soils report.

Flood water flow equalization culverts have been provided to facilitate hydraulic circulation between the north and south sides of Cahuilla Road, as well as the east and west sides of Nanticoke Road. Riprap at each end of these culverts is required. Sizing of the culverts and associated riprap could accurately be established after use of a mathematical two-dimensional flood wave model (e.g., D.H.M.) determined relative flows and corresponding velocities.

9.6.8. Development Study I, Overall Cost Summary

Total costs (onsite, plus 1/2 collector street work)	
Earthwork	$1,333,457.00
Roadway	307,100.00
Sewer	454,360.00
Water	205,600.00
Subtotal	$2,300,500.00
20% special studies, fees, and engineering	460,000.00
15% contingency	345,000.00
TOTAL ONSITE ESTIMATE	$3,105,500.00
	(38,818.75/unit)
Total costs (collector roadway, minus 1/2 adjacent to development	
Earthwork	$1,052,679.00
Roadway	748,491.00
Subtotal	$1,801,170.00
20% special studies, fees, and engineering	360,234.00
15% contingency	270,176.00
TOTAL ROADWAY ESTIMATE	$2,431,580.00
TOTAL DEVELOPMENT STUDY I, OVERALL COST	$5,537,080.00
	(69,213.50/unit)

9.7. Apple Valley Dry Lake Development: II. Hypothetical 80 Unit Development at Dry Lake Perimeter

9.7.1. Introduction

Similar to the previous study on the hypothetical development within the deep portions of the Apple Valley Dry Lake, this study section focuses on the shallower, peripheral portions of the dry lake in order to evaluate the cost differential between the two scenarios. As with development study portion I, an 80 acre site is analyzed for a hypothetical 80 dwelling unit subdivision. From this scenario, safe and prudent engineering concerns can be evaluated and considered in light of an actual possible residential development. Likewise, estimated construction costs can be developed for comparison purposes.

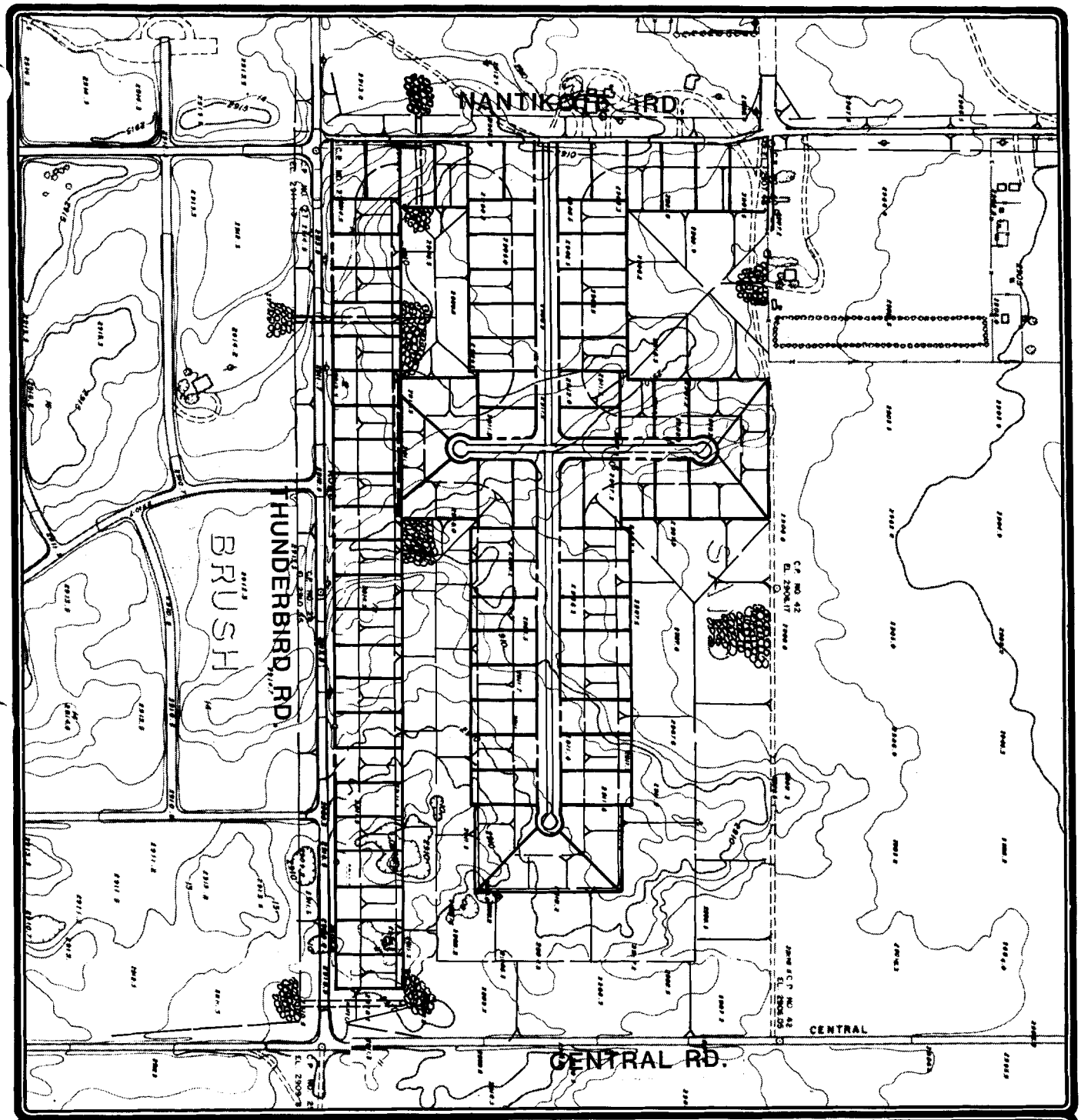
9.7.2. Grading and Earthwork

The excavation and fill quantities for development scenarios in the peripheral regions of the dry lake, represents the most significant differences in terms of development costs when compared to the development concept within the lake bed. As with the previous study area, the 100-year water surface elevation of 2915 dictates the building pad and road surface finish elevations. The previous elevations of 2917 for pads and 2916 for road flowlines were set to reevaluate the necessary cut and fill volumes the proposed development would require if located in the northwest quadrant of the Central Road and Thunderbird Road intersection.

The existing terrain varies rather significantly (see Fig. 9.3); ranging in elevation from 2906.5 to 2914.3 over a horizontal distance of 1300 feet. In order to evaluate the quantity of earthwork required, area-weighted average elevation for this site was calculated at 2910.0.

This area-weighted average elevation was determined using recent aerial topographic survey information, and calculated within those areas where building pads and local roads were proposed.

Conceptual lot and road configurations for dry lake peripheral developments, were similar to those previously established in the lower lake bed portion of this study. Based on this similar layout there is an estimated 55 percent reduction in earthwork quantities for local access roads and building pads. Offsite road earthwork quantities will be estimated somewhat differently than the previous study, due to an additional 2600 L.F. of road for those lots fronting Thunderbird Road, between Nanticoke and Central. This portion of road is required exclusively for access to that portion of the development and therefore, the cost would be directly associated with the onsite development costs. Consistent with the previous study, one-half the cost of portion of Nanticoke Road, which establishes the western boundary of the site, is assessed to the onsite development cost estimate.



LEGEND

Y BERM

BASE MAP SOURCE: S.B.C.F.C.D. 1961 TOPOGRAPHIC MAP

APPLE VALLEY MASTER PLAN OF DRAINAGE

DEVELOPMENT CONCEPT II
DRY LAKE PERIMETER
FIGURE 9.3

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Development II Earthwork Cost Estimate Summary

Onsite:	Clearing & demolition	77.59	AC	$500.00	AC	$38,795.00
	Lot fill	247,905	C.Y.	1.50	C.Y.	371,858.00
	Lot over-excavation	41,030	C.Y.	1.50	C.Y.	61,545.00
	Finish Pads	80	EA	200.00	EA	16,000.00
	Onsite street fill					
	(Onsite streets)	28,222	C.Y.	1.50	C.Y.	42,333.00
	(Thunderbird)	28,889	C.Y.	1.50	C.Y.	43,334.00
	(1/2 Nanticoke)	7,222	C.Y.	1.50	C.Y.	32,500.00
	Onsite street over-excavation	19,082	C.Y.	1.50	C.Y.	28,622.00
	TOTAL ONSITE EARTHWORK					$634,987.00
						(7,937.00/unit)
Offsite:	Clearing & demolition	35.87	AC	$500.00	AC	$17,935.00
	Road fill					
	(Onsite borrow)	376,762	C.Y.	1.50	C.Y.	565,143.00
	(Import)	8,238	C.Y.	4.50	C.Y.	37,071.00
	Road over-excavation	53,648	C.Y.	1.50	C.Y.	80,472.00
	TOTAL OFFSITE ROAD EARTHWORK					$700,621.00
						(8,758.00/unit)
	TOTAL EARTHWORK					$1,335,608.00
						(16,695.00/unit)

9.7.3. Roadway Surfaces

Paving for local and collector roads of scheme II is similar to that of scheme I with one significant difference; an additional portion of Thunderbird Road between Nanticoke Road and Central Road, must be included for access to the southerly lots. This portion of road represents an additional 33,800 S.F. of paving and removals with an additional cost of $44,954 and $50,700, respectively.

Development II Roadway Surfaces Cost Summary

Concrete driveways	21,600	S.F.	$3.00	S.F.	$64,800.00
Onsite streets paving					
Local streets	68,120	S.F.	1.33	S.F.	90,600.00
1/2 Nanticoke	22,477	S.F.	1.33	S.F.	22,477.00
Thunderbird	68,900	S.F.	1.33	S.F.	91,637.00
Existing road surface removals	85,800	S.F.	1.50	S.F.	128,700.00
TOTAL ONSITE SURFACING COST ESTIMATE					$398,214.00
					(4,978.00/unit)
Offsite Collector Roads	299,650	S.F.	1.33	S.F.	$398,535.00
Existing Road surface removals	299,650	S.F.	1.50	S.F.	449,475.00
TOTAL OFFSITE ROAD SURFACING COST ESTIMATE					$848,000.00
					(10,600.00/unit)
TOTAL ROADWAY SURFACES COST					$1,246,224.00
					(15,578.00/unit)

9.7.4. Onsite Sewers

Rural areas commonly rely upon private onsite septic systems for sewage disposal; however, due to large fill quantities and subsequent difficulty with access to "in-situ" soil as well as the tendancy for adjacent natural soils to be subject to runoff inundation, the availability of proper leaching facilities would be limited. Any development concept needs to consider the prospect of transporting wastewater offsite by joining an existing trunk system and treatment facility by means of an adequately designed onsite sewer system.

Design factors for estimating onsite subdivision sewers were based upon proposed dwelling units and population densities. Low density estimates of one dwelling unit per gross acre, with 3.6 persons per unit, yields a design population of 288 residents. A use factor per person of 85 gallons per day, results in an estimated average daily sewage flow of 24,480 gpd. The design peaking factor for 288 people is 3.25, therefore, the design peak flow for the 80-unit subdivision becomes 79,560 gpd. Based on these design criteria, a 6-inch VCP or PVC sewer line at a slope of 1 percent would provide the adequate capacities and suspension velocities required for the proposed subdivision.

For purposes of this study, sewer facility quantities have been estimated for onsite locations only. Access to existing sewer trunk systems and the availability of additional capacities of that system, are obvious factors affecting the ultimate development of any subdivision onsite system.

Costs for concrete encasement of 6-inch sewer lines is provided for, in the event a long term, high flood water elevation infiltrates into the road fill. The encasement is designed to prevent any leaks of the sewer from escaping and presenting a potential environmental health hazard or water supply contamination hazard.

A lump sum cost of $160,000 for a sewage pumping station has been included in the estimate. The study area is in the geographical low point of the region; therefore, some cost provision should be made for pumping facilities.

Four inch VCP or PVC laterals are assumed for each lot, extending from mainline to 5 feet beyond right-of-way.

Development II Onsite Sewers Cost Summary

4" VCP or PVC	144	L.F.	$14.00	L.F.	$20,160.00
6" VCP or PVC	6600	L.F.	$16.00	L.F.	105,600.00
Concrete encasement	6600	L.F.	$15.00	L.F.	99,000.00
Manholes @ 300 feet	22	EA	$2800.00	EA	61,600.00
Cleanouts	80	EA	$100.00	EA	8,000.00
Pumping station	1	EA	$160,000	EA	160,000.00
TOTAL ONSITE SEWERS COST ESTIMATE					$454,360.00
					(5,679.50/unit)

9.7.5. Onsite Water Facilities

Domestic water facilities for onsite service extends from the intersection of Central and Thunderbird Road, east to Nanticoke and northerly along Nanticoke for 1300 feet. For estimating purposes it is assumed that a water main with adequate service capacity exists at Central Road and Thunderbird Road. The onsite system would "hot-tap" into the line at Central, for service to the subdivision.

A PVC water line was selected to supply the onsite system. Control valves and fire hydrants as well as domestic service meters have also been included in the estimate. Valves would be spaced so that not more than two fire hydrants would be cut out of service at any one time.

The proposed system is currently shown as a dead end system, so the minimum size was determined to be an 8-inch line, to the last fire hydrant.

Development II Onsite Water Cost Summary

8" PVC SDR21 waterline	6770	L.F.	$20.00	L.F.	$135,400.00
Water meters and service	80	EA	$500.00	EA	40,000.00
8" Gate Valves	16	EA	$100.00	EA	1,600.00
Fire Hydrant Installations	18	EA	$1,000.00	EA	18,000.00
"Hot Tap" Sleeve & Valve	1	EA	$500.00	EA	500.00
Thrust Blocks	16	EA	$100.00	EA	1,600.00
Detector Checks	17	EA	$500.00	EA	8,500.00
TOTAL ONSITE WATERLINE COST ESTIMATE					$205,600.00
					(2,570.00/unit)

9.7.6. Onsite Electric and Gas

Electrical power service currently exists adjacent to the hypothetical subdivision area. Supplying the site with electrical service is assumed to consist of extending lines from a convenient existing source on Thunderbird Road north on Nanticoke and east for 1300 feet as well as onto local lot access streets. Power poles with street lights would be added along Nanticoke and local streets. Installation and start up costs are expected to be carried by the local power company.

Natural gas services in rural areas are commonly of a private onsite bottled type. Our estimate makes no provision for constructing an underground natural gas supply pipeline.

9.7.7. Onsite Flood Water Circulation and Drainage

The concept of floodwater circulation and drainage by means of percolation, evapo-transpiration and flow equalization remains valid for scheme II as for scheme I. The most significant difference between the two concepts would be the quantity of runoff during each storm event. A mathematical model such as the U.S.G.S. D.H.M. model previously mentioned, could accurately predict these differences and the relative runoff quantities, and subsequent facilities could be analyzed and developed based upon these predictions. A comparative cost estimate could then be made between schemes I and II.

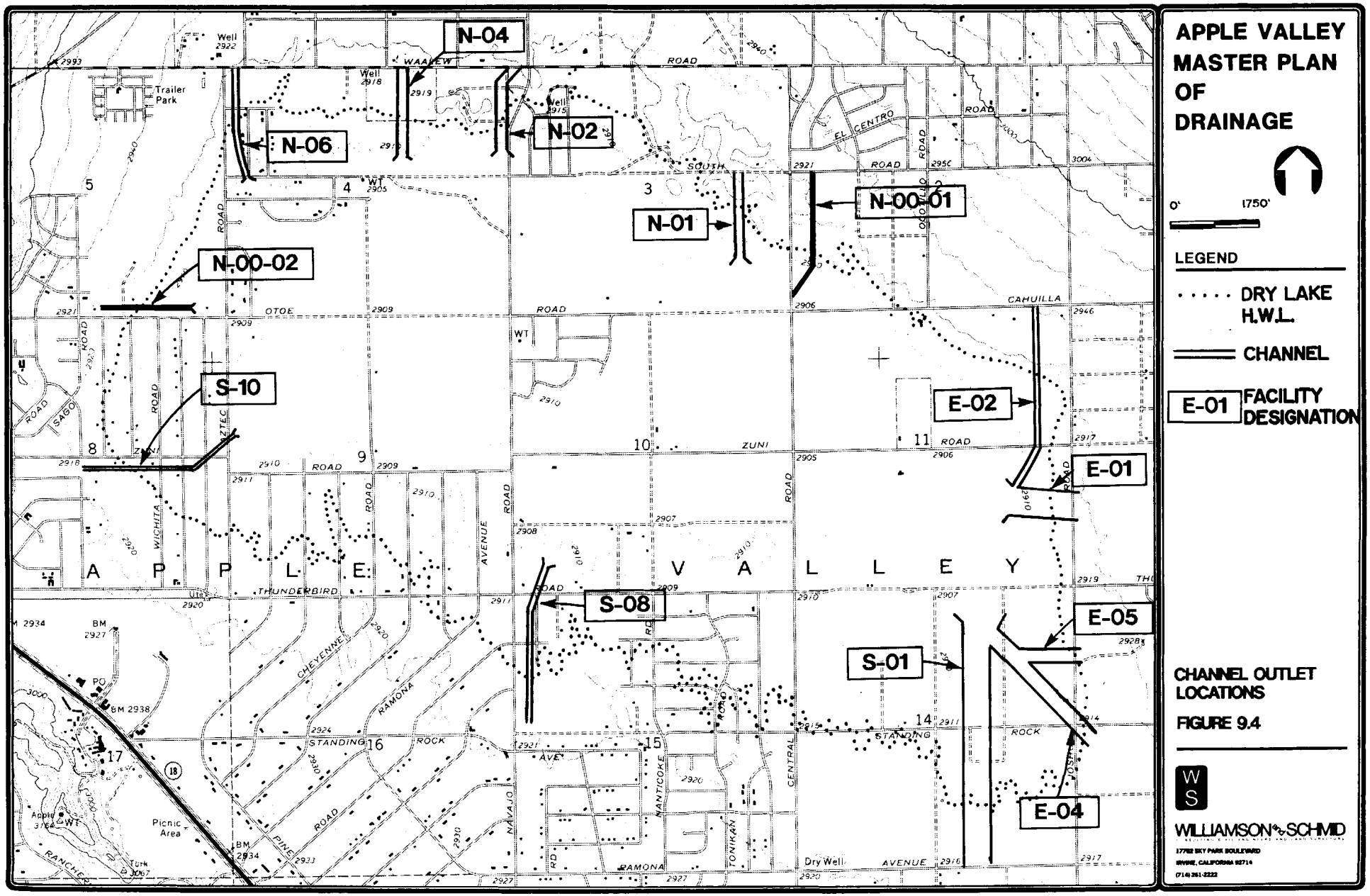
9.7.8. Development Study II, Overall Cost Summary

Total costs (onsite, plus 1/2 collector street work)	
Earthwork	$634,987.00
Roadway	$398,214.00
Sewer	454,360.00
Water	205,600.00
Subtotal	$1,693,161.00
20% special studies, fees, and engineering	338,632.00
15% contingency	253,974.00
TOTAL ONSITE ESTIMATE	$2,285,767.00
	(28,572.00/unit)
Total costs (collector roadway, minus 1/2 adjacent to development)	
Earthwork	$700,621.00
Roadway	848,000.00
Subtotal	$1,548,621.00
20% special studies, fees, and engineering	309,724.00
15% contingency	232,293.00
TOTAL ROADWAY ESTIMATE	$2,090,638.00
TOTAL DEVELOPMENT STUDY II, OVERALL COST	$4,376,405.00
	(54,705.00/unit)

9.8. Channel Outlets to the Dry Lake

There are ten proposed outlets of channels into the dry lake. These outlet facilities were designed to slow and disperse the channel flows. The body responsible for maintaining the channel will need to purchase rights-of-way for the outlet structures as proposed in the study (Fig. 9.4). The typical structure (Fig. 9.5) widens out at a 45-degree angle to a width required to produce a maximum velocity of 3 fps. The 6-foot channel levees are terminated when the ultimate outlet width is obtained.

Due to the leveed condition of the outlet channels major road work will be required at street crossings, streets will need to be reworked at least 100 feet on each side of the channel to provide safe site distances, ponding areas may be created on lots which back up to the levees, and access to existing lots may be



9-23

BASE MAP SOURCE: U.S.G.S. 1980

APPLE VALLEY MASTER PLAN OF DRAINAGE

0' 1750'

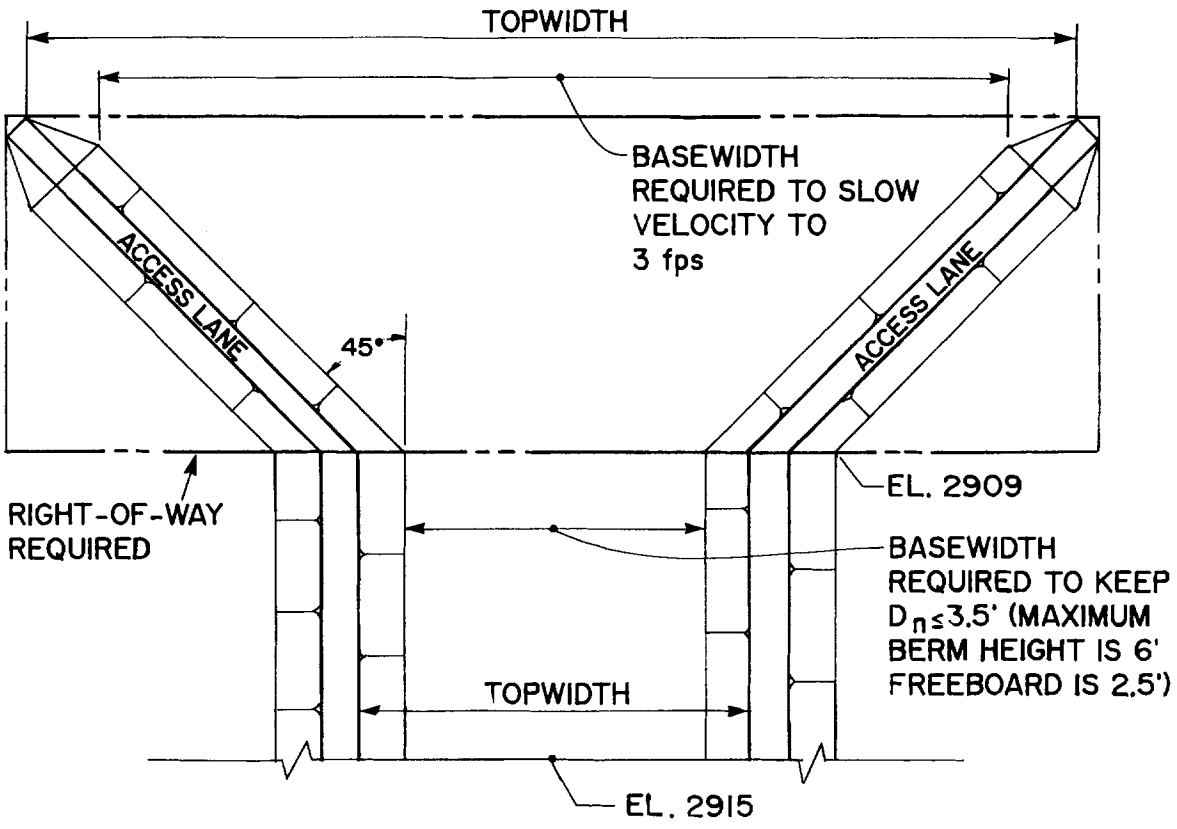
LEGEND

- DRY LAKE H.W.L.
- CHANNEL
- E-01 FACILITY DESIGNATION

CHANNEL OUTLET LOCATIONS

FIGURE 9.4

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LEGEND

BERM

RIGHT-OF-WAY LIMITS

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TYPICAL CHANNEL OUTLET

FIGURE 9.5

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hindered. Each of the leveed channels should be looked at in greater detail during the design phase of the project to determine the most efficient and least disruptive solution to the above problems. It is believed that the costs used in this study for the leveed channels would be comparable to the costs of any alternate design and would, therefore, not significantly affect the overall costs for each community.

9.9. Summary and Recommendations

The most significant cost element associated with either of the considered hypothetical dry lake development schemes, is that of the earthwork operations. The vast quantities of fill necessary to adequately establish finish grade elevations safely above the 100-year water surface elevation, the several recommended master plan studies, and the need to establish regional facilities for even partial development of the dry lake flood plain, questions the economic feasibility of most types of developments within the lake bed area for both the short term and the long term. Varying the size of development within the dry lake affects the facilities required and subsequently the corresponding costs at each level of development. Meaningful analysis for development size and facilities costs is possible if minimum levels of facilities improvements are established for any level of development within the dry lake. The most likely cost distribution arrangement would be an equitable distribution of facilities costs divided among individual landowners.

The master plan establishes roadway and building lot development elevations one foot above the 100-year return frequency elevation of 2915.0. In addition, any development withint he dry lake bed must have two means of access into and out of the dry lake. The need for additional studies has also been identified and those recommendations incorporated into development plans. Protection of underground facilities from inundation and proper flood water circulation are all examples of topics requiring study for any development plan, of any size. It follows that increased levels of development have an associated increase in the facilities requirement. Optimization of development costs therefore exists at a level where facility costs per unit are minimal.

The facility costs when combined with the necessary planning and development studies, makes dry lake development, on a small scale, economically prohibitive. Developing one unit for example in the middle of the dry lake bed, would require that one homeowner initiate the necessary studies as well as provide all the required street, drainage and utility facilities. Such a unit cost, which provides for an upper bound in unit costs is approximately 3.5 to 4 million dollars (excluding all costs for the necessary environmental and engineering studies recommended previously). The more likely scenario would be to distribute the study and development costs among the homeowners of a large multiple unit development, similar to that present in sections 9.6 and 9.7.

A possible alternative to total development of the dry lake flood plain would be to make portions of the lake bed area available for leasing to recreational development which require large land areas, such as golf courses. Developments of this nature would be less negatively impacted by a multi-year event inundation than would other types of development, such as home sites. The income generated by these leases could then be used to offset the cost of the residential development sites, and consequently help to make lake bed development become more feasible.

There appears to be strong evidence that residential development at the 1 D.U./Ac density within the dry lake flood plain will continue in the long term to be substantially more expensive than the offsite land area. This study indicates that anticipated unit costs for development may range from $54,700 per unit to $69,200 per unit, for shallow to deep water island type developments, respectively. Most of these costs occur due to the earthwork needed to provide flood protection.

The analyses and cost estimates contained in this multi-unit, dry lake flood plain development study are intended to establish a general set of criteria and cost comparisons for development within the study areas. These analyses are not intended as a substitute development study for the detailed master planned studies, as recommended herein. Additionally, these cost breakdowns are intended for general comparative purposes only, and their value should be tempered as being approximate, only. No attempt is made to represent these costs as a financial funding study for ultimate developments.

CHAPTER 10

FOOTHILL M.P.D.

10.1. Introduction

The foothill and mountain areas within the Apple Valley watershed will remain largely undeveloped. Therefore a link-node model for the foothills can be created and used for each land-use scenario. The model parameters should not change for different land use scenarios since the terrain is steep and rugged and, therefore, not practical for development. The model parameters and assumptions pertaining to the foothills are discussed below.

10.2. Computer Modeling Approach

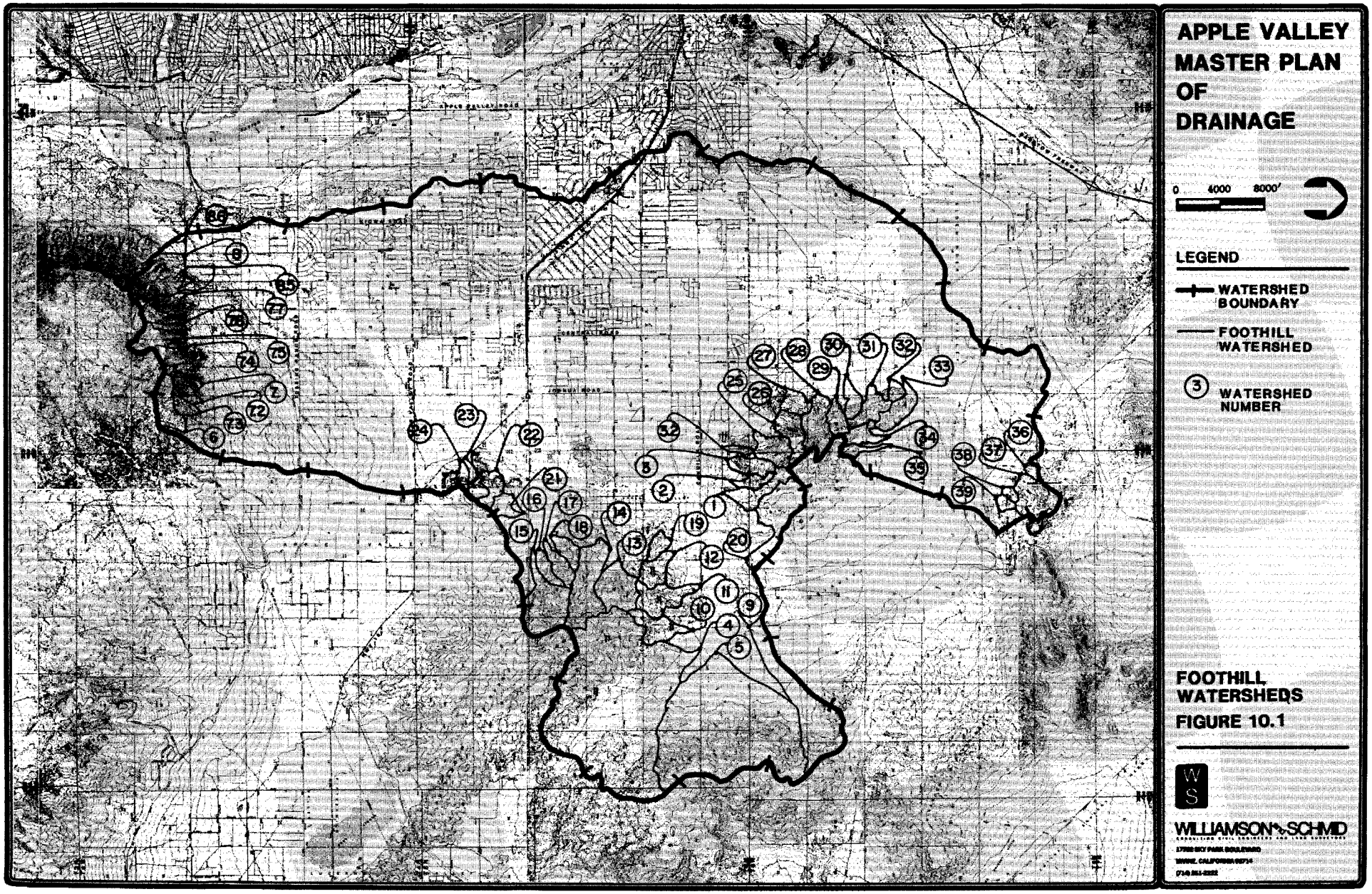
The computer program, RATSB (Advanced Engineering Software, 1988), is based on the criteria established in the 1986 San Bernardino County Hydrology Manual. The 100-year 1-hour rainfall is taken from Fig. 5.5. The 25-year 1-hour rainfall is estimated using Figs. 5.4, 5.5 of this report, and Fig. D-2 of the manual.

Undeveloped (or natural) poor cover is the development type and cover used in the initial subarea analyses, and the loss rates from the other subareas are estimated using the barren natural cover type. The land use 1 D.U./20 Ac is considered undeveloped. It is noted that the loss rates calculated in RATSB are based on AMC II. It should also be noted that a few subareas extend into the future development area, and, therefore, may change in development type. Another variance exists in the nodal schemes of Black Mountain, the northern-most portion of the watershed, where the general plan land use is industrial. Because of the steep and rugged terrain, the land use will be considered undeveloped. It is very unlikely that any land use other than quarries will exist on Black Mountain.

Several assumptions were made in routing the runoff through the mountains and foothills. Trapezoidal channels with a base width of zero feet (triangular channels) were assumed with varying side slopes and Manning's friction factors. Side slopes varied from 3:1 (horizontal to vertical) to 60:1, based upon typical cross-sections from the U.S.G.S. topographic quadrangles (scale: 1 inch = 2000 ft.) and the U.S.G.S. report, "Flood-Hazard Study—100-Year Flood Stage for Apple Valley Dry Lake, San Bernardino County, California." Manning's friction factors of .055 were generally assigned in the steeper, more rugged mountains, and friction factors of .045 were assigned in the flatter, less rugged valleys. The node elevations were taken from reproduced U.S.G.S. topographic quadrangles, and the channel lengths were measured on the same reproduced maps.

10.3 Modeling Results

Forty-nine watersheds comprise what will be considered the Foothill M.P.D. Their boundaries are shown on Fig. 10.1. Watersheds 1, 3, 3.2, 8, 8.5, 14 and 30 are all affected by the ultimate development alternative. The land use at the lower ends of these watersheds will change to a higher density for the case of ultimate development. Results for the foothill watersheds are contained in the Apple Valley M.P.D. Technical Appendix, available from the San Bernardino County Flood Control District.



BASE MAP SOURCE: U.S.G.S. 1980

CHAPTER 11

FLOOD CONTROL ALTERNATIVES

11.1. Introduction

This chapter presents a description of three basic flood control alternatives (A1, A2, and A3), as well as a discussion of overall criteria formulated for the development of the alternatives. The three basic alternatives were developed as all conveyance systems for an equitable comparison of costs. Options of the recommended alternative were further developed in an attempt to identify the most cost efficient system. The options are discussed in chapters 13, 14, and 15.

11.2. Description of Alternatives

The intent of Alternative A1 is to maintain natural channel alignments unless re-directing of flows proves to be economically beneficial. The main facilities are assumed to be open channels, either dirt, riprap, or concrete lined, depending on debris loads, flow velocities, and available easements. The smaller "feeder" lines are assumed to be open channels where slopes are less than 0.005 or where there is a potential for high debris production, and underground storm drains, otherwise. With the use of natural channel alignments, the interim drainage (i.e., before the master planned facilities are completely constructed) can be controlled even with scattered development patterns. Upstream development may, therefore, be permitted without ultimate improvement of the downstream facilities (some interim detention may be needed).

The intent of Alternative A2 is to provide a fully urbanized underground storm drain system, similar to the high density commercial/residential areas of Orange, Riverside and San Bernardino Counties. Storm drains are assumed to be within street rights-of-way and existing easements. Special attention would have to be paid to debris potential due to the increased maintenance problems associated with underground facilities. The interim drainage problem becomes more difficult since downstream facilities would have to be constructed before upstream flows could be diverted to the proposed alignments. On-site detention could be used to reduce developed condition flows to an acceptable level for the existing downstream facilities.

The third Alternative, A3, uses the same alignments as Alternative A1, however, the land use plan is revised to reflect ultimate projected land use densities (per District staff) as opposed to the adopted general plan land use designations used for Alternatives A1 and A2.

11.3. Criteria for Development of Alternatives

In the development of flood control alternatives it was necessary to establish certain standard criteria that would be used throughout the study. This ensures an equitable cost comparison of alternatives and options, as well as establishing standard criteria for the design of flood control facilities.

11.3.1. Design Criteria Development

An extensive search was conducted to determine design criteria of other agencies in desert communities. The results of this search are contained in Appendix D. The following design criteria for Apple Valley was developed by the Consultant and the District utilizing the information from the other desert agencies as a guide.

11.3.2. Open and Closed Conduits

- existing natural drainage paths will remain unimproved in areas zoned for 1 D.U./2.5 Ac and less.

- facilities are considered regional (major drainage facility) when Q_{100} is greater than 750 cfs; the facilities are then designed to convey the peak 100-year discharge.

- facilities are considered secondary (larger drainage facility conveying locally generated flows) when either Q_{25} is greater than 300 cfs or a waterway in excess of 20 square feet is required; these facilities are designed to convey the peak 25-year discharge.

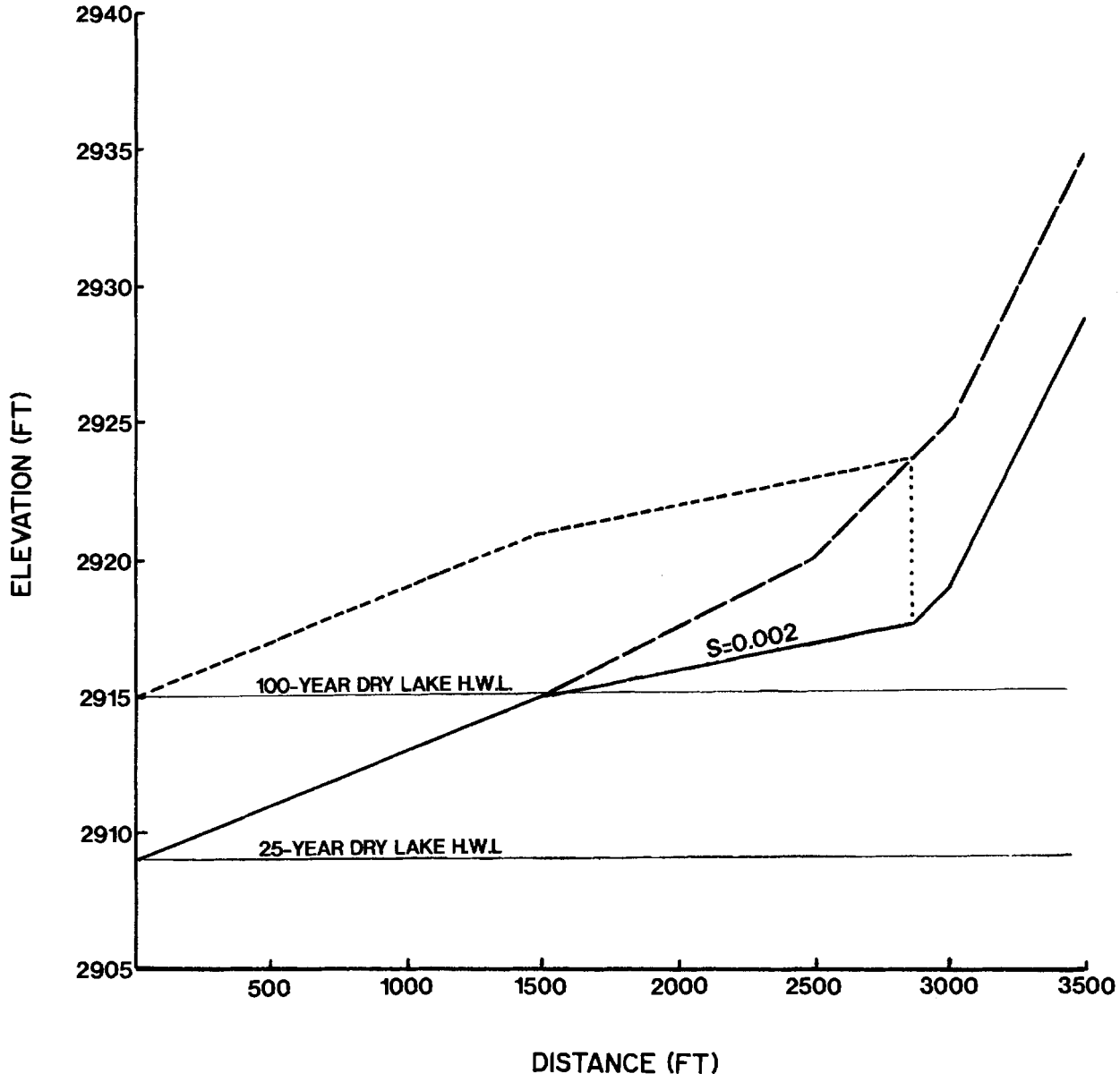
- all drainage facilities used to convey smaller local flows to secondary or regional drains are defined as local drains; these facilities are designed to convey the peak 25-year discharge.

11.3.3. Open Channels

- channels are designed for clear water flow with no debris, due to assumed upstream debris basins.

- freeboard is not less than 2.5 feet.

- channels that empty directly into the dry lake are completely leveed from elevation 2915 (the multi-day 100-year high water line elevation) to elevation 2909 (the 25-year high water line elevation). At elevation 2909 the channels end and the runoff is dispersed within the dry lake. The channel invert beginning at elevation 2915 generally increases at a slope of .002 until it meets the upstream invert elevation of the fully excavated (no levee) channel. The levee gradually decreases in height beginning from elevation 2915 to this upstream point (see Fig. 11.1). See also section 9.8.



LEGEND

- NATURAL GROUND
- PROPOSED FLOW LINE
- TOP OF LEVEE
- VERTICAL TO GROUND

APPLE VALLEY MASTER PLAN OF DRAINAGE

TYPICAL LEVEED CHANNEL SECTION

FIGURE 11.1

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- all improved channels will be fenced for safety.

- there will be a 15-foot access road along each side of every improved channel.

- open channel sizing is as follows:

  0 feet base until D_n reaches 1.5 feet
  2 feet base until D_n reaches 3.5 feet
  4 feet base until D_n reaches 3.5 feet
  6 feet base until D_n reaches 3.5 feet
  8 feet base until D_n reaches 3.5 feet
  10 feet base until D_n reaches 3.5 feet
  15 feet base until D_n reaches 5.5 feet
  20 feet base until D_n reaches 7.5 feet
  25 feet base until D_n reaches 7.5 feet
  30 feet base until D_n feaches 7.5 feet
  35 feet base until D_n reaches 7.5 feet
  40 feet base until D_n reaches 7.5 feet
  45 feet base until D_n reaches 7.5 feet
  50 feet base until D_n feaches 7.5 feet

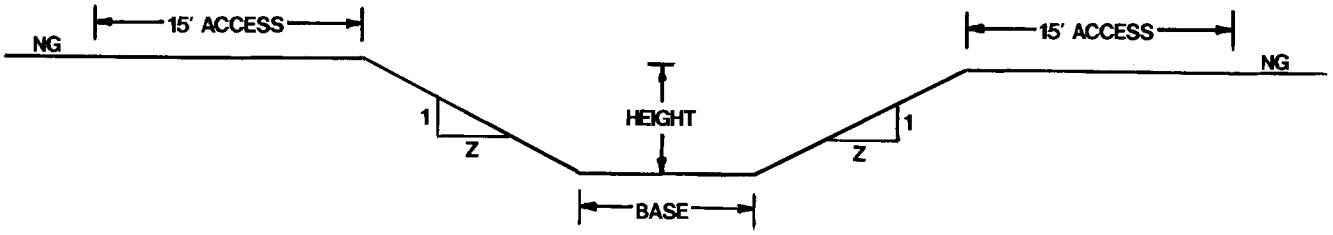
  For larger flows, the base increases in 10-foot increments in order to keep D_n less than 7.5 feet. As channels approach the dry lake, in transition zones or completely leveed sections, D_n is kept below 3.5 feet.

- improved earthen channels will be trapezoidal with 3:1 side slopes (because of the erosive properties of the soil in desert areas) and velocities will generally be less than 5 feet per second.

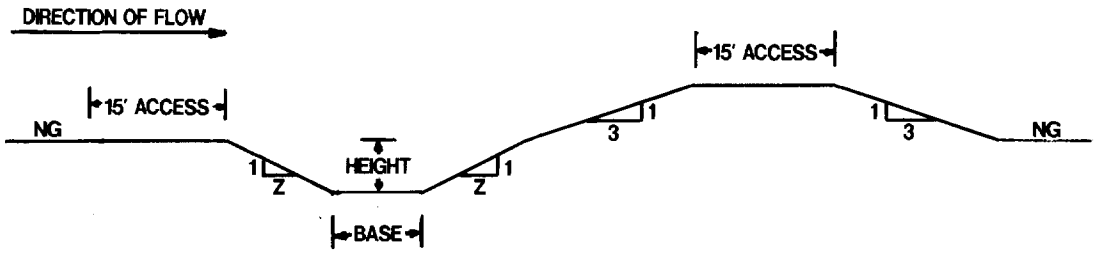
- riprap channels will be trapezoidal with 3:1 side slopes (because of the erosive properties of the soil in desert areas), velocities will generally be less than 12 feet per second, and lining will be twice as thick as the diameter of rock needed to resist movement. For channels with a base of 15 feet or less, the channel bottom is also lined. For channels with a base of 20 feet or larger, bottom controls are utilized at approximately 250-foot intervals in lieu of full bottom lining.

- concrete channels will be trapezoidal with 1.5:1 side slopes. Because of the high velocities (greater than 20 feet per second), the channel lining will be 8 inches on the base and 6 inches on the side slopes.

- leveed intercept channels are proposed for facilities that redirect flows away from the natural path in order to protect property. The levee/channels are designed so that if the channel capacity is exceeded (e.g. due to debris loading), the containment levees will direct flow along the channel alignment without overflow (see Fig. 11.2 for typical sections).



TYPICAL OPEN CHANNEL



TYPICAL LEVEED INTERCEPT OPEN CHANNEL

LEGEND	NG NATURAL GROUND
	Z SIDESLOPE (HORIZONTAL TO VERTICAL)

APPLE VALLEY MASTER PLAN OF DRAINAGE

TYPICAL CHANNEL SECTION

FIGURE 11.2

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- When proposed alignments parallel existing roadways, channels are generally offset along the back property lines to reduce construction and access problems. In some cases, open channels may be shown immediately adjacent to roadways where options are limited or access is not a problem. Proposed alignments and channel sections should be reviewed and may be revised during the design phase of each project to determine the most efficient solution for each facility.

11.3.4. Closed Conduits

- all proposed conduits will be reinforced concrete pipe.

- velocities will be kept at such levels as to achieve self-cleaning, which is assumed to require a minimum slope of .005 ft./ft.

- no closed conduits will be used to convey runoff from foothills, mountains, or wherever debris and sedimentation are a potential problem.

11.3.5. Detention Basins

- locations were chosen for perceived maximum cost benefits and minimal environmental impact on development.

- all basins are assumed to have vertical sidewalls (for sizing purposes only).

- required right-of-way is assumed to be in the surface area of the basin.

- basins are 10 feet deep except the basin on line E-04 which is 5 feet deep, due to its flat slope.

- cost of basin includes only right-of-way and excavation.

- no outlet structures, emergency spillways, or other facilities were considered in the cost.

11.3.6. General Design Considerations

- Systems have not been analyzed for curvature, wave effects, nor rapidly varied flow characteristics. Hydraulic modeling may be required for some systems.

- Energy dissipators may be required at transitions of high-velocity flows into dry lake entrance channel sections with wide basewidths.

- Channel upstream inlet structures may be required.

- Debris basins may be required for natural ground catchment streams.

- Flare section may be required within the dry lake region to slow outlets velocities.

- Revisions to assumed channel geometry may be required to convey flows through developed areas or around major obstructions.

11.4. Facility Designations

Regional facilities are designated by a letter followed by a two digit extension. The letter designates the community that the channel flows through (E, N, or S) and the extension designates the regional channel number (i.e., E-01 designates East Community, regional facility 1).

Secondary facilities are designated in the same manner except there is an additional two digit extension (i.e., E-01-01 designates East Community, regional facility 1, lateral 1).

CHAPTER 12

FACILITIES COST ESTIMATES

12.1. Introduction

The objective of this chapter is to present a preliminary cost estimate for the recommended alignment alternative. The facility costs presented here are estimates and should only be used for master planning purposes.

The estimated cost for each facility contains a cost for construction and right-of-way only. A 30-percent contingency is also included to cover the costs for engineering, inspection, utlility relocations, and soils testing. Two other line item costs may be included; a 5-percent cost for facility maintenance and a 5-percent cost for M.P.D. updates. The detailed cost estimates along with the plans and profiles for the recommended Alternative A1 are contained in Volume II of this report.

The facility cost estimates are based on June 1988 unit costs from the Engineering News Record (ENR) Twenty Cities Construction Cost Index No. 4525 and can be adjusted based on the ENR Index for future cost updating purposes.

12.2. Assumptions

There are several basic assumptions that have been made in order to simplify both the calculations and the understanding of the cost estimate procedure:

1. The costs reflect systems which have no water storing facilities or peak flow rate reducing facilities. The potential cost savings of adding detention basins were analyzed separately.

2. All property within the watershed is considered to have the same resale value ($15,000 per acre).

3. All pipe systems are assumed to be in existing or future street right-of-way.

4. There will be no offsite importing or exporting of dirt.

5. All existing and future paved roads are assumed to be 44 feet wide for culvert sizing purposes.

12.3. Determination of Facility Costs

For each type of facility a cost table has been calculated based on size and velocity. Whenever possible a cost per linear foot has been calculated. This enables the cost to be determined knowing only the length of the facility. When a cost per linear foot cannot be determined, a cost per facility has been calculated based on facility size.

12.4. Pipe Systems

Where feasible pipes are proposed for secondary facilities. A 60-inch diameter pipe was considered the minimum size for this master plan.

12.4.1. Pipe Costs

Reinforced concrete pipe (RCP) is recommended for use within certain areas of the Apple Valley Dry Lake watershed. Unit pipe costs are reflected in Table 12.1. Added to these RCP costs is a construction contingency for manholes, junction structures, etc. This contingency is reflected in the following chart.

Pipe Diameter	Added Contingency
18" - 36"	20%
39" - 54"	15%
57" - 84"	10%
87" - 144"	5%

12.4.2. Pavement Costs

Where pipe is to be constructed in existing paved roads, the pavement will have to be removed and resurfaced. Pavement removal is assumed to be $0.25 per square foot and pavement resurface is $1.25 per square foot for a total cost of $1.50 per square foot. The entire street width (44 feet) will need to be removed and replaced due to the large size of the pipes considered in this study (greater than 60-inch diameter). The length of the removal and resurface will be equal to the length of the facility.

12.5. Open Channel Costs

Within the Apple Valley Dry Lake watershed most major facilities are open channels. These channels are below grade for the most part. However, as the channels approach the 100-year dry lake flood limits (el. 2915), they begin to be leveed (see Section 12.5.4). At elevation 2915 and below, the channels are assumed to be completely leveed.

12.5.1. Excavation Costs

Excavation for open channels is assumed to be a uniform cost of $3.00 per cubic yard regardless of channel dimensions. No off-site removal of dirt costs have been included.

12.5.2. Right-of-Way Costs

Right-of-way width needed for open channels is assumed to be the channel top width plus one 15-foot access lane on each side of the channel. No right-of-way cost is included for the "dry side" side-slope of leveed channels. Based on a limited survey of realtors in the area, right-of-way costs were determined to be $15,000 per acre outside of the dry lake area and $5,000 per acre inside of the dry lake. Since a detailed cost for every site was considered unfeasible, these costs were used as an average.

Table 12.1

R.C.P. COST ESTIMATE

R.C.P. Diameter	Unit	Unit Cost
18"	L.F.	42.00
21"	L.F.	45.00
24"	L.F.	48.00
27"	L.F.	51.00
30"	L.F.	55.00
33"	L.F.	60.00
36"	L.F.	65.00
39"	L.F.	70.00
42"	L.F.	75.00
45"	L.F.	80.00
48"	L.F.	86.00
51"	L.F.	93.00
54"	L.F.	100.00
57"	L.F.	106.00
60"	L.F.	112.00
63"	L.F.	118.00
66"	L.F.	124.00
69"	L.F.	132.00
72"	L.F.	142.00
75"	L.F.	154.00
78"	L.F.	168.00
81"	L.F.	182.00
84"	L.F.	197.00
87"	L.F.	212.00
90"	L.F.	225.00
93"	L.F.	237.00
96"	L.F.	249.00
99"	L.F.	260.00
102"	L.F.	272.00
105"	L.F.	283.00
108"	L.F.	295.00
111"	L.F.	307.00
114"	L.F.	320.00
117"	L.F.	330.00
120"	L.F.	340.00
126"	L.F.	360.00
132"	L.F.	375.00
138"	L.F.	390.00
144"	L.F.	410.00

12.5.3. Armoring Costs

Depending on velocities, some channels may need armoring to resist erosion. Both riprap lining and concrete lining are proposed for use in the watershed.

Riprap lining is used when earthen channel velocities are greater than 5 fps and generally less than 12 fps. For channels with a base of 15 feet or less the depth of riprap in the channel on both the invert and sideslopes is assumed to be twice the diameter of stone needed to resist movement (see Fig. 12.1). For channels with a base of 20 feet or more, only the sideslopes are lined using the above criteria. The invert of this type of section is soft bottom with bottom controls located at approximately 250-foot intervals (see Fig. 12.2). All riprap channels have a "z" value of 3. The cost of riprap, regardless of stone diameter, is assumed to be $40.00 per cubic yard. For the channel profiles and cost estimates the total channel armoring is referred to as "riprap channel" and the side-slope armoring is referred to as "rock-slope protection or RSP".

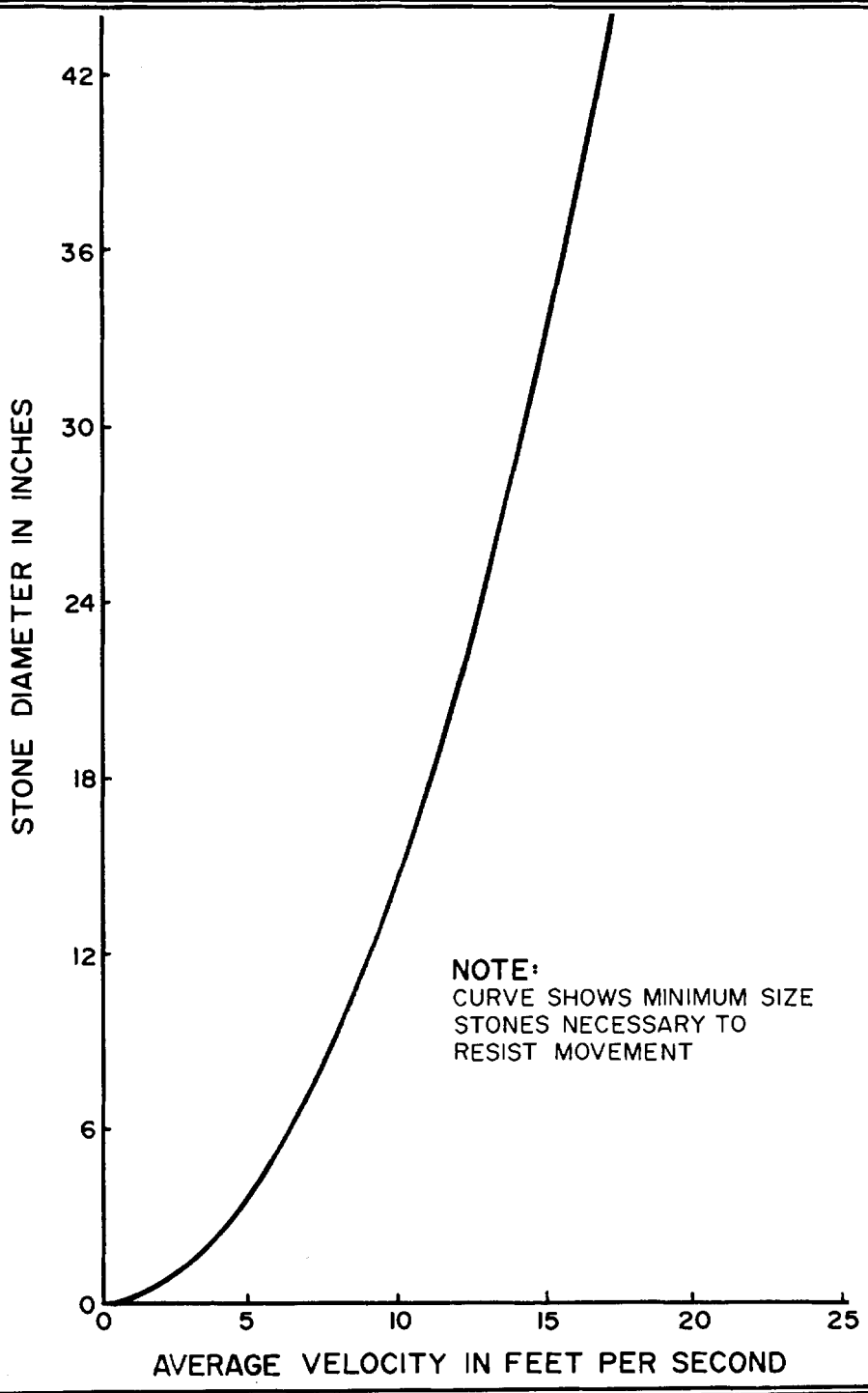
Concrete sections are used when riprap channel velocities exceed 12 fps. Invert thickness of concrete is 8 inches with side walls being lined with 6 inches of concrete. All concrete lined trapezoidal channels have a "z" value of 1.5. Concrete lining is assumed to be $200.00 per cubic yard. Final determination of a concrete channel section will be made during the design phase. A channel section with 12-inch wall thickness was used for preparation of the cost estimates in Volume II. These costs are considered conservative and were used in the preparation of the Finance Study (Chapter 16). Cost estimates using the recommended wall thickness (6-inches) are contained in the Appendix of Volume II, Parts A, B and C.

12.5.4. Levee Costs

As the channels approach the dry lake they are assumed to be leveed. The levee will begin at the natural ground level and gradually increase to a maximum height of 6 feet above the natural ground (Fig. 11.1). There will be a 15-foot access lane on top of each levee running the entire length of the levee. The side slopes (horizontal to vertical) are 3:1. Cost of the levee is $7.00 per cubic yard which covers the moving and the compacting of the dirt. No importing of dirt is considered. When a facility is completely leveed, the cost per linear foot is $50.00. When a facility is transitioning from a leveed section to an excavated section, the cost of the levee is assumed to be $25.00 per linear foot and an excavation cost equivalent to one half of the full excavation cost is also included, regardless of channel geometry. Containment levees are located where water has been redirected from its natural course. The cost for a containment levee is the same as the cost of a dry lake levee since the levee geometry is identical for both types, however, no cost is included for right-of-way.

12.5.5. Culvert Costs

For open channels crossing an existing or future paved road, culverts will be necessary to convey the flow under the street. Two types of culverts will be considered. For channels with base less than or equal to 50 feet, concrete box culverts will be used. For channels with base of 60 feet or more, bridges will be used.

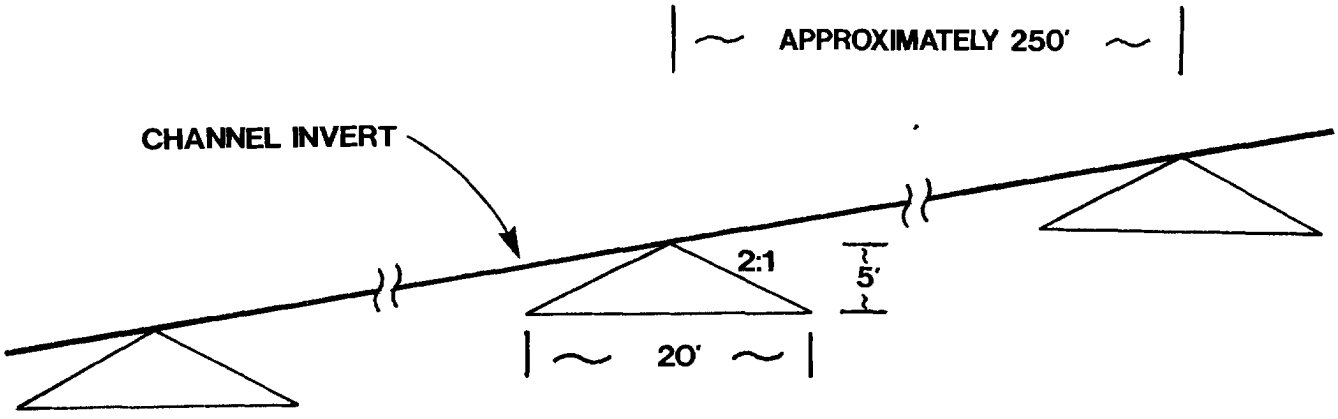


LEGEND | FIGURE REPRODUCED FROM BUREAU OF RECLAMATON'S "HYDRAULIC DESIGN OF STILLING BASINS AND ENERGY DISSIPATORS"

APPLE VALLEY MASTER PLAN OF DRAINAGE

CURVE TO DETERMINE MAXIMUM STONE SIZE IN RIPRAP MIXTURE
FIGURE 12.1

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(714) 261-2222



LEGEND

CHANNEL INVERT

RIPRAP BOTTOM CONTROL

APPLE VALLEY MASTER PLAN OF DRAINAGE

TYPICAL BOTTOM CONTROL

FIGURE 12.2

WILLIAMSON & SCHMID
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IRVINE, CALIFORNIA 92714
(714) 261-2222

For concrete box culverts the cross-sectional flow area of the culvert is assumed to be equivalent to the cross-sectional flow area of the channel downstream of the culvert. Both culvert and channel have the same freeboard requirements. The width to height ratio of each barrel is 1.5:1 and the maximum width of one barrel is 14 feet. The length of the box is 40 feet wider than the street width or 84 feet in total length. Wall thickness for box culverts is 1 foot. Structural concrete is estimated to be $450.00 per cubic yard.

Pavement removal and resurfacing must also be considered. The length of street needing pavement removal and resurfacing is the box width plus 100 feet on each side of the box. Pavement removal and resurfacing is $1.50 per square foot ($0.25 per square foot for removal and $1.25 per square foot for resurfacing).

Where bridges are necessary, concrete will be used for construction. The length of the bridge is the channel top width and the width of the bridge is the street width. The cost for bridge construction is $65.00 per square foot regardless of dimensions or size of bridge.

It should be noted that excavation costs for the culverts are included in the excavation cost of the open channel.

12.5.6. Fencing Costs

For safety reasons, all channels are assumed to be fenced. A cost of $7.50 per linear foot per side of channel is assumed.

12.5.7. Miscellaneous Costs

Several other costs have been analyzed and are included in the previously discussed costs.

1) Transition structures for the change in channel dimensions are included in the channel cost. It is also noted that at the dry lake there are large transitions where the water must be slowed before entering the dry lake. It is possible that the wide channels entering the dry lake may be downsized, however a detailed hydraulic analysis would be required which is beyond the scope of this study.

2) Outlet structures, manholes, junction structures, etc. are included in the variable (5%-20%) contingency added to RCP costs.

3) Where a lateral channel joins an unlined larger channel with a lower invert, an apron will be required to eliminate undercutting. The cost for this has not been included because of its minute effect on the overall system cost.

4) Dry lake inlets (see Fig. 9.5) are required to slow velocities to 3 fps. The cost for the inlets is included in the levee cost for the most downstream channel section.

6) At the upstream end of all facilities the water will have to be captured in some manner. It is assumed, unless otherwise noted, that local facilities will convey the water to the uppermost reaches of all improved facilities, therefore no additional cost has been associated with the capturing of water.

12.6. Detention Basin Costs

Detention basins are analyzed for the Apple Valley Dry Lake watershed in order to determine the cost effectiveness of these facilities. The six largest channels for Alternative A1 were designated as having the most potential for cost savings with detention.

In the analysis of each basin four alternates were considered based on various flowby conditions for the Q_{100} (which was taken from the unit hydrograph for that area). The basin requirements were based on 75, 50, 25, and 0 percent of the Q_{100} to flowby (or remain in the channel).

The channel flow was routed through a flowby basin model using the FLOOD program (AES) to obtain new peak flow rates for the downstream reaches. The channels were sized using the same criteria used in Alternative A1 with the new peak flow rates. A summary cost table (Table 12.2) was prepared to compute the potential cost savings that would result in downsizing the channels (armoring, culverts, right-of-way, and excavation). The cost of the basins include only right-of-way and excavation. No outlet structures, emergency spillways, or other facilities were considered in the costs. Each basin is assumed to be 10 feet deep except the basin in line E-04 which is 5 feet deep, due to its flat slope. All basins are also assumed to have vertical sidewalls (for sizing purposes only) and the right-of-way is assumed to be the surface area of the basin.

In the South Community of the watershed, several combinations of each of the basins were analyzed in addition to a single basin on each line. This was done in order to determine the effectiveness of several smaller basins versus one large basin.

A detailed analysis and cost estimate of the options which appeared to be the most cost effective is contained in the Technical Appendix.

12.7. Contingencies

After detailed cost estimates were prepared for each facility a cost for contingencies was added. The amount added to each facility cost was an additional 30-percent of that cost. The contingencies anticipated and covered in this cost are for engineering, inspection, utility relocations, and soils testing. In addition to the 30-percent contingency, two additional contingencies should be considered which can be deleted at the District's discretion. The first is a 5-percent contingency for facility maintenance and the second is a 5-percent contingency for M.P.D. updates. These two 5-percent contingencies have been omitted in the cost estimates presented in this report.

Table 12.2.

SUMMARY OF DETENTION BASIN ANALYSIS

LINE	BASIN LOCATION (NODE)	FLOWBY	STORAGE (ACRE FEET)	SAVINGS (DOLLARS)
E-01	5128	.75	46.796	1,063,985
E-01	5128	.50	208.531	1,448,275
E-01	5128	.25	588.706	123,675
E-01	5128	0	2,248.899	-4,467,975
E-04	5445	.75	13.868	-176
E-04	5445	.50	50.227	347,900
E-04	5445	.25	131.645	234,120
E-04	5445	0	800.068	-4,163,418
N-02	3826	.75	17.217	46,587
N-02	3826	.50	62.327	99,106
N-02	3826	.25	149.267	-495,481
N-02	3826	0	701.152	-1,314,094
N-04	3743	.75	54.756	2,229
N-04	3743	.50	133.546	90,198
N-04	3743	.25	251.934	-6,236
N-04	3743	0	752.141	-2,248,587

Table 12.2. (CONT.)

SUMMARY OF DETENTION BASIN ANALYSIS

LINE	BASIN LOCATION (NODE)	FLOWBY	STORAGE (ACRE FEET)	SAVINGS (DOLLARS)
S-01	6686	.75	57.477	3,898,399
S-01	6686	.50	237.280	5,223,368
S-01	6686	.25	608.738	7,148,575
S-01	6686	0	2,699.817	-332,387
S-02/S-06	7004/7156	.75	8.449/7.179	2,775,578
S-02/S-06	7004/7156	.50	42.820/37.919	3,715,503
S-02/S-06	7004/7156	.25	110.364/102.152	5,221,355
S-02/S-06	7004/7156	0	657.185/624.557	1,780,042
COMBINATION OF BOTH BASINS S-01 & S-02, S-06				
S-01	7185	.75	-	4,725,327
S-01	7185	.50	-	7,961,571
S-01	7185	.25	-	11,813,980
S-01	7185	0	-	479,605
ADDITION OF UPSTREAM BASIN TO BOTH BASINS S-01 & S-02, S-06				
S-01	6284	.75	30.131	6,350,896
S-01	6284	.50	95.665	12,184,055
S-01	6284	.25	236.116	19,046,609
S-01	6284	0	1,479.286	3,361,296

CHAPTER 13

EAST COMMUNITY M.P.D.

13.1. Topography

The east community is generally defined as the area of the Apple Valley Dry Lake watershed lying to the east of the dry lake. The area encompasses approximately 30 square miles or 31 percent of the total Apple Valley Dry Lake watershed.

The majority of the area is composed of steep mountains with incised flow paths. The remainder of the area mainly consists of the gently sloping valley floor. The Granite Mountains form the south and east watershed boundaries of the area, while Fairview Mountain defines a portion of the boundary to the north. The Fairview Valley Dry Lake is also just north of the watershed.

The canyons south of Red Top Mine, in Fairview Mountain, open to a wide alluvial fan on which the flow path is indeterminate. The runoff from these canyons could flow into either Fairview Valley Dry Lake or Fairview Wash. Because of this uncertainty of the watershed boundary, the area is assumed to drain into the Apple Valley Dry Lake watershed.

13.2. Land Use

The existing land use consists mainly of sparse residential development and a few mines in Fairview Mountain. Currently most of the residences lie on the south side of the valley between the Fairview and the Granite Mountains and are approximately evenly dispersed between the base of the surrounding hills and the valley floor.

The General Plan land use dictates that sparse residential development will continue as the predominate land use. Approximately 60 percent of the area is preserved for rural conservation and 1 D.U./20 Ac. Rural Conservation allows 1 D.U./40 Ac and is targeted for the hills. Most of the remaining area is zoned for either 1 D.U./2.5 Ac or 1 D.U./Ac. Figure 7.1 shows the land use as depicted on the general plan.

13.3. Hydrologic Characteristics

The 1986 Soil Conservation Service (SCS) soil survey of the study area generally depicts the hills on the perimeter of the catchment as group D (high runoff potential) and the valley as groups A and B (low runoff potential). In the course of this study it was recognized that the relatively pervious valley area will generate little runoff (with sparse residential development) in comparison to the runoff originating in the hills. The steep, incised watercourses of the hills, for the most part, give way to less discernible flow paths on the valley floor. Most flow paths disappear soon after they leave the hills. For large storms, therefore, much of the runoff will be in the form of sheet flow.

The underpinnings of the "fair share" concept is based upon acreage fees that vary depending upon runoff potential. This runoff potential, in turn, is related to the impervious area fraction. The resulting acreage fee is then shared among the dwellings occupying the acre. For example, a 4 D.U./Ac density has twice the acreage fee as a 1 D.U./Ac density; however, because 4 dwellings "share" the 4 D.U./Ac fees, each dwelling in the 4 D.U./Ac density pays only one-half the fees of the 1 D.U./Ac dwelling.

13.4. Existing Flood Control Facilities

There are no significant man made flood control facilities in the East Community. The natural drainage system consists of one major watercourse (Fairview Wash) in the northern portion and several watercourses in the southern portion that become ill-defined on the valley floor. On a large scale, the cross section for Fairview Wash is broad based and well defined in the middle and upstream reaches (east of Japatul Road). Channel side slopes for these reaches range from 10:1 to 70:1 with channel depths ranging from 5 feet to over 20 feet. Because the middle and upstream channel reaches are broad based, there is a high probability of the thalweg laterally migrating in these reaches. However, the lateral migration would be contained within the broad channel base. The downstream reach (east of Joshua Road) of the watercourse becomes ill-defined and finally indistinguishable as it enters the dry lake. The potential for lateral migration would, therefore, be high for a major storm event.

13.5. Flood Control Alternatives

13.5.1. Introduction

Chapter 11 describes the intent of each of the three alternatives studied, as well as criteria used in the development of the alternatives. The two-fold purpose of this section is to discuss the recommended alternative plan in detail, and to compare the costs of the three alternatives.

13.5.2. Natural Watercourses

Since the areas zoned for 1 D.U./2.5 Ac and less will not have significant development, it is proposed in this Master Plan of Drainage (MPD) not to improve the existing natural drainage paths through these areas. This policy applies to each alternative plan. Therefore, some drainage areas have one plan repeated for all three alternatives. Such areas include the mountains and foothills described in Chapter 10, the drainage area upstream of Redwing Road for Facility E-01 (Fairview Wash) and its tributaries, and the drainage area south of Esaws Avenue at Oden Road for Facility E-04 and its tributaries.

13.5.3. Preliminary Cost Comparison of Alternatives

The preliminary cost comparison of the three alternatives is not intended to be comprehensive. Rather, those costs identified as being the most basic costs of construction are used. Costs for armoring channels, culvert costs, and fencing costs were not included since they could not be known without a detailed cost estimate of each alternative. This will affect the cost comparison in the following way: Alternatives A1 and A3, which contain significantly more channels than Alternative A2, will underestimate the actual costs more than alternative A2 will (for a description of alternatives see Chapter 11). For preliminary comparison purposes, however, this level of detail is adequate.

The preliminary cost comparison, then, is based on the following criteria.

Channel costs include a cost for excavation plus right-of-way.

(1) Excavation is $3.00 per cubic yard.
(2) There is no off-site removal of dirt.
(3) Land value is $15,000.00 per acre.
(4) Channels are unlined, unfenced, and without culverts or bridges.
(5) Right-of-way needed is the top width of the channel plus a 15-foot lane if the channel top width is less than 15 feet, or the top width of the channel plus two 15-foot lanes if the channel top width is 15 feet or more.

Pipe costs are based on unit costs as outlined in Chapter 12 (Table 12.1). The total channel and pipe costs are summarized in Table 13.1 (see Technical Appendix for detailed analysis).

Table 13.1.

EAST FACILITY PRELIMINARY COST SUMMARY

STUDY DESCRIP-TION	CHANNEL COST (DOLLARS)	PIPE COST (DOLLARS)	TOTAL COST (DOLLARS)
A1	7,902,900	6,026,700	13,929,600
A2	3,550,700	43,118,875	46,669,575
A3	7,875,450	6,472,200	14,347,650

These preliminary costs were used to determine the recommended project alternative for which detailed cost estimates were prepared (see Volume II).

From this preliminary cost comparison, it is evident that Alternative A2 need not be considered further, as its total cost is substantially higher than both Alternatives A1 and A3. Additionally, the channel costs not considered in this comparison would not nearly make up the difference. The difference in cost between Alternatives A1 and A3 is small enough that one should not be chosen over the other based on this cost comparison. The recommended flood control plan, Alternative A1, was chosen over Alternative A3 because the general plan land use is established, whereas the ultimate projected land use is an uncertain prediction with a scope of about 50 years.

13.5.4. Description of Facilities

The drainage plan presented as Alternative A1 is the recommended drainage plan. This alternative attempts to maintain natural drainage alignments wherever feasible. Improved earthern channels are generally used unless flow velocities require the channels to be lined with riprap or concrete (see chapter 12). Underground storm drains are, for the most part, not used for regional or secondary facilities, only local systems.

Eleven regional channels are proposed for the East Community, although three will remain entirely unimproved and portions of E-01 and E-04, as stated earlier, will also remain unimproved. Only E-01, E-02, and E-04 outlet into the dry lake. For all dry lake inlets, the wide channel sections shown in this MPD are based upon normal depth for the flat slopes encountered. It is noted that it is highly likely that smaller channel sections may be used which utilize the high velocity flows developed from the steep channel system upstream. A detailed hydraulic analysis is necessary in order to ascertain the most economically feasible channel section for the dry lake region, and is beyond the scope of this study. Because the water surface profiles near the dry lake are dependent upon the dry lake land use implementation, a wide channel section is used as a maximum case for right-of-way costing purposes. The plans and profiles, along with the cost estimates, for the Alternative A1 East facilities are contained in Volume II of this report.

The following is a summary of the regional facilities and their tributaries. A brief description of the facility's drainage area, inlet and outlet conditions, and peak flow rates are discussed first. Then the channel is described by following its alignment from its outlet to its upstream origin, identifying major changes in channel sections, confluences with secondary or other regional facilities, and other distinct features of the channel.

E-01 (Fairview Wash) and tributaries. Runoff generated from the Granite Mountains in the east and south, and from Fairview Mountain in the north, flows into the southern portion of the Fairview Valley. This runoff is contained within a broad flood plain with side slopes of approximately 60 to 1. The thalweg of this broad flood plain is known as Fairview Wash. At the E-01 channel outlet at the dry lake, the 100-year peak flow rate is approximately 8500 cfs, and the total area contributing to this runoff is 20.2 square miles.

E-01 outlets to the dry lake appproximately 1200 feet west of Joshua Road and 1000 feet south of Zuni Road. At the outlet E-02 confluences with E-01. From the outlet, E-01 follows a generally eastward alignment upstream through the natural drainage course. The channel is RSP lined with a base of 550 feet and is completely leveed to the dry lake high water line (HWL) which is 200 feet west of Joshua Road. The channel then transitions to an excavated section and is fully excavated 1200 feet east of Joshua Road. In this stretch the channel base is 550 feet and the channel is RSP lined. Secondary Facility E-01-01 confluences with E-01 approximately 300 feet east of Joshua Road. From the end of the dry lake levees (1200 feet east of Joshua Road) to the channels confluence with E-01-02, which is 950 feet east of Shirwaun Road, the channel remains RSP lined, however, the base transitions to 70 feet. From the E-01/E-01-02 confluence upstream flowing southeast of the Japatul Road/Zuni Road intersection to the E-01/E-03 confluence, located 1350 feet east of Japatul Road, the channel is concrete lined with a base of 30 feet and a height of 10 feet. The channel continues with the same dimensions to the E-01/E-01-03 confluence, located approximately 1300 feet west of Redwing Road at Little Teepee Road (projected). Upstream of this confluence to 550 feet east of Redwing Road, the channel remains concrete lined, however, the base is reduced to 25 feet. Upsteam of Redwing Road, the channel is contained in a SBCDE for the 550 feet to the end of the improved channel section.

Because the peak flow rate in the reach upstream of Redwing Road is significant and the channel is proposed to remain unimproved, a flood plain was developed to determine safe building setbacks in the area zoned as 1 D.U./2.5 Ac. The resulting flood plain would be almost 600 feet wide without consideration of debris and up to 750 feet wide if a bulking factor of 2 is included (see fig. 13.1). The natural alignment of the wash is maintained for the proposed channel, which will collect the runoff by means of an earthen levee on each side at the upstream portion of the improved channel. The proposed containment levees will be constructed at an angle so as to direct flows toward the improved channel section.

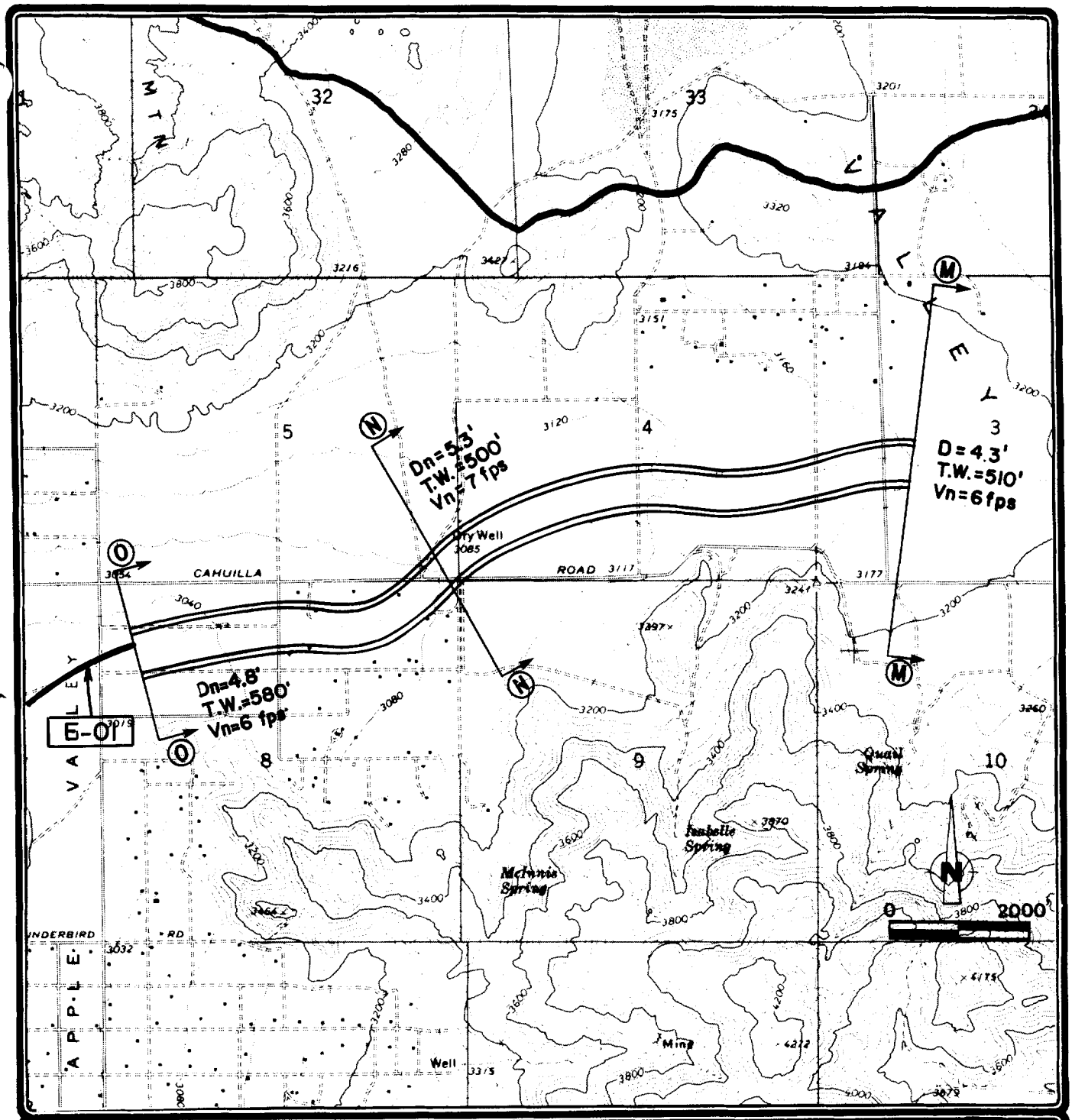
Several designated Future San Bernardino County Drainage Easements exist upstream of the flood plain area as shown on Fig. 13.1. These easements could be used to contain natural flows if needed in the future, but are not included in this plan.

E-02 and tributaries. E-02 confluences with E-01 at the outlet to the dry lake. Runoff in E-02 is generated from Fairview Mountain to the north of Waalew Road. The runoff will be collected into a concrete channel by means of an earthen levee along the north side of Waalew Road, east of Tokata Road, as well as a short reach of levee running north on the west side of the natural watercourse. The 100-year frequency runoff is approximately 1400 cfs, and the tributary area is 1.5 square miles at its confluence with E-01.

From its confluence with E-01, E-02 generally parallels Joshua Road to the north. The channel is leveed with a base of 80 feet to Keator Road (projected). The leveed section transitions to an excavated section between Keator Road and Resoto Road. The channel continues north parallel to Joshua Road then northeast to the Joshua Road/South Road intersection. In this reach the channel has riprap lining, a base of 15 feet and a height of 7 feet. Also in this reach at Cahuilla Road, E-02-01 confluences with E-02. From the Joshua Road/South Road intersection northeast to Waalew Road, the channel is concrete lined with a base of 4 feet and a height of 6 feet. As discussed earlier, containment levees will be needed at the upstream end to channelize the flows at the inlet.

E-03 and tributaries. The E-03 channel drains the south portion of Fairview Mountain. The 100-year peak flow rate is 836 cfs for the entire channel. E-03 confluences with E-01 approximately 1200 feet east of Japatul Road. For a reach of 750 feet to the north, the channel is riprap lined and has a base of 15 feet. At the upstream, secondary facilities E-03-01 and E-03-02 confluence to form E-03.

E-04 and tributaries. Runoff conveyed by E-04 originates in the western portion of the Granite Mountains and the Deadman Hills. The runoff is channelized just north of Esaws Avenue, approximately 1600 feet east of Japatul Road. A levee running southeast from the channel inlet for approximately 500 feet and another levee along the east side of Redwing Road from Yucca Loma Road 1300 feet north (not shown on plan) will ensure channelization of the runoff. The earthen levee along Redwing Road is proposed because there is a good possibility that the flow path could migrate south, flowing parallel to Yucca Loma Road and into the E-06 system. At its outlet into the dry lake, E-04 has a 100-year peak flow rate of approximately 5700 cfs with 10.4 square miles contributing.



LEGEND	INNER BOUNDARY: WITHOUT BULKING OUTER BOUNDARY: WITH 100% BULKING	Dn = NORMAL DEPTH T.W. = TOP WIDTH Vn = NORMAL VELOCITY	WITHOUT BULKING

APPLE VALLEY MASTER PLAN OF DRAINAGE

APPROXIMATE 100-YEAR FLOODPLAIN BOUNDARIES FOR LINE E-01 FIGURE 13.1

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E-04 outlets to the dry lake approximately 350 feet northwest of its crossing of Candlewood Road. The channel is RSP lined with a base of 300 feet and is fully leveed. At Candlewood Road, E-05 confluences with E-04. The channel continues in a southeast direction to 400 feet north of Klickitat Avenue where E-04-01 confluences with E-04. In this reach, the channel has a base of 230 feet and is an improved earth section. The channel continues with the same dimensions in the same direction to 400 feet south of Klickitat Avenue where E-04-02 confluences E-04, and on to Ramona Avenue where E-04-03 confluences with E-04. The channel remains fully leveed with the same dimensions to 600 feet north of Esaws avenue where E-06 confluences with the channel. At this point the channel turns and heads east paralleling Esaws Avenue. From the E-04/E-06 confluence to 400 feet east of Shirwaun Road, the channel transitions from a leveed section to an excavated section with the same dimensions. After the transition, the channel is RSP lined upstream to the end of the improved section, 1600 feet east of Japatul Road. For this entire reach, the channel has a base of 20 feet and a height of 9 feet. As discussed previously, a containment levee is required at the upstream portion of this facility.

E-05 and tributaries. E-05 conveys runoff emanating from the Granite Mountains between Thunderbird Road and Standing Rock Avenue. The channel confluences with E-04 at Candlewood Road. The 100-year peak flow rate is approximately 3800 cfs with a tributary area of 4.0 square miles at the confluence.

From its confluence with E-04 at Candlewood Road to Joshua Road, the channel is fully leveed with RSP lining and a base of 240 feet. From Joshua Road to 400 feet west of Shirwaun Road, the channel transitions to an excavated section with the same dimensions through the transition. From this point to Shirwaun Road where E-07 confluences with E-05, the channel is RSP lined with a base of 30 feet and a height of 10 feet. The channel continues in a generally easterly direction to Oden Road 200 feet south of Thunderbird Road, where E-05-02 confluences with E-05. The channel continues to be RSP lined but with a base of 20 feet. In the section E-05-01 confluences with E-05 at Japatul Road. From Oden Road to the Burns Drive/Old Mine Road intersection, where E-05-03 confluences with E-05 the channel is concrete lined with a base of 15 feet and a height of 7 feet. The channel remains concrete lined with a base of 10 feet to Via Vista Road where E-08 confluences with E-05. From the E-05/E-08 confluence, 950 feet southeast, the channel is concrete lined with a base of 4 feet. The upstream reach of 500 feet continues to have concrete lining with a base of 2 feet.

E-06 and tributaries. E-06 conveys runoff originating from the Deadman Hills. It confluences with E-04 750 feet north of Esaws Avenue and 500 feet west of Shirwaun Road. The 100-year peak flow of E-06 at the confluence is approximately 1600 cfs.

From the E-04/E-06 confluence, the channel heads south with a base of 90 feet and leveed sideslopes to 150 feet north of Cherokee Avenue where E-06-01 confluences with E-06. The channel continues south to 150 feet north of Yucca Loma Road where it confluences with the E-06-02. The channel is still leveed

with a base of 70 feet. The channel then turns and parallels Yucca Loma Road to the east. For the next 1800 feet upstream, the channel transitions to an excavated section. In this reach the channel has a 50-foot base and is an improved earth section. The remaining 750 feet upstream to Japatul Road is riprap lined with a base of 15 feet and a height of 7 feet. To the east of Japatul Road is secondary Facility E-06-04 which also parallels Yucca Loma Road.

E-07 and tributaries. Runoff conveyed in E-07 originates in the Granite Mountains and Japatul Hills south of Standing Rock Avenue. E-07 confluences with E-05 at Shirwaun Road. The 100-year peak flow rate in E-07 at the confluence is approximately 1200 cfs. E-07 heads in an easterly direction for its entire reach to Barbara Lane. The channel is riprap lined with a base of 15 feet, and confluences with E-07-01 at Japatul Road. At Barbara Lane, E-07-02 and E-07-03 confluence to form the upstream reach of E-07 which has a 100-year peak flow rate of 933 cfs at that point.

E-08 and tributaries. E-08 conveys runoff emanating from the Granite Mountains between Thunderbird Road and Standing Rock Avenue. The channel confluences with E-05 at Via Vista Road just east of Lillian Way. The 1750-foot reach of channel is concrete lined with a base of 2 feet and heads in an easterly direction. The 100-year peak flow rate for E-08 is 752 cfs. Upstream of improved Facility E-08 is secondary Facility E-08-01 which also follows the natural drainage path.

13.5.5. Detention/Conveyance Option

Two detention basins were analyzed as possible flood control measures. One basin would be located along Facility E-01 at the beginning of the improved section (by Redwing Road). The other basin analyzed would be located at the confluence of Facilities E-04 and E-06. Both basins were analyzed as flowby basins for simplicity of analysis. The basins and channels were analyzed for flowbys of 0, 25, 50, and 75 percent.

Costs for the downsized channels were calculated using the same criteria established in chapter 12. Detention basin costs included excavation and right-of-way only. Costs for such items as flowby structures, basin outlets, and emergency spillways would have to be determined at the design phase, so these costs are not included. One should keep in mind that any potential savings with the detention/conveyance option will be lessened and possibly even negated by these items.

From the analysis of the various flowbys, the 50 percent flowby option was the most economical for both basins, with cost savings of $1,960,000 for line E-04. The basin for line E-01 is not economically desirable because the cost savings would be negated by the costs not included in this analysis (see Technical Appendix for detailed calculations).

13.6. Recommendations

13.6.1. Interim Condition

Existing development within the East Community is sparce; thus an appropriate interim drainage plan should be implemented. This interim drainage plan should be consistent with the recommended drainage plan (Alternative A1), so that as development occurs, the recommended facilities may be constructed. The drainage plan recommended for the interim condition is, therefore, presented below.

Hydrologic data in and around Apple Valley Dry Lake is very lacking. There is one recording rain gage in neighboring Victorville, and one stream gage on the upper Mojave River. Several recording rain gages and stream gages should be placed along Fairview Wash. If monitored and maintained properly, these gages will yield valuable information about rainfall and loss rates. Such data, when collected over several years, could warrant changes in this study that would either reduce the proposed facility sizes and, thus, the costs, or show some inadequacies of the facilities. Debris yields from the surrounding mountains and foothills should be monitored and the pertinent data used in calibrating design criteria for debris basins.

As discussed previously, most flow paths disappear on the valley floor. One consequence of this is that homes have been built within flood plains. Future development should, as a requirement, meet certain drainage criteria prior to issuance of building permits. Building pads should be two feet above the existing ground elevation with drainage swales graded around the buildings, unless they can be shown to be out of the 100-year flood plain. Because of the possibility that flow paths could migrate laterally during a storm event, building should not be permitted within 500 feet of Fairview Wash or within 200 feet of all other known water courses. Additionally, building should not be permitted within 50 feet of anticipated drainage rights-of-way as determined in this study. The appropriate entities (i.e., County, City, or District) should begin to purchase rights-of-way and accept dedications as development occurs, where feasible, for the proposed facilities.

13.6.2. Long Range Recommendations

From the detention basin analysis, the proposed basin for Facility E-04 appears to present a cost savings to the E-04 system. This basin should, therefore, be considered in the design phase of the system. Debris basins should be designed and constructed as development in the valley increases. If, in the interim, debris flows are monitored, the data may be used in the design of some of the basins. Particularly, one large basin is envisioned upstream of Facility E-06, and the combination of hydrologic data and debris production data could reduce the cost of the basin significantly. Certain areas will most likely need debris basins in the near future depending on the pace at which development progresses. Basin sites should be purchased upstream of proposed Facilities E-02, E-03-01, E-05, E-05-03, E-05-04, and E-08-01 in anticipation of their need.

CHAPTER 14

NORTH COMMUNITY M.P.D.

14.1. Topography

The north community is generally defined as the area of the Apple Valley Dry Lake watershed lying to the north of the dry lake. The area encompasses approximately 25 square miles or 26 percent of the total Apple Valley Dry Lake watershed.

Black Mountain defines the boundary to the north, and Fairview Mountain forms the boundary on the east. Bell Mountain, Little Bell Mountain, and Catholic Hill define a portion of the western boundary. In between Bell Mountain and Black Mountain there is no clearly defined ridgeline. Most of the topography is quite flat with no clearly defined flow paths. The transition between the mountains and the valley floor is usually abrupt.

14.2. Land Use

The existing land use consists mainly of sparse residential development with quarries in Black Mountain. Currently, most of the residences are south of Corwin Road.

The General Plan land use dictates that approximately half of the area will remain undeveloped or sparsely developed. Almost a third of the area is zoned for industrial or commercial use. Figure 7.1 shows the land use as depicted on the general plan.

14.3. Hydrologic Characteristics

The 1986 Soil Conservation Service (SCS) soil survey of the study area generally depicts the hills on the perimeter of the catchment as group D (high runoff potential) and the valley as groups A and B (low runoff potential). In the course of this study it was recognized that the relatively pervious valley area will generate little runoff (with sparse residential development) in comparison to the runoff originating in the hills. The steep, incised watercourses of the hills, for the most part, give way to less discernible flow paths on the valley floor. Most flow paths disappear soon after they leave the hills. For large storms, therefore, much of the runoff will be in the form of sheet flow.

14.4. Existing Flood Control Facilities

There are a few existing flood control facilities in the North Community, but they are inadequate, being unlined and undersized. Facility N-01 between Ocotillo Road and Central Road currently exists as an improved earthen channel,

however, some further excavation and concrete lining will be needed. Facility N-02 exists as a shallow earthen channel adjacent to the airport. This channel will also need excavation and concrete lining. Some sections of improved earthen channels exist by Johnson Road east of Hudson Road conveying flow into N-02. Because the area is zoned as 1 D.U./2.5 Ac, no further improvements are recommended unless structures encroach within the floodplains.

14.5. Flood Control Alternatives

14.5.1. Introduction

Chapter 11 describes the intent of each of the three alternatives studied, as well as criteria used in the development of the alternatives. The two-fold purpose of this section is to discuss the recommended alternative plan in detail, and to compare the costs of the three alternatives.

14.5.2. Natural Watercourses

Since the areas zoned for 1 D.U./2.5 Ac and less will not have significant development, it is proposed in this Master Plan of Drainage (MPD) not to improve the existing natural drainage paths through these areas. This policy applies to each alternative plan. Therefore, some drainage areas have one plan repeated for all three alternatives. Such areas include the mountains and foothills described in Chapter 10, the drainage area upstream of the Mojave Northern Railroad for Facility N-04, and the upstream reaches of Facilities N-01, N-02, N-06, and N-07.

14.5.3. Cost Comparison of Alternatives

The cost comparison of the three alternatives is not intended to be comprehensive. Rather, those costs identified as being the most basic costs of construction are used. Costs for armoring channels, culvert costs, and fencing costs were not included since they could not be known without a detailed cost estimate of each alternative. This will affect the cost comparison in the following way: alternatives A1 and A3, which contain significantly more channels than alternative A2, will underestimate the actual costs more than alternative A2 will (for a description of alternatives see Chapter 11). For comparison purposes, however, this level of detail is adequate.

The cost comparison, then, is based on the following criteria.

Channel costs include a cost for excavation plus right-of-way.

(1) Excavation is $3.00 per cubic yard.
(2) There is no off-site removal of dirt.
(3) Land value is $15,000.00 per acre.
(4) Channels are unlined, unfenced, and without culverts or bridges.
(5) Right-of-way needed is the top width of the channel plus a 12-foot lane if the channel top width is less than 15 feet, or the top width of the channel plus two 12-foot lanes if the channel top width is 15 feet or more.

Pipe costs are based on unit costs as outlined in Chapter 12 (Table 12.1). The total channel and pipe costs are summarized in Table 14.1 (see Technical Appendix for detailed analysis).

Table 14.1.

NORTH FACILITY PRELIMINARY COST SUMMARY

STUDY DESCRIP-TION	CHANNEL COST (DOLLARS)	PIPE COST (DOLLARS)	TOTAL COST (DOLLARS)
A1	7,178,500	12,725,850	19,904,350
A2	1,470,850	56,625,100	58,095,950
A3	7,158,750	13,273,350	20,432,100

These preliminary costs were used to determine the recommended project alternative for which detailed cost estimates were prepared (see Volume II).

From this preliminary cost comparison, it is evident that alternative A2 need not be considered further, as its total cost is substantially higher than both alternatives A1 and A3. Additionally, the channel costs not considered in this comparison would not nearly make up the difference. The difference in cost between alternatives A1 and A3 is small enough that one should not be chosen over the other based on this cost comparison. The recommended flood control plan, alternative A1, was chosen over alternative A3 because the general plan land use is established, whereas the ultimate projected land use is an uncertain prediction with a scope of about 50 years.

14.5.4. Description of Facilities

The drainage plan presented as alternative A1 is the recommended drainage plan. This alternative attempts to maintain natural drainage alignments wherever feasible. Improved earthern channels are generally used unless flow velocities require the channels to be lined with riprap or concrete (see Chapter 12). Underground storm drains are, for the most part, not used for regional or secondary facilities, only local systems.

Seven regional channels are proposed for the North Community, although portions of facility N-04 will remain unimproved. Only facilities N-01, N-02, N-04, and N-06 outlet to the dry lake. For all dry lake inlets, the wide channel sections shown in this MPD are based upon normal depth for the flat slopes encountered. It is noted that it is highly likely that smaller channel sections may be used which utilize the high velocity flows developed from the steep channel system upstream. A detailed hydraulic analysis is necessary in order to ascertain the most economically feasible channel section for the dry lake region, and is beyond the scope of this study. Because the water surface profiles near the dry lake are dependent upon the dry lake land use implementation, a wide channel section is used as a maximum case for right-of-way costing purposes. The plans and profiles, along with the cost estimates, for the alternative A1 North facilities are contained in Volume II of this report.

The following is a summary of the regional facilities and their tributaries. A brief description of the facility's drainage area, inlet and outlet conditions, and peak flow rates are discussed first. Then the channel is described by following its alignment from its outlet to its upstream origin, identifying major changes in channel sections, confluences with secondary of other regional facilities, and other distinct features of the channel.

N-00-01 and N-00-02. Secondary Facility N-00-01 drains South Road east of Central Road. From the channel outlet to the dry lake at the intersection of Central Road and Otoe Road, the channel follows a northerly path to South Road. The channel is completely leveed and has base of 8 feet. Upstream of Secondary Facility N-00-01 are local facilities draining to the channel. Secondary Facility N-00-02 drains a small residential tract north of Otoe Road and west of Sago Road. From the outlet to the dry lake, the channel parallels Otoe Road to the west with a base of 20 feet and leveed sideslopes. At 300 feet east of Sago Road, the channel turns to parallel Sago Road to the north. In this reach, the channel has riprap lining, a 20-foot base and transitions to an excavated section. After the turn, the channel continues north with a base of 2 feet, height of 6 feet and riprap lining. At the upstream of Facility N-00-02, local facilities drain into channel.

N-01 and tributaries. Facility N-01 collects runoff from eight different sources in Fairview Mountain, all of which are diffused on the valley floor. The interception of this runoff will provide flood protection for buildings west of the channel and east of Central Road which is zoned for commercial development. The peak flow rate at the N-01 channel outlet at the dry lake is approximately 2700 cfs with 3.3 square miles contributing to the runoff.

From the channel outlet, 1700 feet south of South Road, N-01 is completely leveed with a base of 170 feet with Rock Slope Protection (RSP) until it reaches the dry lake high water line (HWL) which is 650 feet south of South Road. The channel then continues upstream, crossing South Road and turning east to parallel South Road. Through this reach, which continues to Central Road, the channel still has RSP lining while transitioning from a leveed channel to an excavated channel. Upstream of Central Road, the channel is excavated completely. East of Central Road, the channel parallels El Centro Road through an existing improved earth channel and corresponding San Bernardino County Drainage Easement (SBCDE). This existing channel, which continues east to Ocotilla Road, will need to be further excavated and concrete lined to carry the 100-year flows. The ultimate channel section through this reach will have a base of 15 feet and a height of 7 feet. The channel continues with the same dimensions in a northeast direction to 450 feet northeast of the Waalew Road/Mesquite Road intersection. At this location, secondary facility N-01-01 confluences with N-01. The N-01 channel then parallels Mesquite Road and continues north for approximately two miles. Throughout this two mile reach, the channel is designed as an interceptor channel with a containment levee on the west side. Because this channel is designed to intercept sheetflow off of the foothills there is a high probability that debris will accumulate in the channel. Therefore the channel is designed to be itself a debris basin. After major events this channel will require cleaning to insure the protection of properties to the

west of the channel. The channel is designed with enough freeboard (the top of levee is 6 feet above the top of channel) to carry the 100-year flow with the expected amount of debris without overtopping the containment levee. This interceptor channel protects the property west of the channel and east of Central Road which would otherwise be a large alluvial fan subject to unpredictable flow paths. The interceptor channel is concrete lined to 200 feet north of Papago Road where N-01-02 confluences with it. Upstream of the N-01/N-01-02 confluence to Los Padres Road, the interceptor channel is riprap lined with a base of 15 feet, and a height varying from 7 to 8 feet. Upstream of regional facility N-01 is secondary facility N-01-03 which is also an intercept channel for its entire 3150 feet.

N-02 and tributaries. Runoff conveyed by facility N-02 originates from the south side of Black Mountain and from the northeast side of Fairview Mountain. At the N-02 channel outlet at the dry lake, the 100-year peak flow rate is approximately 4600 cfs with 8.7 square miles contributing.

From the channel outlet, which is located 1500 feet south of Waalew Road and 200 feet west of Navajo Road, N-02 is completely leveed with RSP lining and a base of 290 feet until it reaches the dry lake HWL which is approximately 500 feet south of Waalew Road. The channel continues upstream in a northerly direction crossing Waalew Road, where N-02-01 confluences with the channel, to Waladi Road. In this reach the channel transitions from a leveed channel to an excavated channel. From Waladi Road north to 300 feet south of Papago Road where N-03 confluences with N-02, the channel is RSP lined with a base of 35 feet and a height of 10 feet. The channel then continues northeasterly parallel to the Apple Valley Airport on the east side. From Papago Road north to 650 feet north of Los Padres Road, N-02 is contained in a SBCDE which varies in width from 460 to 680 feet. There is an existing shallow channel which is undersized for the 100-year flows. Through this entire reach the channel is concrete lined with a base of 20 feet and a height of 8 feet. N-02 confluences with N-02-02 at Corwin Road (projected), with N-02-03 at Gustine Road (projected), and with N-02-04 650 feet south of Los Padres Road (projected) through a SBCDE. The channel then follows a more natural flowpath upstream to the northeast. N-02 continues to be concrete lined with a base of 20 feet and height of 8 feet to its intersection with Central Road, 1050 feet south of Johnson Road. The channel continues to follow the natural flow path crossing Johnson Road 650 feet east of Central Road to approximately Candlewood Road (projected) with concrete lining, a base of 15 feet and a height of 8 feet. From this point, the natural alignment moves upstream in an easterly direction with riprap lining and a 20-foot base to Hudson Road. From Hudson Road the channel follows a defined natural drainage course (NDC) with a base of 20 feet and riprap lining. The channel then turns to the northeast following the NDC to the Mojave Northern Railroad with a base of 15 feet and riprap lining. At the railroad, there is an existing culvert which conveys accumulated flows through the tracks, however it is undersized. Upstream of the railroad, N-02 continues in a northerly direction with riprap lining and a base of 15 feet for 400 feet. The most upstream reach requires concrete lining because of high velocities and has a base of 6 feet and height of 6 feet. Upstream of Facility N-02 are several unimproved waterways which drain Black Mountain, therefore a debris basin may be needed upstream of the improved channel.

N-03 and tributaries. N-03 conveys runoff generated from the industrial area east of the airport. Facility N-03 confluences with facility N-02 just south of Papago Road. The channel parallels Papago Road approximately 300 feet south of the road. Its entire 2150-foot reach is riprap lined with a base of 15 feet. The 100-year peak flow rate for the channel varies from 792 cfs to 840 cfs. Outletting at the upstream end of N-03 is secondary facility N-03-01 which also parallels Papago Road.

N-04 and tributaries. Facility N-04 conveys runoff from Black Mountain north of the Mojave Northern Railroad. At the N-04 channel outlet at the dry lake, the 100-year peak flow rate is approximately 2700 cfs, and the total tributary area is 7.6 square miles.

From the channel outlet, which is 1650 feet south of Waalew Road to the dry lake HWL located 800 feet south of Waalew Road, N-04 is fully leveed with RSP lining and a base of 180 feet. Continuing upstream in a northerly direction to 150 feet south of Waladi Road, the channel is still RSP lined with a base of 180 feet, however in this reach, N-04 transitions from a leveed channel to an excavated channel. In this reach, N-04-01 and N-04-02 confluence with N-04 300 feet north of Waalew Road. From 150 feet south of Waladi Road north to 500 feet south of Gustine Street, the channel is RSP lined with a base of 20 feet. In this reach, the channel confluences with N-04-03 at Papago Road and with N-04-04 at Falchion Road. The developed channel ends at 500 feet south of Gustine. At this location, an earthen levee will be required to collect flow from the unimproved section of N-04. The levee will parallel Gustine Street 1300 feet to the west of the channel. The channel is then unimproved (zoned 1 DU/2.5 acres) until it crosses Navajo Road, 500 feet north of Johnson Road. At this location, energy dissipators may be required to outlet the flow from the improved channel upstream. The channel continues upstream in a northeast direction to Central Road with RSP lining, a base of 20 feet, and a height of 8 feet. From Central Road, N-04 continues to follow the natural drainage pattern to the Mojave Northern Railroad. In this reach the channel is riprap lined with a base of 15 feet and a height of 8 feet. At the railroad, there is an existing culvert where flows concentrate and thus are channelized into N-04. A debris basin may be needed at the railroad since upstream of the railroad there are many natural flowpaths draining the Black Mountian area.

N-05 and tributaries. N-05 will convey runoff generated entirely from the industrial area north of the airport. N-05 outlets to N-04 just south of Gustine Street where an earthen levee collects flows for N-04. The 100-year peak flow rate of N-05 for its entire length is approximately 1100 cfs. The channel crosses Gustine Street then turns and parallels Gustine Street to the east to Ramona Road (projected) with a base of 20 feet and RSP lining. The channel continues east crossing Navajo Road then turning to parallel Navajo Road to the north. N-05 continues north to 400 feet south of Los Padres Road with riprap lining and a base of 15 feet. Secondary facilities N-05-01 and N-05-02, which is contained within a SBCDE, confluence to form the upstream portion of N-05.

N-06 and tributaries. N-06 conveys runoff generated by Bell Mountain, Little Bell Mountain, and Catholic Hill. At the N-06 channel outlet at the dry lake the 100-year peak flow rate is approximately 1900 cfs, and the total tributary area is 1.6 square miles.

From the channel outlet at South Road and Mountain Road, where N-06-01 confluences with the channel, N-06 heads upstream generally north to the dry lake HWL which is 250 feet south of Huasna Road. In this reach the channel is fully leveed with a base of 120 feet and RSP lining. In this reach, the channel flows through a NDC shown on the tract map of the area. From the dry lake HWL, N-06 parallels Aztec Road with RSP lining and a 20-foot base to the Corwin Road/Papago Road intersection where N-07 confluences with the channel. In this reach the channel transitions from a leveed section at the dry lake HWL to an excavated section 550 feet north of Waalew Road. N-06 continues to parallel Aztec Road for another 950 feet north on Papago Road with riprap lining and base of 15 feet. This reach and the upstream N-06-02 reach both require containment levees on the east side of the channel. The upstream reaches may require debris basins since natural channels are intercepted which drain Bell Mountain.

N-07 and tributaries. N-07 conveys runoff from Little Bell Mountain and Catholic Hill. The channel generally parallels Corwin Road for its entire 900-foot length and outlets to N-06 at the Corwin Road/Papago Road intersection. The channel is riprap lined with a base of 15 feet. The 100-year peak flow rate for the entire reach is 808 cfs. Secondary facility N-07-01 which parallels Corwin Road is the upstream reach of N-07. This secondary facility requires a containment levee along Corwin Road to collect and channelize flows. A debris basin may be required since natural channels are intercepted which drain Catholic Hill.

14.5.5 Detention/Conveyance Option

Two basins were analyzed as possible flood control measures. One basin was analyzed along facility N-02 on the upstream side of Central Road. The other basin was analyzed along facility N-04 at Gustine Street. Both basins were analyzed as flowby basins for simplicity of analysis. The basins and channels were analyzed for 25, 50, 75, and 100 percent peak reductions.

Costs for the downsized channels were calculated using the detailed cost criteria established in chapter 12. Detention basin costs included excavation and right-of-way only. Costs for such items as flowby structures, basin outlets, and emergency spillways would have to be determined at the design phase. Any potential savings with the detention/conveyance option would, therefore, be lessened and possibly even negated by these items. Additionally, use of detention includes increased maintenance costs.

From the analysis of the various peak reductions, the 50 percent reduction option was the most economical for both basins, with cost savings of $100,000 for line N-02 and $90,000 for line N-04. These cost savings are relatively low and would probably be negated by the costs not included in this analysis.

14.6. Recommendations

14.6.1. Interim Condition

Existing development within the North Community is sparce; thus an appropriate interim drainage plan should be implemented. This interim drainage plan should be consistent with the recommended drainage plan (alternative A1), so that as development occurs, the recommended facilities may be constructed. Interim detention facilities may be needed to mitigate effects of development, but are not included in this plan.

As discussed previously, most flow paths disappear on the valley floor. One consequence of this is that homes have been built within floodplains. Future development should, as a requirement, meet certain drainage criteria prior to issuance of building permits. One strategy is to require building pads to be two feet above the existing ground elevation with drainage swales graded around the buildings, unless they can be shown to be out of the 100-year floodplain. Because of the possibility that flow paths could migrate laterally during a storm event, building should not be permitted within 200 feet of all known water courses. Additionally, building should not be permitted within 50 feet of anticipated drainage rights-of-way as determined in this study. The appropriate entities (i.e., County, City, or District) should begin to purchase rights-of-way and accept dedications as development occurs, where feasible for the proposed facilities.

It is noted that hydrologic data in and around Apple Valley is very lacking. There is one recording rain gage in neighboring Victorville, and one stream gage on the upper Mojave River. Several recording rain gages and stream gages should be strategically placed. If monitored and maintained properly, these gages will yield valuable information about rainfall and loss rates. Such data, when collected over the course of a few decades, could warrant changes in this study that would either reduce the proposed facility sizes and, thus, the costs, or show some inadequacies of the facilities. Debris yields from the surrounding mountains and foothills should also be monitored and the pertinent data used in calibrating design criteria for debris basins for this region of San Bernardino County. With the goal of providing 100-year return frequency flood protection at 85-percent confidence, the lack of data is perhaps the source of the most expensive cost items in this MPD.

14.6.2. Long Range Recommendations

Debris basins should be designed and constructed along the west side of Fairview Mountain and the east side of Bell Mountain and Catholic Hill as development in the valley increases. If, in the interim, debris flows are monitored, the data may be used in the design of some of the basins. Basin sites should be purchased, however, in anticipation of their need. Since neither of the detention basins analyzed provided a significant cost savings, no permanent detention facility is recommended with this plan.

CHAPTER 15

SOUTH COMMUNITY M.P.D.

15.1. Topography

The South Community is generally defined as the area of the Apple Valley Dry Lake watershed lying to the south of the dry lake. The area encompasses approximately 37 square miles, or 38 percent of the total Apple Valley Dry Lake watershed.

The Ord Mountains form the southern boundary. Bass Hill and Catholic Hill define a portion of the western boundary. In between Bass Hill and the Ord Mountains the drainage boundary stays close to the escarpment formed by the Mojave River. The eastern drainage boundary from Deadman Point to Roundup Way, lies between Japatul Road and Laguna Seca Drive. Neither the east nor the west boundaries are clearly defined. Most of the topography is quite flat and the transition between the Ord Mountains and the valley is gradual (unlike the hills and mountains in the East and North Communities).

15.2. Land Use

The South Community contains a significant amount of existing development unlike the East and North Communities. The most densely developed areas are west of Central Road between Bear Valley Cutoff and Thunderbird Road and west of Pioneer Road between Tussing Ranch Road and Bear Valley Cutoff. These areas are mostly residential with some commercial development along Bear Valley Road and Highway 18. East of Central Road there is scattered residential development, but it is more densely developed than most of the East and North Communities.

The General Plan land use for the South Community is consistent with existing development. Certain areas along Highway 18 and Bear Valley Cutoff are zoned for commercial or industrial use. Most of the areas west of Central Road and north of Bear Valley Cutoff are zoned for development more dense than one dwelling unit per acre. The area east of Navajo Road and south of Bear Valley Cutoff is zoned almost entirely as one dwelling unit per acre. As development north of Bear Valley begins to reach its capacity, it is expected that the relatively scarce development south of Bear Valley will accelerate. This may give rise to rezoning some areas for more dense development. Figure 7.1 shows the land use as depicted on the General Plan.

15.3. Hydrologic Characteristics

The 1986 Soil Conservation Service (SCS) soil survey of the study area classifies almost all the soil in the South Community as hydrologic soil group B. This includes the Ord Mountains to the south, which are not rock outcroppings like most of the mountains in the North and East Communities. Because the transition from the Ord Mountains to the valley is not abrupt, and the valley floor is not as flat as in the North and East Communities, the flow paths are generally discernible for some distance into the valley. The largest watercourse in the South Community, identified as Mariana Wash, is discernible until it reaches Highway 18.

15.4. Existing Flood Control Facilities

There are no significant man-made flood control facilities in the South Community. A short channelized reach of Mariana Wash (Facility S-01) exists just downstream of Apple Valley Junior High School, south of Nisqually Road. Some culverts and ditches have also been constructed along the A.T.& S.F. railroad and along Highway 18 but they are inadequate for larger storms. The natural drainage system consists of several washes generally running parallel to each other. They become less discernible until they disappear completely, all before reaching Highway 18. Side slopes for these natural "channels" are usually greater than 10 to 1. Because of the relative flatness of the side slopes, and because building has proceeded within or next to these washes, there exists a high potential for extensive flood damage in the South Community. An example of this is the large stadium under construction at the southeast corner of Bear Valley Cutoff and Navajo Road. The stadium is being constructed within Mariana Wash, which has the largest tributary area and thus will convey more runoff than any other wash in the South Community.

15.5. Flood Control Alternatives

15.5.1. Introduction

Chapter 11 describes the intent of each of the three alternatives studied, as well as criteria used in the development of the alternatives. The two-fold purpose of this section is to discuss the recommended alternative plan in detail, and to compare the costs of the three alternatives.

15.5.2. Natural Watercourses

Since the areas zoned for 1 D.U./2.5 Ac and less will not have significant development, it is proposed not to improve the existing natural drainage paths through these areas. This policy applies to each alternative plan. Therefore, some drainage areas have one plan repeated for all three alternatives. Such areas include the mountains and foothills described in Chapter 10 and the area east of Japatul Road and south of Bear Valley Cutoff.

15.5.3. Cost Comparison of Alternatives

The cost comparison of the three alternatives is not intended to be comprehensive. Rather, those costs identified as being the most basic costs of construction are used. Costs for armoring channels, culvert costs, and fencing costs were not included since they could not be known without a detailed cost estimate of each alternative. This will affect the cost comparison in the following way: alternatives A1 and A3, which contain significantly more channels than alternative A2, will underestimate the actual costs more than alternative A2 will (for a description of alternatives see Chapter 11). For comparison purposes, however, this level of detail is adequate.

The cost comparison, then, is based on the following criteria.

Channel costs include a cost for excavation plus right-of-way.

(1) Excavation is $3.00 per cubic yard.
(2) There is no off-site removal of dirt.
(3) Land value is $15,000.00 per acre.
(4) Channels are unlined, unfenced, and without culverts or bridges.
(5) Right-of-way needed is the top width of the channel plus a 12-foot lane if the channel top width is less than 15 feet, or the top width of the channel plus two 12-foot lanes if the channel top width is 15 feet or more.

Pipe costs are based on unit costs as outlined in Chapter 12 (Table 12.1). The total channel and pipe costs are summarized in Table 15.1 (see Technical Appendix for detailed analysis).

Table 15.1.

SOUTH FACILITY PRELIMINARY COST SUMMARY

STUDY DESCRIP-TION	CHANNEL COST (DOLLARS)	PIPE COST (DOLLARS)	TOTAL COST (DOLLARS)
A1	29,229,340	21,202,100	50,531,440
A2	1,754,200	246,656,500	248,410,700
A3	29,452,590	21,830,250	51,282,840

These preliminary costs were used to determine the recommended project alternative for which detailed cost estimates were prepared (see Volume II).

From this preliminary cost comparison, it is evident that alternative A2 need not be considered further, as its total cost is substantially higher than both alternatives A1 and A3. Additionally, the channel costs not considered in this comparison would not nearly make up the difference. The difference in cost between alternatives A1 and A3 is small enough that one should not be chosen over the other based on this cost comparison. The recommended flood control plan, alternative A1, was chosen over alternative A3 because the general plan land use is established, whereas the ultimate projected land use is an uncertain prediction with a scope of about 50 years.

15.5.4. Description of Facilities

The drainage plan presented as alternative A1 is the recommended drainage plan. This alternative attempts to maintain natural drainage alignments wherever feasible. Improved earthen channels are generally used unless flow velocities require the channels to be lined with riprap or concrete (see Chapter 12). Underground storm drains are, for the most part, not used for regional or secondary facilities, only local systems.

Ten regional channels are proposed for the South Community although only three, S-01, S-08, and S-10 outlet into the dry lake. For all dry lake inlets, the wide channel sections shown in this MPD are based upon normal depth for the flat slopes encountered. It is noted that it is highly likely that smaller channel sections may be used which utilize the high velocity flows developed from the steep channel system upstream. A detailed hydraulic analysis is necessary in order to ascertain the most economically feasible channel section for the dry lake region, and is beyond the scope of this study. Because the water surface profiles near the dry lake are dependent upon the dry lake land use implementation, a wide channel section is used as a maximum case for right-of-way costing purposes. The plans and profiles, along with the cost estimates, for the alternative A1 South facilities are contained in Volume II of this report.

The following is a summary of the regional facilities and their tributaries. A brief description of the facility's drainage area, inlet and outlet conditions, and peak flow rates are discussed first. Then the channel is described by following its alignment from its outlet to its upstream origin, identifying major changes in channel sections, confluences with secondary of other regional facilities, and other distinct features of the channel.

S-01 (Mariana Wash) and tributaries. Most of the runoff from the portion of the Ord Mountians within the watershed will be initially conveyed by facility S-01, which collects flow in a broad canyon. Because the South Community is presently densely developed, facility S-01 may severely impact existing development. When the final alignment determination and design are being analyzed, it may be beneficial to evaluate reaches as rectangular concrete channels to reduce impacts on existing development. At the S-01 channel outlet to the dry lake, the 100-year peak flow rate is approximately 9900 cfs with a tributary area of 29.1 square miles.

S-01 outlets to the dry lake approximately 1950 feet north of Standing Rock Avenue and 650 feet west of Candlewood Road. From the outlet to the S-01-01 confluence (200 feet south of Standing Rock Avenue), the S-01 channel is an improved earth section with leveed sideslopes and a base of 550 feet. The channel continues south with the same dimensions to the S-01-02 confluence, 200 feet south of Ramona Avenue, and to the confluence with S-02, 650 feet south of Ramona Avenue. From the S-01/S-02 confluence, S-01 continues upstream in a southwest direction through the Central Road/Esaws Avenue intersection to the S-01-03 confluence, 300 feet southwest of the intersection. In this reach, the

channel has a base of 440 feet and continues as an improved earthen channel. From the S-01/S-01-03 confluence, the channel heads generally south to the S-01-04 confluence 100 feet south of Highway 18 with the same channel section, however, in this reach the channel begins to transition to an excavated section. From this confluence upstream 1100 feet to Powhatan Road, existing development has encroached into the wide channel section. Therefore a concrete rectangular channel has been analyzed to reduce the width of right-of-way required for the channel. In the reach, the concrete section has a base of 210 feet and a height of 6 feet. From Powhatan Road to the S-01-05 confluence 200 feet south of Ottawa Road, the channel is an improved earth section with a base of 440 feet, while continuing to transition to an excavated channel. The channel continues with the same dimensions to 1250 feet southwest of the S-01/S-01-05 confluence where S-01 becomes fully excavated. From this point southwest to Nisqually Road, 300 feet west of Quinnault Road (where S-03 confluences with S-01), the channel is RSP lined with a base of 100 feet. The channel continues in a southwest direction, through Apple Valley Junior High School, to the S-01-06 confluence 200 feet south of Pah-ute Road. Within this reach there is an existing earthen channel within a SBCDE. This existing section will require additional right-of-way, channel excavation and armoring to carry the 100-year flood flows. This section is assumed to have RSP lining and a 100-foot base.

From the S-01/S-01-06 confluence, the channel heads south to the S-01-07 confluence which is 100 feet south of Bear Valley Cutoff. In this reach the channel continues to be RSP lined and the base decreases to 80 feet. S-01 crosses Bear Valley Cutoff approximately 250 feet east of its natural drainage course in order to avoid existing development. South of Bear Valley Cutoff, the channel traverses the newly constructed Apple Valley High School Stadium. At the present time the final alignment through the stadium has not been resolved. Notwithstanding, the channel again heads southwest with RSP lining and a base of 80 feet to the S-01-08 confluence, 300 feet south of Sandia Road. From the S-01/S-01-08 confluence, the channel generally heads south along the west side of Juniper Street to the S-01-09 confluence (150 feet south of Del Oro Road). In this reach the channel continues to have RSP lining with the same dimensions and flows through a SBCDE from Del Oro Road downstream 1100 feet. The channel continues to parallel Juniper Street through the S-01-10 confluence, 200 feet south of Wren Street to the S-04 confluence at Tussing Ranch Road. Through this entire reach the channel is still RSP lined with a base of 80 feet. There is a 300-foot reach of existing SBCDE north of Wren Street. From Tussing Ranch Road the channel follows a well defined drainage course generally to the southeast.

Continuing upstream from the S-01/S-04 confluence the channel confluences with S-01-11 200 feet south of Tussing Ranch Road. In this short reach S-01 has RSP lining and a base of 60 feet. The channel continues with the same dimensions to the S-05 confluence which is approximately 250 feet south of Poppy Road (projected). In this reach the channel crosses the A.T.& S.F. Railroad where there is an existing culvert that will need to be replaced by a larger facility. From the S-01/S-05 confluence, the entire upstream portion of

the channel is concrete lined. From the S-05 confluence upstream through the S-01-13 confluence, 200 feet south of Ocotillo Way, to the S-01-14 confluence, 550 feet west of Mesa Vista Street, the channel has a base of 20 feet and a height of 8 feet. The channel continues generally easterly with the same dimensions to the S-01-15 confluence, 700 feet east of Mesa Vista Street. From the S-01-15 confluence to the S-01-16 confluence, 700 feet west of Central Road, the channel has a base of 15 feet and a height of 8 feet. From the S-01-16 confluence to the S-01-17 confluence, 200 feet west of Bella Vista Street, the channel has a base of 15 feet and the height ranges from 6 to 7 feet. The final upstream reach of S-01 to S-01-18, 250 feet southeast of Bella Vista Street, has a base of 4 feet and a height of 6 feet. At the upstream, secondary facility S-01-S-01-18 flows into S-01, collecting flows from the Ord Mountains.

S-02 and tributaries. S-02 conveys runoff from the low density residential area south of the A.T.& S.F. Railroad and north of Ocotillo Way. The alignment of S-02 closely follows the alignment of the existing wash. S-02 outlets to S-01 650 feet south of Ramona Avenue with a 100-year peak flow rate of approximately 5200 cfs and 9.0 square miles contributing.

From its confluence with S-01, Facility S-02 follows a southerly alignment through the S-02-01 confluence, 200 feet south of Esaws Avenue to the S-06 confluence, 1350 feet south of Esaws Avenue. In this section, the channel is an improved earth section with a base of 290 feet and fully leveed. From the S-06 confluence, the channel continues south to the S-02-02 confluence at Highway 18. This section is still earthen with the base reduced to 160 feet and the channel transitioning to an excavated section. Continuing south S-02 remains earthen to the S-02-03 and S-02-04 confluence 300 feet south of Ottawa Road. The channel continues to transition to an excavated section with a base of 150 feet in this reach. From this confluence to 450 feet north of Nisqually Road, the channel continues to transition to an excavated section with a base of 140 feet. At this point, the channel becomes fully excavated. From here to 200 feet south of Nisqually where S-02-05 and S-02-06 confluence with S-02, the channel requires RSP lining, a base of 20 feet and a height of 10 feet. From the S-02-05 and S-02-06 confluence south to Pah-ute Road, where the channel confluences with S-02-07, the channel continues to be RSP lined with a base of 20 feet and a height of 9 feet. From approximately Minnetonka Road to Pah-ute Road the S-02 channel is contained within an existing SBCDE. From the S-02-07 confluence, through the S-02-08 confluence 300 feet south of Pah-ute Road, to the S-02-09 and S-02-10 confluence 200 feet south of Bear Valley Cutoff, S-02 continues with a base of 20 feet, a height of 9 feet and RSP lining. From this confluence to the S-02-11 confluence 600 feet northwest of the S-02 Joshua Road crossing, the channel continues to have RSP lining and a base of 20 feet, however the height is reduced to 8 feet. From the S-02-11 confluence to the S-02-12 confluence, 200 feet south of Del Oro Road, the channel is riprap lined with a base of 15 feet and a height of 8 feet. From the S-02/S-02-12 confluence through the S-02-13 confuence, 200 feet south of Wren Street, to the S-02-14 and S-02-15 confluence at A.T.& S.F. Railroad, the channel is riprap lined with a base of 15 feet and the height varies from 6 to 7 feet. Secondary facilities S-02-14 and S-02-15 confluence at the A.T.& S.F. Railroad and Tajunga Drive (projected) to form the upstream portion of Facility S-02. At the railroad, there is an existing culvert that will have to be replaced to carry the 100-year flows.

S-03 and tributaries. S-03 will convey runoff from the Ord Mountains, east of the portion that is directly tributary to S-01. At its confluence with S-01, the 100-year peak flow rate is approximately 3800 cfs with 5.5 square miles contributing.

From its confluence with S-01 at Nisqually Road, S-03 parallels Quinnault Road south to the confluence with S-03-01, 200 feet north of Pah-ute Road. The channel is RSP lined with a base of 60 feet and a height of 10 feet. From the S-03-01 confluence continuing south to Sioux Road where S-07 confluences with S-03, the channel has a base of 40 feet and RSP lining. Continuing south, S-03 has RSP lining with a base of 20 feet and a height of 10 feet to the S-03-02 and S-03-03 confluence, 200 feet south of Sandia Road. From this confluence, the channel follows a defined natural alignment to 300 feet south of Del Oro Road where S-03-04 confluences with S-03. In this section, the channel has a base of 20 feet and height of 9 feet with RSP lining. From the S-03-04 confluence southeast to the S-03-05 confluence, 300 feet southeast of Wren Street, the channel has a base of 20 feet, a height of 8 feet, and riprap lining. Continuing upstream, S-03 has a base of 20 feet, a height of 8 feet and RSP lining to the S-03-06 confluence 300 feet south of Tussing Ranch Road. From the S-03/S-03-06 confluence to the S-03-07 confluence, 100 feet south of the A.T.& S.F. Railroad, the channel has riprap lining with a base of 15 feet and height of 8 feet. There is a culvert through the railroad which will need to be replaced with a larger facility to carry the 100-year flows. From the S-03-07 confluence upstream 1300 feet, the channel is riprap lined with a base of 15 feet and the height is reduced to 7 feet. The remainder of the upstream channel is concrete lined. From the S-03-07 confluence upstream to 200 feet south of the power line road, where S-03-08 confluences with S-03, the channel has a 15-foot base and a height of 6 feet. From the S-03-08 confluence upstream to 1100 feet southeast of Ocotilla Way, the concrete section of channel has a base of 4 feet and a height of 6 feet. Upstream of S-03 is secondary Facility S-03-09 which drains a portion of the Ord Mountains.

S-04 and tributaries. Facility S-04 will convey runoff originating in the Ord Mountains, west of the portion that is directly tributary to S-01. At its confluence with S-01, S-04 has a peak flow rate of approximately 2100 cfs with 2.1 square miles contributing.

From its confluence with S-01 at Tussing Ranch Road, S-04 heads southwest 700 feet to the A.T.& S.F. Railroad where S-04-01 confluences with the channel. The channel is RSP lined with a base of 20 feet and a height of 9 feet. The channel then heads south through the S-04-02 confluence, 200 feet south of Poppy Road, to the S-04-03 confluence, 800 feet north of Ocotillo Way, with a base of 20 feet, a height of 9 feet, and RSP lining. The channel continues with the same dimensions to 200 feet south of Ocotilla Way where S-04-04 confluences with S-04. From the S-04/S-04-04 confluence upstream in a southerly direction to the S-04-05 confluence, 650 feet south of Roundup Way, the channel is RSP lined with a base of 20 feet and a height of 8 feet. From the S-04-05 confluence 2050 feet upstream (to approximately the end of Juniper Street) S-04 has riprap lining, a base of 15 feet and a height varying from 6 to 7 feet. At this upstream end, two containment levees are required to channelize

the flows into the improved section. One levee parallels Juniper Street (projected) to the west and the other is positioned at a 90 degree angle to Juniper Street (projected).

S-05 and tributaries. S-05 will convey runoff from single family residential developments south of the A.T.& S.F. Railroad. The channel will have a base of 15 feet and riprap lining for its entire 200-foot length. The 100-year peak flow rate is 781 cfs. Continuing east, upstream of S-05 is secondary facility S-05-01.

S-06 and tributaries. S-06 conveys runoff from the Deadman Hills, and the low density residential area in the eastern portion of the South Community. The proposed alignment of S-06 closely follows the existing alignment of Colony Wash. At its confluence with S-02, S-06 conveys approximately 3100 cfs for the 100-year storm event, with 4.4 square miles contributing.

From its confluence with S-02, 1350 feet north of Highway 18, S-06 heads upstream in a southeasterly direction to 250 feet southeast of the Joshua Road/Yucca Loma Road intersection where S-06-01 confluences with the channel. In this reach the channel is a completely leveed earthern channel with a base of 180 feet. From the S-06-01 confluence the channel heads south to the confluence with S-06-02, and S-06-03, 250 feet south of Ottawa Road, with a base of 160 feet. In this reach the channel transitions from a leveed section to an excavated section. From this point upstream, the channel follows an existing wash. The channel heads generally southeast for 1850 feet to the S-06-04 confluence. In this reach the channel continues to transition to an excavated section, the channel is still an improved earth section with a base of 120 feet. Upstream of the S-06-04 confluence, S-06 is a completely excavated channel section. From the S-06-04 confluence, 1350 feet to the southeast where S-06-05 confluences with S-06, the channel has RSP lining, a base of 20 feet, and a height of 10 feet. Secondry facility S-06-05 collects flow northeast of Highway 18 and south of Nisqually Road (projected) by means of an earthen levee paralleling Highway 18 to the northeast. The channel continues southeasterly to Shirwaun Road (projected) where S-06-06 confluences with S-06. Through this reach the channel has a base of 20 feet, a height of 8 feet and RSP lining. From the S-06-06 confluence through the S-06-07 confluence, 2000 feet upstream, to the S-06-08 and S-06-09 confluence at Japatul Road, the channel is riprap lined with a base of 15 feet and a height ranging from 6 to 7 feet. Secondary facilities S-06-08 and S-06-09 confluence to form the upstream portion of S-06.

S-07 and tributaries. S-07 will convey runoff from residential areas only. The proposed alignment closely follows the existing Del Oro Wash for its entire length. The 100-year peak flow rate for S-07 at its outlet to S-03 is approximately 1600 cfs with 2.4 square miles contributing.

From its confluence with S-03 at Sioux Road, 300 feet west of Quinnault Road, S-07 heads south to 250 feet south of Bear Valley Cutoff where S-07-01 confluences with S-07. In this reach the channel has RSP lining, a base of 20 feet, and a height of 9 feet. From the S-07-01 confluence to the S-07-02 confluence, 250 feet south of Sandia Road, the channel continues with the same dimensions. In this reach there is a SBCDE which will contain the proposed channel from Sandia Road, downstream approximately 800 feet. From the S-07-02 confluence to the S-07-03 confluence, S-07 continues to follow an existing wash. In this reach, the channel is riprap lined with a base of 15 feet and a height of 8 feet. The channel continues to follow the wash to 200 feet southeast of the Wren Street/Manzanita Road intersection where S-07-04 and S-07-05 confluence to form S-07. Through this stretch the channel has a base of 15 feet, a height of 7 feet and riprap lining.

S-08 and tributaries. S-08 conveys runoff from the west portion of the South Community to the dry lake. The watershed is long and narrow and the most dense development is single family homes. At the S-08 channel outlet to the dry lake, the 100-year peak flow rate is approximately 2800 cfs, with 7.4 square miles contributing.

From the S-08 channel outlet to the dry lake, approximately 450 feet north of Thunderbird Road to its confluence with S-08-01, 200 feet south of Thunderbird Road, the channel is RSP lined with a base of 150 feet and is completely leveed. From the S-08/S-08-01 confluence the channel heads south for 1300 feet to the dry lake HWL. In this reach the channel remains completely leveed with a base of 140 feet and RSP lining. From the dry lake HWL the channel begins to transition to an excavated section. From the HWL to Standing Rock Avenue where S-09 confluences with the channel, S-08 is an improved earthen section with a base of 140 feet. The channel continues to transition through the S-08-02 confluence 30 feet south of Standing Rock Avenue to 300 feet southwest of the Ramona Avenue/Navajo Road intersection where S-08-03 confluences. Through this reach the channel continues to be an earth section with a base of 100 feet. From the S-08-03 confluence the channel parallels Navajo Road on the west to 600 feet south of Mohawk Road where the channel becomes fully excavated. From this point the channel continues generally southwest to Yucca Loma Road where S-08-04 and S-08-05 confluence with the channel. In this reach the channel is RSP lined with a base of 20 feet and a height of 10 feet. From this confluence through the S-08-06 confluence, 200 feet south to Rancherias Road to the S-08-07 confluence, 300 feet south of Ottawa Road, the channel continues to be RSP lined with a base of 20 feet and height of 9 feet. From the S-08-07 confluence to the S-08-08 and S-08-09 confluence, 200 feet south of Sitting Bull Road at Tamiani Road, the channel is RSP lined with a base of 10 feet and a height of 8 feet. Upstream, secondary Facilities S-08-08 and S-08-09 confluence to form the S-08 channel.

S-09 and tributaries. S-09 conveys runoff from single family homes in the west portion of the South Community and outlets to S-08 300 feet north of Standing Rock Avenue and 300 feet east of Navajo Road. The 100-year peak flow rate of S-09 at the confluence is approximately 1100 cfs with 2.8 square miles contributing.

From its confluence with S-08, Facility S-09 heads west to the Ramona Avenue/Erie Road intersection where S-09-01 and S-09-02 confluence with the channel. In this reach S-09 is a leveed earthen channel with a base of 60 feet. Continuing west paralleling Standing Rock Avenue on the south, the channel continues to 100 feet southwest of Highway 18 where S-09-03 confluences with the channel. Through this reach the channel continues to be leveed with a base of 50 feet. From the confluence with S-09-03, the channel heads in a southeast direction paralleling Rancherias Road to 300 feet northwest of the Rancherias/Kiowa Road intersection. The channel then turns and parallels Kiowa Road to 200 feet south of Yucca Loma Road where S-09-04 and S-09-05 confluence. Throughout this entire reach, the channel is completely leveed with a base of 50 feet. S-09-04 and S-09-05 confluence to form the upstream portion of S-09.

S-10 and tributaries. S-10 conveys runoff from the area immediately west of the dry lake. At this channel outlet to the dry lake, the 100-year peak flow rate is approximately 1100 cfs with 1.2 square miles contributing. The entire reach has a base of 60 feet and is completely leveed. Downstream of Wichita Road the channel requires RSP lining, while upstream of Wichita Road, the channel will be an earthen section. From the outlet the channel heads in a southwest direction to south of Zuni Road where it turns west to parallel the road. Secondary facilities S-10-01 and S-10-03 confluence to form the upstream portion of S-10.

15.5.5. Detention/Conveyance Option

Three basins were analyzed as possible flood control measures. Two basins were analyzed along facility S-01 both in combination and separately. One basin would be located at the northwest corner of Boxwood Street and Juniper Street, intercepting both facilities S-01 and S-04. The second basin would be located northeast of Apple Valley Junior High School and south of Nisqually Road, intercepting facilities S-01 and S-03. The third basin was analyzed between facilities S-02 and S-06, south of Highway 18. All three basins were analyzed as flowby basins for simplicity of analysis. The basins and channels were analyzed for flowbys of 0, 25, 50, and 75 percent.

Costs for the downsized channels were calculated using the same criteria established in Chapter 12. Detention basin costs included excavation and right-of-way only. Costs for such items as flowby structures, basin outlets, and emergency spillways would have to be determined at the design phase, so these costs are not included. One should keep in mind that any potential savings with the detention/conveyance option will be lessened and possibly even negated by these items.

From the analysis of the various flowbys, the 25 percent flowby option was the most economical for all three basins both separately and in combination with cost savings of $8,506,000 for one basin on line S-01, $2,937,000 for a basin on line S-02 and S-06, $11,021,000 for a combination of these two basins, and $18,992,000 for the system with the addition of an upstream basin on line S-01 (see Technical Appendix for detailed analysis).

15.5.6. Diversion Option

A diversion of runoff to the Mojave River was considered for the area south of the A.T.&S.F. railroad. The original intent of this option was to reduce the tributary area and downsize the regional facilities in the South Community. An additional benefit of a reduced dry lake high water line was also investigated.

The area south of the railroad encompasses approximately ten square miles and is primarily zoned undeveloped and low-density residential (1 D.U./Ac). Several channel alternatives (earthen and concrete-lined) were studied to collect and convey the flows (from the ten square miles) to the Mojave River. A preliminary cost estimate was then prepared for the most efficient of these alternatives (concrete-lined trapezoidal channel). A preliminary cost estimate was also prepared for the channel facilities effected by the diversion of flows both with and without the diversion.

Comparing the savings in the master planned facilities with the cost of the diversion channel, it was determined the diversion to the Mojave River would not be economical. The cost of the concrete-lined diversion channel is significantly greater than the savings in the master planned facilities.

The impact of the diversion on the dry lake was also investigated. The ten squre mile watershed represents approximately ten percent of the total tributary area to the dry lake. The diversion of which would reduce the runoff volume to the dry lake by approximately ten percent, resulting in a drop in the dry lake high water line of less than a foot. The diversion of the ten square miles would also divert potential ground water recharge possibly to a different water table.

Based on the increase in channel cost, the minimal lowering of the dry lake high water line, and potential adverse impact on the ground water table, the diversion to the Mojave River was not considered a desirable alternative.

15.6. Recommendations

15.6.1. Interim Condition

The west half of the South Community already contains a significant amount of development, and new development is proceeding at a rapid pace throughout the South Community. Existing drainage facilities, as discussed earlier in this chapter, are not nearly adequate for major storms, and up to the present time development has occurred without regard for any flood control planning. Because of this, some problems should be anticipated in locating precise alignments for the proposed facilities. Therefore, alignments should be established and rights-of-way purchased for regional facilities as soon as it is feasible. At the same time, however, variations in the proposed alignments should be considered in anticipation of problems acquiring the necessary rights-of-way.

Public awareness of the potential hazard due to flooding should also be continued. Property owners within the 100-year floodplains need to be aware of the inevitable flooding and its consequences. This understanding by the general public is important for the successful implementation of the proposed flood control facilities.

Hydrologic data in and around Apple Valley is very lacking. There is one recording rain gage in neighboring Victorville, and one stream gage on the upper Mojave River. Several recording rain gages and stream gages should be placed strategically. If monitored and maintained properly, these gages will yield valuable information about rainfall and loss rates. Such data, when collected over several years, could warrant changes in this study that would either reduce the proposed facility sizes and, thus, the costs, or show some inadequacies of the facilities. Debris yields from the surrounding mountains and foothills should be monitored and the pertinent data used in calibrating design criteria for debris basins.

As discussed previously, most flow paths disappear on the valley floor. One consequence of this is that homes have been built within floodplains. Future development should, as a requirement, meet certain drainage criteria prior to issuance of building permits. Building pads should be two feet above the existing ground elevation with drainage swales graded around the buildings, unless they can be shown to be out of the 100-year floodplain. Because of the possibility that flow paths could migrate laterally during a storm event, building should not be permitted within 200 feet of all known water courses. Additionally, building should not be permitted within 50 feet of anticipated drainage rights-of-way as determined in this study. The appropriate entities (i.e., County, City or District) should being to purchase rights-of-way and accept dedications as development occurs, where feasible for the proposed facilities.

15.6.2. Long Range Recommendations

From the detention basin analysis, the three proposed basins for the South facilities appear to present a cost savings to the system. The basins should, therefore, be considered in the design phase of the system.

As development south of Roundup Road increases, debris basins should be designed and constructed at the edge of development in the Ord Mountains. If, in the interim, debris flows are monitored, the data may be used in the design of some of the basins. Certain areas will most likely need debris basins in the near future, however, depending on the pace at which development progresses. Basin sites should be purchased upstream of proposed facilities in anticipation of their need.

CHAPTER 16

APPLE VALLEY DRAINAGE FINANCING STUDY

16.1. Introduction

This report presents a strategy for financing the costs of master plan drainage facilities in the Apple Valley area. The strategy focuses primarily on development fees levied against new land uses in the benefit area. According to Assembly Bill 1600, which becomes effective January 1, 1989, municipalities are required "to establish a reasonable relationship between a development project . . . and the public improvement for which the developer fee is charged." This analysis attempts to establish such a "fair share" cost relationship.

16.1.1 Background

A flood control master plan covering a drainage area of over 63,000 acres in the Apple Valley has been prepared by the engineering firm of Williamson and Schmid. Drainage and flood control facilities have been recommended for four distinct drainage areas, including the eastern, northern, and southern portions of the master plan area, as well as the Dry Lake. As shown in Figure 16.1, the South drainage area is the largest of the four areas with nearly 23,000 acres, followed by the East area with over 19,000 acres, the North area with over 16,000 acres, and the Dry Lake with about 3,500 acres.

Recommended facilities include storm drains, culverts, flood channels, levees, and other master plan drainage and flood control improvements required by a 100 year standard project flood. These facilities are regional and secondary in nature; no local systems are included. Facilities located in the East, North, and South drainage areas will provide flood protection primarily for their respective areas. While some recommended facilities are located in the Dry Lake area, these are designed to facilitate drainage flows into the Dry Lake from the other three areas. As a result, the strategy for financing master plan facilities allocates the costs of the facilities solely to land uses outside the Dry Lake.

The total estimated project cost of master plan drainage facilities exceeds $325 million in 1988 dollars. As shown below, included in this figure are over $193 million for the South drainage area, over $71 million for the North drainage area, and nearly $62 million for the East drainage area.

• East	$ 61.5 million
• North	$ 71.2 million
• South	$193.2 million
Total	$325.9 million

APPLE VALLEY MASTER PLAN OF DRAINAGE
0 4000 8000'
LEGEND
ADOPTED WATERSHED BOUNDARY
APPLE VALLEY DRY LAKE ELEVATION 2915
WATERSHED BOUNDARY MAP FIGURE 16.1
WILLIAMSON SCHMID
17782 SKY PARK BOULEVARD
IRVINE, CALIFORNIA 92714
(714) 851-2222
APPLE VALLEY RD.
DEEP CREEK RD.
KIOWA RD.
MESQUITE RD.
BEAR VALLEY RD.
CENTRAL RD.
DEL ORO RD.
TUSSING RANCH RD.
OCOTILLO WAY
JAPATUL RD.
LAGUNA SECA DR.
HIGHWAY 18
SOUTH COMMUNITY
DRY LAKE
NAVAJO RD.
RAMONA AVE.
JOSHUA RD.
YUCCA LOMA RD.
THUNDERBIRD RD.
CAHUILLA RD.
EAST COMMUNITY
WHALEY RD.
CORWIN RD.
PADRES RD.
JOHNSON RD.
QUARRY RD.
NORTH COMMUNITY

Project costs for facilities in the Dry Lake, which total about $14.7 million, have been allocated to the other three drainage areas, and are included in the $325.9 million shown above.

16.1.2 Objectives and Methodology

The current financing study has two major objectives:

- Develop a "fair share" method of allocating the costs of recommended master plan drainage facilities to different land uses within the East, North, and South drainage areas.

- Recommend a financing strategy to be employed by the County and the newly incorporated Town of Apple Valley in paying for the required facilities.

The fair share cost allocation employs the following methodology:

- Within each drainage area, identify the different land uses and acreage ("allocation acreage") to be used in making the cost allocation based on a measure of benefit.

- The measure of benefit selected for use in making the cost allocation is based on the premise that new development should provide for its pro-rata share of drainage flows. Compliance with this premise is assumed to convey the right to develop.

- Allocate the costs of recommended drainage facilities to residential and non-residential land uses generally, based on their pro-rata share of allocation acreage within each drainage area, adjusted for drainage flow equivalency per acre.

- Allocate the costs of recommended facilities for residential land uses to different land use categories based on drainage flow equivalency per dwelling unit.

The financing strategy presented in this report is based on project cost and land use data for buildout of the General Plan provided by Williamson & Schmid. Quantification of existing land uses derives from previous studies by the William C. Lawrence Company, as well as information obtained from Williamson & Schmid. Estimates of phasing of future land use development are based on previous projections for the Apple Valley area by the William C. Lawrence Company and the Continental Telephone Company (CONTEL).

16.1.3 Overview of the Report

Section 16.2 of the report provides a summary of the fair share cost allocations and recommended financing strategy and implementation plan for each drainage area. Section 16.3 provides a more complete description of project costs, as well as an overview of drainage area land uses at buildout of the General Plan. Section 16.4 contains a detailed discussion of the fair share cost allocations within each drainage area. Finally, section 16.5 presents the recommended financing strategy.

16.2. Summary of Financing Recommendations

16.2.1 Fair Share Cost Allocation

The fair share cost allocation used in this study focuses on currently undeveloped land, based on the premise that new land uses should provide for their own drainage flows as a condition of development. In particular, this fair share approach allocates the cost of recommended drainage improvements to new residential and nonresidential land uses, based on their pro-rata share of new "equivalent acres" within each drainage area. Equivalent acres represent "allocation acres" adjusted for drainage flow equivalency. Allocation acres include undeveloped land in all residential and commercial-industrial categories designated by the General Plan.

Fair Share Cost Allocations

Table 16.1 shows the fair share percentages and resulting cost allocations for each of these areas, as well as averages for the master plan area as a whole. About 84 percent of project costs are allocated to new residential land uses in the master plan area as a whole, with about 16 percent being allocated to new nonresidential uses. Fair share allocation percentages vary from one drainage area to another. Residential shares are 100 percent in the East drainage area, where the General Plan does not permit nonresidential development, and 95 percent in the South area. In contrast, the residential share is only about 41 percent in the North area, where the General Plan allows for extensive nonresidential development.

Table 16-2 shows the average cost allocations per acre for each drainage area. The average cost allocation per acre for all drainage areas is $11,185 per acre--$11,546 per residential acre and $9,584 per non-residential acre. Allocated residential costs range from $8,522 per acre in the North to $13,909 in the East. Nonresidential allocations range from zero in the East to $12,410 per acre in the South.

Fair share cost allocations for different residential land uses are based on their pro-rata shares of equivalent dwelling units (DUs) within each drainage area. As shown in Table 16.3, fair share cost allocations per DU for all drainage areas combined average $7,064, ranging from a low of $2,915 per DU for high density residential uses to $9,419 per DU for low density uses. Both the average allocated cost per DU, and the range of per DU costs from one density to another, are different in each drainage area.

16.2.2 Recommended Financing Strategy

General Provisions

- Development fees on new residential and non-residential land uses, based on their pro-rata share of allocation acreage, adjusted for drainage flow and dwelling unit equivalency factors.

TABLE 16.1

APPLE VALLEY DRAINAGE FINANCING STUDY

FAIR SHARE COST ALLOCATIONS BY DRAINAGE AREA

(1988 Dollars)

	Fair Share Percentage	Fair Share Amount
East		
Residential	100.00%	$61,505,990
Non-Residential	0.00%	$0
Subtotal, East	100.00%	$61,505,990
North		
Residential	41.23%	$29,333,875
Non-Residential	58.77%	$41,813,045
Subtotal, North	100.00%	$71,146,920
South		
Residential	95.01%	$183,589,970
Non-Residential	4.99%	$9,642,290
Subtotal, South	100.00%	$193,232,260
Grand Total		
Residential	84.21%	$274,429,835
Non-Residential	15.79%	$51,455,335
Grand Total	100.00%	$325,885,170

Source: Don Owen & Associates

Note: Project costs were separately allocated to residential and non-residential development in each drainage area, based on their respective shares of equivalent acres in each area. The grand total represents the sum of individual area allocations.

TABLE 16.2

APPLE VALLEY DRAINAGE FINANCING STUDY

AVERAGE FAIR SHARE COST ALLOCATIONS PER ACRE

(1988 Dollars)

	New Equivalent Acres	Average Cost Per Acre
East		
Residential	4,422	$13,909
Non-Residential	0	$0
Subtotal, East	4,422	$13,909
North		
Residential	3,442	$8,522
Non-Residential	4,592	$9,106
Subtotal, North	8,034	$8,856
South		
Residential	15,904	$11,544
Non-Residential	777	$12,410
Subtotal, South	16,681	$11,584
Grand Total		
Residential	23,768	$11,546
Non-Residential	5,369	$9,584
Grand Total	29,137	$11,185

Source: Don Owen & Associates

Note: Fair share allocation amounts for residential land uses represent a weighted average of cost allocations for different residential densities.

TABLE 16.3

APPLE VALLEY DRAINAGE FINANCING STUDY

RECOMMENDED FEES PER ACRE/1 FOR RESIDENTIAL AND NONRESIDENTIAL LAND USES

(1988 Dollars)

Land Use Type	Fee/Acre	Fee/DU
1 DU/20 AC	$9,419	$9,419
1 DU/2.5 AC	$9,419	$9,419
1 DU/AC	$9,419	$9,419
2 DU/AC	$14,128	$7,064
4 DU/AC	$19,252	$4,813
5 DU/AC	$21,880	$4,376
8 DU/AC	$25,912	$3,239
12 DU/AC	$34,980	$2,915
Average, Residential	$11,546	$7,064

	Fee/Acre
Industrial	$9,584
Retail	$9,584
Office	$9,584
Average, Non-Residential	$9,584
Average, Total	$11,185

Source: Don Owen & Associates

1. Recommended fees per acre based on current facility cost estimates and fair share cost allocations per DU and per square foot.
2. Weighted average of costs per acre for individual drainage areas

AC--acre

DU--dwelling unit

- Private construction of master plan drainage facilities in-lieu of development fees, when fee revenues are inadequate to provide timely flood protection, combined with long term repayment agreements.

- Development fees, combined with private construction of temporary drainage facilities not covered by repayment agreements, when there are compelling economic reasons for temporary mitigation.

- Special assessment or Mello-Roos financing allowed for master plan facilities required by development projects when economically feasible.

Specific Provisions

- New land uses in the East, North, and South drainage areas will pay for master plan drainage facilities located in their respective areas, along with facilities in the Dry Lake that serve their respective areas.

- New land uses in the Dry Lake will not be included in the financing program, though they may be required to provide private, non-master plan mitigation for any flood control hazards they face.

- Drainage fees will be levied on new land uses in the three drainage areas based on projected new development through buildout of the General Plan, and fair share equity criteria.

- Average development fees per acre have been recommended for residential and nonresidential land uses in the three drainage areas, based on current facility cost estimates. As shown in Table 16-3, development fees per acre in 1988 dollars average $11,185 for all drainage areas combined--$11,546 for residential land uses and $9,584 for nonresidential uses. Average fees per acre in each drainage area are different for both residential and nonresidential land uses.

- Development fees per acre have also been recommended for different residential land use categories in the three drainage areas, based on fair share cost allocations per dwelling unit. As shown in Table 16-3, average residential fees per acre for all drainage areas combined range from a low of $9,419 for low density uses to a high of $34,980 for high density uses. Average fees per acre in each drainage area may be different for each density category.

- Uniform development fees per acre are recommended for different nonresidential land uses within a given drainage area. As also shown in Table 16-3, average nonresidential fees per acre are $9,584 for all drainage areas combined, though they vary from one drainage area to another.

- Development fees will be used to build recommended drainage facilities in each drainage area in accordance with a facilities priority formula to be developed by the County. This formula should be flexible and respond to the pattern of development.

Other Financing Issues

- Construction of all master plan drainage facilities by 2010, or some other pre-buildout year, is impractical without additional capital from the County or State. This is due to the fact that projected new development by 2010 only accounts for between 19 and 43 percent of new buildout land uses according to the General Plan.

- The facilities priority formula referred to above will also be required to determine the order in which publicly constructed drainage facilities are built. This will involve refinements in both the drainage master plan, and in growth projections and assumptions.

- Since recommended development fees under the proposed drainage master plan are relatively high, a lower cost drainage alternative might be considered, although a reduction in the drainage master plan will reduce levels of protection. By lowering drainage costs, development fees could be reduced to more feasible levels, and the drainage master plan could probably be completed at an earlier date.

16.3. Project Costs and Land Uses by Drainage Area

16.3.1 Project Costs

Table 16.4 presents the estimated project cost for master-planned flood control and drainage facilities, including rights-of-way acquisition, facilities, and contingencies. Of the total estimated $325.9 million in costs, $225.9 million, or 69.3 percent, is for facilities. Contingencies account for $75.2 million and 23.1 percent of total estimated costs. Costs for acquisition of rights-of-way account for the remaining $24.7 and 7.6 percent of estimated costs.

Table 16-4 also presents estimated flood control costs by each of the three drainage areas: East, North and South. Of total estimated $325.9 million costs, the South is allocated the highest share, at $193.2 million or 59.3 percent. The North is allocated $71.1 million or 21.8 percent, and the East is allocated $61.5 million or 18.9 percent.

16.3.2 Land Uses by Drainage Area

Figure 16-1 shows a map of the drainage area. Table 16.5 presents drainage acres at General Plan Buildout by area and by land use type. Land use categories are those found in the General Plan, and include eight residential categories, ranging in density from 1 dwelling unit on 20 acres to 12 dwelling units per acre. Non-residential land use categories include industrial, retail, office, agriculture, airport, park, rural conservation land, school, and waste disposal.

East Drainage Area. As shown in Table 16.5, the East Drainage Area totals 19,430 acres. Much of the East Area is in low density land uses, with over 3,000 acres in each of the three lowest density residential categories, accounting for over 49 percent of total area. In addition, the East Area has significant land uses in rural conservation land, 8,969 acres, or 46.2 percent of the total. The East Area has no non-residential land uses.

TABLE 16.4

APPLE VALLEY DRAINAGE FINANCING STUDY

PROJECT COSTS BY TYPE AND DRAINAGE AREA

(1988 Dollars)

	Drainage Areas				
	East	North	South	Total	Percent of Total
Rights-of-Way	$4,508,750	$4,313,650	$15,961,700	$24,784,100	7.6%
Facilities	$42,803,550	$50,414,750	$132,678,500	$225,896,800	69.3%
Contingencies/1	$14,193,690	$16,418,520	$44,592,060	$75,204,270	23.1%
Total	$61,505,990	$71,146,920	$193,232,260	$325,885,170	100.0%
Percent of Total	18.9%	21.8%	59.3%	100.0%	

Source: Don Owen & Associates
Williamson and Schmid

1. Assumed to equal 30 percent of facility and right-of-way costs.

TABLE 16.5

APPLE VALLEY DRAINAGE FINANCING STUDY

LAND USE PROJECTIONS BY DRAINAGE AREA AT GENERAL PLAN BUILDOUT

DRAINAGE ACRES AND ACRE SHARES

	-----East-------		------North-----		-----South------		---Grand Total--/1	
Land Use Type	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
1 DU/20 AC	3,035	15.6%	970	6.0%	106	0.4%	4,111	6.9%
1 DU/2.5 AC	3,594	18.5%	5,100	31.4%	1,020	4.3%	9,714	16.4%
1 DU/AC	3,010	15.5%	1,810	11.1%	10,750	45.4%	15,570	26.2%
2 DU/AC	42	0.2%	296	1.8%	6,950	29.3%	7,288	12.3%
4 DU/AC	55	0.3%	0	0.0%	159	0.7%	214	0.4%
5 DU/AC	0	0.0%	0	0.0%	76	0.3%	76	0.1%
8 DU/AC	0	0.0%	72	0.4%	1,530	6.5%	1,602	2.7%
12 DU/AC	0	0.0%	0	0.0%	163	0.7%	163	0.3%
Industrial	0	0.0%	4,500	27.7%	466	2.0%	4,966	8.4%
Retail	0	0.0%	74	0.5%	238	1.0%	312	0.5%
Office	0	0.0%	57	0.3%	182	0.8%	239	0.4%
Agriculture	658	3.4%	545	3.4%	0	0.0%	1,203	2.0%
Airport	0	0.0%	484	3.0%	0	0.0%	484	0.8%
Park	12	0.1%	0	0.0%	130	0.5%	142	0.2%
RCN	8,969	46.2%	2,350	14.5%	1,850	7.8%	13,169	22.2%
School	0	0.0%	0	0.0%	63	0.3%	63	0.1%
Waste Disposal	55	0.3%	0	0.0%	0	0.0%	55	0.1%
Total	19,430	100.0%	16,258	100.0%	23,683	100.0%	59,371	100.0%

Source: Don Owen & Associates
Williamson & Schmid

1. Grand total excludes about 3,500 drainage acres in the Dry Lake.

DU--dwelling unit AC--acre RCN--rural conservation

North Drainage Area. The North Drainage Area totals 16,258 acres. Of this total, 5,100 acres--31.4 percent--is in 1 dwelling unit per 2.5 acre residential; 4,500 acres--27.7 percent--are in industrial land; and 2,350 acres--14.5 percent--are in rural conservation land. Of the remaining 26.4 percent of land, 1 DU per 20 acre residential and 1 DU per 1 acre residential comprise 6.0 and 11.1 percent respectively, with smaller amounts of some higher density residential; retail and office land comprise 0.5 and 0.3 percent, respectively; agriculture comprises 3.4 percent; and parks comprise 3.0 percent.

South Drainage Area. The South Drainage Area is the largest, with a total of 23,683 acres. The bulk of land in the South area is found in low and low-medium residential categories, with 1 DU per acre residential accounting for 10,750 acres and 45.4 percent, and 2 DU per acre residential accounting for 6,950 acres and 29.3 percent. The South Area has smaller amounts of all other residential land use types, as well as small amounts of all non-residential, public and open space land use categories.

Total of All Drainage Areas. In total, the General Plan buildout drainage acres amount to an estimated 59,371. Of this total, residential land uses account for 65.3 percent; non-residential land uses account for 9.3 percent; agriculture for 2.0 percent; rural conservation for 22.2 percent; and public uses for the remaining 1.2 percent.

16.4. Fair Share Cost Allocations

Prior to recommending a financing strategy for flood control costs, a "fair share" method of allocating the costs to affected privately-owned parcels has to be determined.

16.4.1 General Approach

The fair share allocation approach used in all three drainage areas is based on the following steps:

1. Selection of certain land parcels ("allocation parcels") in each benefit area according to particular measures of benefit.

2. Identifying the measure of benefit to be used in the analysis. For the Apple Valley Drainage Financing Study, the measure of benefit is based on the concept that new development should provide for its own drainage flows in some relationship to potential runoff flows generated by that development.

3. Adjustment of allocation acres for drainage equivalency per acre.

4. Allocation of costs to residential and non-residential land uses, based on their pro rata share of equivalent allocation acres.

5. Allocation of residential share of costs to specific residential land use types, based on drainage equivalency per dwelling unit.

16.4.2 Allocation Acres

The selection of allocation acres is based on General Plan land use categories and uses a concept that the right to develop, due to the master-planned improvements, is related to the measure of benefit. Therefore, all flood control costs are assumed to be borne by privately benefitted parcels of land, as measured by the estimate of allocation acres. The analysis focuses, therefore, on new development and on privately-owned land, specifically residential and industrial/commercial. Commercial land uses are split between office and retail land uses based on a study by the William C. Lawrence Company. Public land uses, such as schools, parks, and airports are excluded, as is all land designated rural conservation.

Specifically, allocation acres include undeveloped land in all residential and commercial/industrial categories designated by the General Plan. Allocation acres exclude all land in the Dry Lake, as well as land designated by the General Plan for agriculture, rural conservation (RCN), parks, schools, or other public facilities like airports and waste disposal sites. Allocation acres also exclude all but the first acre of residential land with a density of one dwelling unit (DU) per 2.5 acres or one DU per 20 acres. This is based on the assumption that the maximum extent of the impacted development in such cases is one acre per DU with the remaining land being kept mainly in its natural state, (i.e. for 160 acres zoning 1 DU/20 acres, the total allocation acres would equal 160/20 or 80 acres.)

Table 16.6 presents total drainage acres and benefitted allocation acres at assumed General Plan buildout by land use category and by drainage area. In total, drainage acres amount to 59,371, with 34,521 of these acres considered allocation acres.

East Drainage Area: General Plan Buildout. In the East Drainage Area, a total of 4,696 acres are assumed to be allocation acres out of a total of 19,430. The proportion of allocation acres to drainage acres is relatively small due to the large amounts of very low density residential and rural conservation lands. As described above, only one acre per parcel of very low density residential is included in the allocation.

North Drainage Area: General Plan Buildout. In the North Drainage Area, a total of 8,898 acres are assumed to be allocation acres out of a total of 16,258--over half the total. Again, very low density residential land decreases the proportion of allocation acres to drainage acres. In addition, public and rural conservation land is excluded.

South Drainage Area: General Plan Buildout. The South Drainage Area has the highest proportion of allocation acres to drainage acres, with a total of 20,927 allocation acres out of a total of 23,683 drainage acres. The South Area has more higher density residential and less public and rural conservation land.

Table 16.7 presents existing drainage and allocation land uses by land use categories for the three drainage areas, as of January 1988. In total, existing drainage acres amount to 6,358 in all three areas, with 5,384 of these acres considered allocation acres.

TABLE 16.6

APPLE VALLEY DRAINAGE FINANCING STUDY

LAND USE PROJECTIONS BY DRAINAGE AREA AT GENERAL PLAN BUILDOUT
DRAINAGE ACRES AND ALLOCATION ACRES

	East		North		South		Grand Total/1	
Land Use Type	Drainage Acres	Allocation Acres	Drainage Acres	Allocation Acres	Drainage Acres	Allocation Acres	Drainage Acres	Allocation Acres
1 DU/20 AC	3,035	152	970	49	106	5	4,111	206
1 DU/2.5 AC	3,594	1,438	5,100	2,040	1,020	408	9,714	3,886
1 DU/AC	3,010	3,010	1,810	1,810	10,750	10,750	15,570	15,570
2 DU/AC	42	42	296	296	6,950	6,950	7,288	7,288
4 DU/AC	55	55	0	0	159	159	214	214
5 DU/AC	0	0	0	0	76	76	76	76
8 DU/AC	0	0	72	72	1,530	1,530	1,602	1,602
12 DU/AC	0	0	0	0	163	163	163	163
Industrial	0	0	4,500	4,500	466	466	4,966	4,966
Retail/2	0	0	74	74	238	238	312	312
Office	0	0	57	57	182	182	239	239
Agriculture	658	0	545	0	0	0	1,203	0
Airport	0	0	484	0	0	0	484	0
Park	12	0	0	0	130	0	142	0
RCN	8,969	0	2,350	0	1,850	0	13,169	0
School	0	0	0	0	63	0	63	0
Waste Disposal	55	0	0	0	0	0	55	0
Total	19,430	4,696	16,258	8,898	23,683	20,927	62,871	34,521

Source: Don Owen & Associates
Williamson & Schmid
William C. Lawrence Company

Note: Allocation acres include all industrial, retail, and office uses, and up to one acre per dwelling unit where allowed by the General Plan.

1. Grand total excludes about 3,500 drainage acres in the Dry Lake.
2. Estimates represent about 56.7 percent of commercial land acreage according to land use projections by the William C. Lawrence Company.

DU--dwelling unit
AC--acre
RCN--rural conservation

TABLE 16.7

APPLE VALLEY DRAINAGE FINANCING STUDY

EXISTING LAND USES BY DRAINAGE AREA FOR SELECTED LAND USE TYPES
DRAINAGE ACRES AND ALLOCATION ACRES

	East		North		South		Grand Total/1	
Land Use Type	Drainage Acres	Allocation Acres	Drainage Acres	Allocation Acres	Drainage Acres	Allocation Acres	Drainage Acres	Allocation Acres
1 DU/20 AC	86	4	143	7	4	0	233	12
1 DU/2.5 AC	361	144	788	315	105	42	1,254	502
1 DU/AC	115	115	473	473	1,097	1,097	1,685	1,685
2 DU/AC	0	0	0	0	2,523	2,523	2,523	2,523
4 DU/AC	11	11	0	0	105	105	117	117
5 DU/AC	0	0	0	0	55	55	55	55
8 DU/AC	0	0	29	29	168	168	197	197
12 DU/AC	0	0	0	0	147	147	147	147
Industrial	0	0	23	23	27	27	50	50
Retail/2	0	0	13	13	65	65	78	78
Office	0	0	3	3	17	17	20	20
Total	573	275	1,472	862	4,314	4,247	6,358	5,384

Source: Don Owen & Associates
Williamson & Schmid
William C. Lawrence Company

Note: Allocation acres include all industrial, retail, and office uses, and up to one acre per dwelling unit where allowed by the General Plan. Acreage estimates are not available for land uses not employed in the allocation process.

1. Grand totals exclude the Dry Lake.
2. Retail acreages estimated to include about 56.7 percent of existing commercial acreage according to land use projections by the William C. Lawrence Company.

DU--dwelling unit
AC--acre

East Drainage Area: Existing Land Uses. In the East Drainage Area, a total of 573 acres are estimated to be currently developed, with 275 of these acres considered allocation acres. All development is in residential land uses.

North Drainage Area: Existing Land Uses. In the North Drainage Area, a total of 1,472 acres are estimated to be developed. Of this total, 862 acres are considered allocation acres. Drainage and allocation acres include both residential and non-residential land uses.

South Drainage Area: Existing Land Uses. The South Drainage Area has far more developed land than the other two drainage areas, at 4,314 acres. Of this total, 4,247 acres are considered allocation acres, due to the higher proportion of higher density residential land uses.

16.4.3 Equivalent Acres

Equivalent acres include allocation acres that have been adjusted for drainage flow equivalency by land use. The runoff equivalency factor is based on differences in the rate of water runoff among different land uses and densities. In this case, equivalent acres are measured in terms of a standardized water runoff equivalency for residential land with a density of one DU per acre.

Runoff Equivalency Factor. Table 16.8 presents the derivation of the runoff equivalency factor, based on runoff rates in terms of cubic feet per second per acre, with a concentration time of 10 minutes, as provided by Williamson & Schmid. As shown in Table 16.8, runoff rates by land use type do not differ significantly, but range from 3.33 for a density of 4 dwelling units per acre residential to 3.66 for office land uses. The equivalency factor is derived by dividing the land-use-specific runoff rates by a standard unit of measure.

As shown in Table 16.8, the residential category for 1 DU per acre has an equivalency factor of 1.000, and is used as the standard of measure. All other land use categories are based on this standard. Therefore, 1 DU per 20 acres of land residential, with a runoff rate of 3.49, has an equivalency factor of 1.0265, slightly higher than the 1.0000 factor for one DU per acre with its lower runoff rate of 3.40.

Equivalent Acres. Table 16.9 presents projected new land uses at general plan buildout in terms of allocation acres and equivalency acres. The equivalency acres have been derived by multiplying allocation acres by the equivalency factor shown previously in Table 16.8.

As shown in Table 16.9, the East Drainage Area has a total of 4,443 equivalent acres; the North Drainage Area has a total of 8,412 acres; and the South Drainage Area has a total of 16,747. Equivalent acres do not differ significantly from allocation acres, as the runoff factors do not differ markedly by land use type. The total acres designated as equivalent acres are 29,603.

The fair share allocation percentages for residential and nonresidential land uses as a group are based on their pro-rata share of equivalent allocation acres within each drainage area. Table 16.10 presents the breakdown of equivalent acre by residential and nonresidential land uses. The East Drainage Area is composed solely of residential land uses. The North Drainage Area has 41.23 percent

TABLE 16.8

APPLE VALLEY DRAINAGE FINANCING STUDY

EQUIVALENCY FACTORS BY LAND USE TYPE

TYPE	Runoff Rate/1	Equiv Factor/2
1 DU/20 AC	3.49	1.0265
1 DU/2.5 AC	3.45	1.0147
1 DU/AC	3.40	1.0000
2 DU/AC	3.38	0.9941
4 DU/AC	3.33	0.9794
5 DU/AC	3.39	0.9971
8 DU/AC	3.47	1.0206
12 DU/AC	3.60	1.0588
Industrial	3.66	1.0765
Retail	3.66	1.0765
Office	3.66	1.0765

Source: Don Owen & Associates
Williamson & Schmid

1. In terms of cubic feet per second per acre CFS/AC) with a concentration time of 10 minutes.
2. Relative to rate for 1 DU/AC.

DU--dwelling unit
AC--acre

TABLE 16.9

APPLE VALLEY DRAINAGE FINANCING STUDY

PROJECTED NEW LAND USES AT GENERAL PLAN BUILDOUT
BY LAND USE CATEGORY

ALLOCATION ACRES AND EQUIVALENT ACRES

	East		North		South		Total/1*	
Land Use Type	Allocation Acres	Equivalent Acres	Allocation Acres	Equivalent Acres	Allocation Acres	Equivalent Acres	Allocation Acres	Equivalent Acres
1 DU/20 AC	147	151	41	42	5	5	194	199
1 DU/2.5 AC	1,293	1,312	1,725	1,750	366	371	3,384	3,434
1 DU/AC	2,895	2,895	1,337	1,337	9,653	9,653	13,885	13,885
2 DU/AC	42	42	296	294	4,427	4,401	4,765	4,737
4 DU/AC	44	43	0	0	54	53	97	95
5 DU/AC	0	0	0	0	21	21	21	21
8 DU/AC	0	0	43	44	1,362	1,390	1,405	1,434
12 DU/AC	0	0	0	0	16	17	16	17
Industrial	0	0	4,477	4,820	439	473	4,916	5,292
Retail/2	0	0	61	66	172	186	234	252
Office	0	0	54	58	165	178	219	236
Total •	4,422	4,443	8,035	8,412	16,681	16,747	29,137	29,603

Source: Don Owen & Associates
Williamson & Schmid
William C. Lawrence Company

• Numbers may not add due to rounding

Note: Equivalent acres equal allocation acres multiplied by runoff equivalency factors, from Table 16.8.

1. Grand totals exclude Dry Lake.
2. Retail acreages estimated to include about 56.7 percent of existing commercial acreage according to land use projections by the William C. Lawrence Company.

residential land uses and 58.77 percent nonresidential land uses. The South Drainage Area has 95.01 percent residential land uses and 4.99 percent nonresidential land uses.

16.4.4 Fair Share Cost Allocation

Allocation by Residential vs. Nonresidential Land Uses. Table 16.11 allocates the drainage costs by area to residential and nonresidential land uses, based on the fair share percentages shown in Table 16.10. The fair share amount is divided by equivalent acres to yield the projected average cost per acre. As shown in Table 16.11, the East has residential costs of $13,909 per acre; the North has residential costs of $8,522 per acre; and the South has residential costs of $11,544 per acre, with overall residential costs per acre of $11,546. Nonresidential costs are projected at $9,106 in the North and $12,410 in the South, for an overall total of $9,584.

Residential Allocation by Density Type.

Table 16.11 has derived an average cost per acre for residential land uses by each of the three drainage areas. To further refine the allocation, the allocation is differentiated by residential density types, based on an impervious factor. Table 16.12 presents the impervious percent per dwelling unit by density type, with the percentage equal to the percent of impervious ground cover per acre divided by the dwelling units per acre. As shown in Table 16.12, the impervious percentage ranges from 20 percent for low density residential up to 1 DU per acre to 6.7 percent for 12 DUs to the acre residential.

An impervious equivalency factor is derived, using the 20 percent impervious percentage as the standard of measure. As shown in Table 16.12, the impervious factor ranges from 1.0000 for low density residential to 0.333 for 12 DU per acre residential.

Table 16.13 presents the average cost per DU by residential density type, based on the impervious factor. In the East Drainage Area, costs per DU range from $13,711 for low density types down to $6,855 for 4 DUs per acre. In the North Drainage Area, costs per DU range from $7,980 for low density types down to $2,992 for 8 DUs per acre. In the South Drainage Area, costs per DU range from $8,753 for low density types down to $2,915 for 12 DUs per acre.

16.5. Financing Strategy and Implementation Plan

16.5.1 Potential Financing Mechanisms

The following financing mechanisms have been considered for the recommended drainage master plan.

1. Development fees

2. Development fees, or in-lieu private construction of master plan facilities covered by long term repayment agreements

TABLE 16.10

APPLE VALLEY DRAINAGE FINANCING STUDY

PROJECTED NEW EQUIVALENT ACRE SHARES

RESIDENTIAL AND NONRESIDENTIAL LAND USES

	East		North		South	
	Acres	Share	Acres	Share	Acres	Share
New Equivalent Acres						
Residential	4,443	100.00%	3,468	41.23%	15,911	95.01%
Nonresidential	0	0.00%	4,944	58.77%	837	4.99%
Total	4,443	100.00%	8,412	100.00%	16,747	100.00%

Source: Don Owen & Associates

1. Grand totals exclude the Dry Lake.

TABLE 16.11

APPLE VALLEY DRAINAGE FINANCING STUDY

FAIR SHARE COST ALLOCATIONS PER ACRE

(1988 Dollars)

	Fair Share Percentage	Fair Share Amount	New Allocation Acres	Average Cost Per Acre
East				
Residential	100.00%	$61,505,990	4,422	$13,909
Non-Residential	0.00%	$0	0	$0
Subtotal, East	100.00%	$61,505,990	4,422	$13,909
North				
Residential	41.23%	$29,333,875	3,442	$8,522
Non-Residential	58.77%	$41,813,045	4,592	$9,106
Subtotal, North	100.00%	$71,146,920	8,034	$8,856
South				
Residential	95.01%	$183,589,970	15,904	$11,544
Non-Residential	4.99%	$9,642,290	777	$12,410
Subtotal, South	100.00%	$193,232,260	16,681	$11,584
All Areas				
Residential	84.21%	$274,429,835	23,768	$11,546
Non-Residential	15.79%	$51,455,335	5,369	$9,584
Grand Total	100.00%	$325,885,170	29,137	$11,185

Source: Don Owen & Associates

Note: Project costs were separately allocated to residential and non-residential development in each drainage area, based on the shares of each land use in the different allocation acres in each area. The grand total represents the sum of individual area allocations.

TABLE 16.12

APPLE VALLEY DRAINAGE FINANCING STUDY

DWELLING UNIT EQUIVALENCY FACTORS BY
RESIDENTIAL LAND USE CATEGORY

TYPE	Impervious % per Acre/1	Impervious % per DU/2	Impervious Equivalency Factor/3
1 DU/20 AC	20.0%	20.0%	1.000
1 DU/2.5 AC	20.0%	20.0%	1.000
1 DU/AC	20.0%	20.0%	1.000
2 DU/AC	30.0%	15.0%	0.750
4 DU/AC	40.0%	10.0%	0.500
5 DU/AC	50.0%	10.0%	0.500
8 DU/AC	60.0%	7.5%	0.375
12 DU/AC	80.0%	6.7%	0.333

Source: Don Owen & Associates
Williamson & Schmid

1. Percent of impervious ground cover per acre; for residential densities below 1 DU/AC, applies to one developed acre only.
2. Percent of impervious ground cover per acre divided by DUs per acre.
3. Relative to rate for 1 DU/AC.

DU--dwelling unit
AC--acre

TABLE 16.13

APPLE VALLEY DRAINAGE FINANCING STUDY

FAIR SHARE COST ALLOCATIONS PER DWELLING UNIT AND PER SQUARE FOOT

(1988 Dollars)

	Cost Per DU			
Land Use Type	East	North	South	Total/1
Cost/DU:				
1 DU/20 AC	$13,711	$7,980	$8,753	$9,419
1 DU/2.5 AC	$13,711	$7,980	$8,753	$9,419
1 DU/AC	$13,711	$7,980	$8,753	$9,419
2 DU/AC	$10,283	$5,985	$6,565	$7,064
4 DU/AC	$6,855	n/a	$4,376	$4,813
5 DU/AC	n/a	n/a	$4,376	$4,376
8 DU/AC	n/a	$2,992	$3,282	$3,239
12 DU/AC	n/a	n/a	$2,915	$2,915
Average, All Types	$13,385	$7,263	$6,062	$7,064

Source: Don Owen & Associates

1. Weighted average of costs per acre for individual drainage areas

DU--dwelling unit
AC--acre
n/a--not applicable

3. Development fees, combined with private construction of temporary drainage facilities not covered by repayment agreements

4. Special assessment or Mello-Roos financing

5. General obligation bond financing

The first four financing mechanisms focus on new development only, based on the assumption that new development should provide for its pro-rata share of drainage flows. The fifth financing mechanism covers new and existing development, based on the assumption that new and existing land uses will benefit from at least some of the proposed drainage improvements.

General Obligation Bonds

While it may be desirable to charge new and existing land uses for some drainage improvements, this is probably infeasible due to difficulties in getting majority approval by voters, and identifying which existing land uses would benefit from specific flood control facilities. Hence, a financing approach focusing on new development only is recommended.

Special Assessment or Mello Roos Financing

While special assessment or Mello Roos financing may be feasible for large, single developments with a short buildout cycle, these financing mechanisms are not recommended for the drainage plan as a whole. It is unlikely that either mechanism would be feasible for widespread financing of drainage facilities, given the relatively large number of landowners in all three drainage areas. Further, given the projected length of the development cycle in the Apple Valley area, it is unlikely that landowners would choose to impose special assessments or special taxes on land that may remain undeveloped for many years in the future.

Development Fees

Since widespread use of bond financing does not appear to be feasible for this project, development fees--used alone or in combination with private construction of master plan or temporary drainage facilities--are the recommended financing mechanism. Since buildout of the General Plan is not expected to occur for many years, use of a pay-as-you-go financing approach implies that construction of all master plan facilities by 2010, or some other pre-buildout year, is probably infeasible without additional capital from the County or State, or reductions in projected drainage costs.

As noted above, the focus of fee financing is new development, based on the premise that new land uses should provide for their pro-rata share of drainage flows. To provide a stronger nexus between payment of fees and benefits received, development fees in this case should be levied under authority of the state subdivision map act.

In order to enhance the flexibility and feasibility of the financing program, development fees should be combined with private construction options. Private construction of drainage facilities may be allowed to provide timely flood protection for a given new development, or to handle drainage flows generated by the development.

In either case, if the facilities provided are master plan facilities, in-lieu private construction could be combined with long term repayment agreements when the cost of the facilities exceeds the amount of the development fees owed. The terms of these repayment agreements would be governed by a facilities priority formula to be developed by the County, which would also determine the order in which publicly constructed drainage facilities are built. While this formula should be flexible and respond to the pattern of development, by providing for accelerated reimbursement for high priority facilities, a priority formula would also encourage patterns of development that are economically feasible and technically acceptable.

Construction of temporary drainage facilities may also be allowed along with payment of fees, if these facilities provide adequate flood protection and there are compelling economic reasons for temporary mitigation. However, it is recommended that there be no reimbursement for construction of non-master plan facilities, nor public participation in the operation and maintenance of such facilities.

16.5.2 Recommended Financing Strategy

General Provisions

- Development fees on new residential and non-residential land uses, based on their pro-rata share of allocation acreage, adjusted for drainage flow and dwelling unit equivalency factors.

- Private construction of master plan drainage facilities in-lieu of development fees, when fee revenues are inadequate to provide timely flood protection, combined with long term repayment agreements.

- Development fees, combined with private construction of temporary drainage facilities not covered by repayment agreements, when there are compelling economic reasons for temporary mitigation.

- Special assessment or Mello-Roos financing allowed for master plan facilities required by development projects when economically feasible.

Specific Provisions

- New land uses in the East, North, and South drainage areas will pay for master plan drainage facilities located in their respective areas, along with facilities in the Dry Lake that serve their respective areas.

- New land uses in the Dry Lake will not be included in the financing program, though they may be required to provide private, non-master plan mitigation for any flood control hazards they face.

- Drainage fees will be levied on new land uses in the three drainage areas based on projected new development through buildout of the General Plan, and fair share equity criteria.

- Average development fees per acre have been recommended for residential and nonresidential land uses in the three drainage areas, based on

current facility cost estimates. As shown in Table 16.14, average fees per acre in 1988 dollars range from $8,522 to $13,909 for residential uses, and $9,106 to $12,410 for non-residential uses. It is assumed that all fees will be adjusted for; 1) inflation using the Engineering News Record construction cost index, 2) major changes in land use designations and, 3) updated cost estimates based on engineered plans.

- Development fees per acre have also been recommended for different residential land use categories in the three drainage areas, based on the fair share cost allocations per dwelling unit and per square foot contained in Table 16.7. As shown in Table 16.14, residential fees per acre range from a low of $7,980 for low density uses in the North area, to a high of $34,980 for high density uses in the South area.

- As shown in Table 16.14, uniform development fees per acre are recommended for different nonresidential land uses within a given drainage area.

- Development fees will be used to build recommended drainage facilities in each drainage area in accordance with a facilities priority formula to be developed by the County. This formula should be flexible and respond to the pattern of development.

16.5.3 Other Financing Issues

Completion of Drainage Master Plan by 2010

The possibility of paying for all master plan drainage facilities by 2010 was explored, but found to be impractical, since projected levels of new development by 2010 only account for between 19 and 43 percent of General Plan buildout.

Table 16.15 shows projected new allocation acres in each drainage area for the year 2010, based on dwelling unit and nonresidential square footage projections by the William C. Lawrence Company, and existing density estimates by Williamson & Schmid. As shown in Table 16.15, new allocation acres are projected to account for less than 20 percent of new buildout development by 2010, ranging from less than 10 percent in the East drainage area to nearly 27 percent in the South. While buildout development shares are slightly higher for residential land uses, they are dramatically lower for nonresidential uses, ranging from about 1 percent in the North to about 11 percent in the South.

The land use projections in Table 16.15 imply average growth rates through 2010 of about 3.2 percent per year for residential uses and 3.1 percent per year for nonresidential uses. Higher growth rates have been projected by Continental Telephone Company (CONTEL), which projects population in the entire Apple Valley to increase by about 6.7 percent annually through the year 2000. However, even after extending this higher growth rate through 2010, new allocation acres would account for less than 44 percent of new buildout development.

Recommended development fees per acre based on new buildout development are relatively high--$11,185 for all land uses and drainage areas combined. As a

TABLE 16.14

APPLE VALLEY DRAINAGE FINANCING STUDY

RECOMMENDED FEES PER ACRE/1 FOR RESIDENTIAL AND NONRESIDENTIAL LAND USES

(1988 Dollars)

Land Use Type	East	North	South	Total/2
Cost/Acre				
1 DU/20 AC	$13,711	$7,980	$8,753	$9,419
1 DU/2.5 AC	$13,711	$7,980	$8,753	$9,419
1 DU/AC	$13,711	$7,980	$8,753	$9,419
2 DU/AC	$20,566	$11,970	$13,130	$14,128
4 DU/AC	$27,420	--	$17,504	$19,252
5 DU/AC	--	--	$21,880	$21,880
8 DU/AC	--	$23,936	$26,256	$25,912
12 DU/AC	--	--	$34,980	$34,980
Average, Residential	$13,909	$8,522	$11,544	$11,546
Cost/Acre				
Industrial	--	$9,106	$12,410	$9,584
Retail	--	$9,106	$12,410	$9,584
Office	--	$9,106	$12,410	$9,584
Average, Non-Residential	--	$9,106	$12,410	$9,584
Average, Total	$13,909	$8,856	$11,584	$11,185

Source: Don Owen & Associates

1. Recommended fees per acre based on current facility cost estimates and fair share cost allocations per DU and per square foot.
2. Weighted average of costs per acre for individual drainage areas

AC--acre
DU--dwelling unit

TABLE 16.15

APPLE VALLEY DRAINAGE FINANCING STUDY

PROJECTED NEW ALLOCATION ACRES AND EQUIVALENT ACRES
THROUGH 2010
RESIDENTIAL AND NONRESIDENTIAL LAND USES

	East		North		South		Total	
	Acres	% Buildout	Acres	% Buildout	Acres	% Buildout	Acres	% Buildout
New Acres:								
Resid	445	10.07%	710	20.63%	4,334	27.25%	5,489	23.10%
Nonresidential	0	--	56	1.22%	88	11.33%	144	2.68%
Total New Acres	445	10.07%	766	9.54%	4,422	26.51%	5,633	19.33%
New Equivalent Acres								
Resid	462	10.40%	745	21.48%	4,420	27.78%	5,627	23.62%
Nonresidential	0	--	39	0.79%	95	11.36%	134	2.32%
Total New Equiv. Acres	462	10.40%	784	9.32%	4,515	26.96%	5,761	19.46%

Source: Don Owen & Associates

result, basing development fees on smaller levels of development through 2010 or some other pre-buildout year would probably be impractical without additional capital from the County or State. Alternatively, applying the recommended development fees to projected new development through 2010 would allow for construction of less than half of all master plan facilities by that year.

This is shown in Table 16.16, which projects development fee revenues through 2010 under alternate growth scenarios. Under a William C. Lawrence growth scenario, only about $50 million in fee revenues would accrue by 2010, enough to pay for approximately 15 percent of all master plan facilities by that year. Under a CONTEL growth scenario, about $107 million in fee revenues would accrue by 2010, sufficient to pay for about 33 percent of master plan facilities. While more optimistic growth scenarios would allow for higher completion rates, all recommended facilities could be completed by 2010 only if General Plan buildout is obtained in that year.

Facilities Priority Formula

Given the likelihood that only a portion of the drainage master plan can be paid for by 2010, a facilities priority formula will have to be developed by the County to determine the order in which publicly constructed drainage facilities are built. As noted above, this formula should be flexible and respond to ongoing patterns of development, at the same time encouraging development patterns that are economically feasible and technically acceptable. Development of a priority formula will require refinements in the drainage master plan and in growth projections and assumptions.

Alternate Drainage Plans

As noted above, development fees per acre under the proposed drainage master plan are relatively high, even when based on new development through General Plan buildout. This suggests that a lower cost drainage alternative might be considered, if it can provide adequate flood protection to Apple Valley residents.

Sensitivity of Costs to Concrete Channel Alternates

The recommended concrete channel section for the master plan has six-inch thick concrete walls and an eight-inch thick concrete base. There are design constraints which may result in more expensive channel costs. To ensure that all design constraints are addressed, twelve-inch thick walls were considered in the cost analysis and this financing study. There is only a five percent difference in cost between the two sections for the East and North Communities and a two percent change for the South Community with a total difference of only three percent for the entire system. Therefore, use of the recommended section (six-inch side wall) would have a negligible impact on this financial analysis.

TABLE 16.16

APPLE VALLEY DRAINAGE FINANCING STUDY

DEVELOPMENT FEE REVENUES THROUGH 2010/1 UNDER ALTERNATE PHASING SCENARIOS

% Buildout by 2010	East	North	South	Total
100%	$61,505,990	$71,146,920	$193,232,260	$325,885,170
80%	$49,204,792	$56,917,536	$154,585,808	$260,708,136
60%	$36,903,594	$42,688,152	$115,939,356	$195,531,102
43%/2	$26,447,576	$30,593,176	$83,089,872	$140,130,623
40%	$24,602,396	$28,458,768	$77,292,904	$130,354,068
20%	$12,301,198	$14,229,384	$38,646,452	$65,177,034
19%/3	$11,686,138	$13,517,915	$36,714,129	$61,918,182
Average Fee Per Acre	$13,909	$8,856	$11,584	$11,185

Source: Don Owen & Associates

1. Assumes given fee per equivalent acre
2. Based on projections by CONTEL for total of all subareas, using Williamson & Schmid density estimates; fee revenues for individual subareas reflect different subarea percentages.
3. Based on projections by William C. Lawrence Company for total of all subareas, using Williamson & Schmid density estimates; fee revenues for individual subareas reflect different subarea percentages

Note: Phasing based on projected new equivalent acres by 2010 as a percentage of General Plan buildout.

CHAPTER 17

CONCLUSIONS AND RECOMMENDATIONS

17.1. Study Findings

Not only are the existing flood control facilities in the Apple Valley area few and far between, they are inadequate. There are also many structures in and along existing flowpaths and floodplains of natural watercourses.

Using the most current criteria for hydrologic modeling (per the 1986 S.B.C.F.C.D. Hydrology Manual). The Apple Valley Dry Lake 100-year storm high water level was determined to be 2915 feet above sea level. This corresponds to 12 feet of water at the deepest point in the dry lake. Similarly, the 25-year high water level was determined to be 2909, resulting in 6 feet of water at the deepest point. Development has already encroached below the 2915 elevation.

17.2 Study Conclusions

It is important to realize the benefits in maintaining use of natural channels, when possible, in desert type settings. This is due to the high percolation rates available (due to transmission losses) which enables "flashy" flows to subside within the channel system, often dissipating before reaching the dry lake. However, for severe "project flood" type flows, the potential for erosion and channel diversion must be considered before finalizing a designated channel to remain "natural."

Due to maintenance concerns, open channel facilities remain the District's preference for conveying flows in desert communities. This policy was adhered to in this study as an open channel network was found to be the most cost efficient alternative. Where the slope allows and where facilities are not draining foothill areas (high sediment potential), R.C.P. is proposed for secondary and local storm drain systems for safety, health, and driveway access reasons.

A more detailed cost estimate for the recommended Alternative A1 was completed in order to derive a much more accurate estimation of the costs. The watershed was subdivided into three communities; East, North, and South, based on their location with respect to the dry lake. The detailed costs were broken down by community (see Table 17.1).

Table 17.1

ALTERNATIVE A1 DETAILED COST SUMMARY

COMMUNITY	ESTIMATED COST (DOLLARS)
East	58,621,160
North	67,600,260
South	189,421,115
TOTAL	315,642,535

Detention basins were analyzed for several locations on regional facilities. The basins were found to be cost effective in both the East and South Communities. In the East Community, the 50-percent flowby option presented the most potential cost savings for Facility E-04. Utilizing a flowby basin on this channel at the northwest corner of Esaws Avenue and Shirwaun Road requiring 130 Ac-ft of storage would present an estimated savings of $1,960,000. In the South Community, the 25-percent flowby option presented the most potential cost savings for the community. In the South a combination of three basins presented a total cost savings of $18,992,000. Two of the basins are located on Mariana Wash which is the largest channel in the South Community, one at the intersection of Quinnault Road and Nisqually Road with a required capacity of 385 Ac-ft and the other at the intersection of Juniper Road and Tussing Ranch Road with a required capacity of 240 Ac-ft. The third basin is located at the confluence of two arterial washes, just south of Highway 18 between Mesquite Road and Joshua Road with a required capacity of 250 Ac-ft, approximately one mile south of their confluence with Mariana Wash.

Several options were analyzed to reclaim the dry lake from the 100-year flood plain. The feasibility of each option is based on economic factors only as this comparison is to determine financially viable options. A summary of the estimated cost of each option is contained in Table 17.2.

Table 17.2

DRY LAKE RECLAMATION COST

OPTION	ESTIMATED COST (MILLIONS OF DOLLARS)
Drainage Channel to Mojave River	27
Single 40-foot Deep Retention Basin	35
Single 100-foot Deep Retention Basin	34
Dual Retention Basins	32
500 cfs Pump Station	40
3,000 cfs Pump Station	46

The conclusion of the feasibility study is that land values cannot presently support even the least expensive scenario for reclaiming the 2600 acre dry lake.

Should development in the dry lake be proposed, additional studies would be required to establish proper planning and engineering policies. These studies would include (as a minimum) master plans of roadways, water and sewer, telephone and electricity, storm water circulation in the dry lake, and open space. A soils and geology study of the dry lake to determine the structural integrity and other properties of the soils as a construction resource would also need to be performed. Two hypothetical residential, medium-size land development schemes were developed for the purpose of identifying anticipated costs of development. The first hypothetical development is within the central portion of the dry lake, and the second is within the fringe of the dry lake. The total development costs for each hypothetical development ranged from $54,705.00/unit at the dry lake perimeter to $69,213.50/unit within the central area of the dry lake. Again, the current land values could not support these required studies and improvements for small developments. If a large development were proposed, however, the efficiency of satisfying the above requirements would be greatly increased and could possibly be feasible at that time.

A strategy was recommended for financing the costs of the master planned drainage facilities in each of the three communities (North, South, and East). General provisions of the strategy include: 1) development fees on new residential and non-residential land uses, based on their prorata share of allocation acreage; 2) private construction of master plan facilities in-lieu of development fees, when fee revenues are inadequate to provide timely flood protection, combined with long term repayment agreements; 3) development fees, combined with private construction of temporary drainage facilities not

covered by repayment agreements, when there are compelling economic reasons for temporary mitigation; and 4) Special Assessment or Mello-Roos financing allowed for master planned facilities required by development projects when economically feasible.

The average cost allocation per acre for all drainage areas is $10,833 per acre; $11,211 per residential acre and $9,158 per non-residential acre. Allocated residential costs range from $8,097 per acre in the North Community to $13,257 per acre in the East Community. Non-residential allocations range from zero in the East Community to nearly $12,200 per acre in the South Community.

Fair share cost allocations for different residential land uses are based on their prorata shares of equivalent dwelling units within each drainage area. Fair share cost allocation per dwelling unit (D.U.) for all drainage areas combined average $6,847, ranging from a low of $2,860 per D.U. for high density residential uses to $9,145 per D.U. for low density uses.

17.3. Study Recommendations

This Master Plan of Drainage (M.P.D.) should be updated periodically to reflect revised modeling techniques, revised rainfall-runoff data, and newly constructed drainage facilities. For this M.P.D. to remain useful, updates are imperative in order to keep the M.P.D. current.

Raingages and streamgages should be installed and monitored throughout the watershed to obtain local rainfall-runoff data. Since neither of these exist in the watershed at the present time, they will yield valuable information for updating the M.P.D. in the future.

The County should adopt some priority procedure as to the construction of facilities. Extreme problem areas should be identifed and given priority for construction. The identification process should include eyewitness accounts, historical data, and areas of flooding damage.

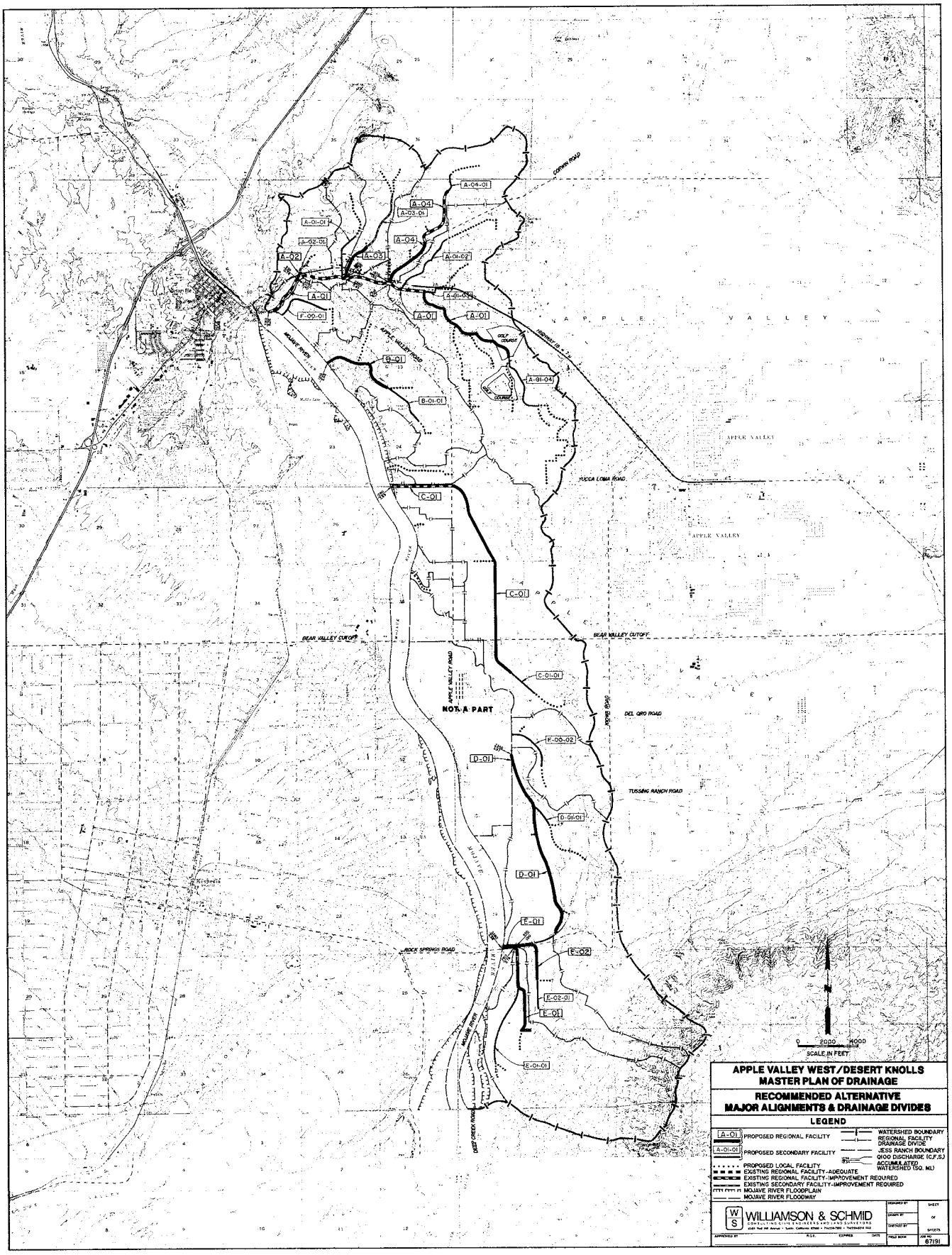
Detention basins should be considered for several of the regional channels if right-of-way can be obtained in a timely manner to facilitate their construction. It was found that in some cases, the cost savings of having a basin and downsizing the downstream channel was significant in comparison to the channel sized for the peak flow rate without detention. In the South Community, a combination of basins present a far more significant cost savings than any one single basin.

The environmental possibilities afforded by onsite runoff retention are so positive, that onsite detention is recommended for desert communities. Some of the major benefits afforded are: 1) water reclamation and conservation;, 2) nuisance flow control; (e.g., the City of Palmdale currently has considerable concerns regarding nuisance flow runoff from landscape over-irrigation, among other sources), 3) flood control; (e.g., onsite detention reduces the flood damage risk for both interim and ultimate development scenarios), and 4) flood channel erosion control; (e.g., onsite detention reduces the frequency and duration of erosion exposure in flood channels). The use of onsite storage, however, is not recommended in sizing flood control facilities, due to (among other reasons): 1) the benefits of onsite storage are not fully obtained until full development of the catchment; that is, the interim development condition is generally unprotected for onsite storage effects, 2) difficulty of controlling onsite storage faciliites due to modifications by home owners, and 3) loss of permeability with the useage of onsite facility. This Master Plan of Drainage is based upon no onsite storage. This assumption is consistent with the above concerns. However, it is recommended that onsite detention be encouraged due to the environmental and conservation elements described previously. Guidelines for onsite storage can be found in adjacent regions such as Maricopa County, Arizona, and Kern County, California.

Since most natural flowpaths disappear on the valley floor, development has encroached within existing floodplains. Future development should meet certain drainage criteria prior to construction. Building pads should be elevated two feet above existing ground and drainage swales should be graded around the pads. Building should not be permitted within 200 feet of known watercourses, or within 50 feet of known drainage rights-of-ways. The County and Town of Apple Valley should begin to purchase rights-of-way and/or required dedication for the proposed facilities determined by this study.

Development in the dry lake to the General Plan of 1 D.U./Ac is possible, however, it will be very expensive on a per acre basis. If developed, the dry lake should be treated as a modern planned community where the entire area is master planned for all systems. A controlled growth policy is recommended whereby all development within the dry lake is required to satisfy all engineering and planning measures adopted by the County and Town of Apple Valley.

Funding of the master planned facilities will be accomplished by development fees. These fees will be levied on new residential and non-residential land uses. The fees will be based on a prorate share of allocation acreage which in turn will be based on their prorata shares of equivalent dwelling units.


APPLE VALLEY WEST/DESERT KNOLLS
MASTER PLAN OF DRAINAGE
RECOMMENDED ALTERNATIVE
MAJOR ALIGNMENTS & DRAINAGE DIVIDES
LEGEND
PROPOSED REGIONAL FACILITY
PROPOSED SECONDARY FACILITY
PROPOSED LOCAL FACILITY
EXISTING REGIONAL FACILITY-ADEQUATE
EXISTING REGIONAL FACILITY-IMPROVEMENT REQUIRED
EXISTING SECONDARY FACILITY-IMPROVEMENT REQUIRED
MOJAVE RIVER FLOODPLAIN
MOJAVE RIVER FLOODWAY
WATERSHED BOUNDARY
REGIONAL FACILITY DRAINAGE DIVIDE
JESS RANCH BOUNDARY
Q100 DISCHARGE (C.F.S.)
ACCUMULATED WATERSHED (SQ. MI.)
NOT A PART
APPLE VALLEY ROAD
BEAR VALLEY CUTOFF
YUCCA LOMA ROAD
DEL ORO ROAD
TUSSING RANCH ROAD
ROCK SPRINGS ROAD
HESPERIA
APPLE VALLEY
SCALE IN FEET
WILLIAMSON & SCHMID
CONSULTING CIVIL ENGINEERS AND LAND SURVEYORS
87191

Appendix E

City Drainage Criteria

§ 155.350 DRAINAGE REQUIREMENTS.

(A) No land shall be developed and no use shall be permitted that results in water run-off causing flooding or erosion on adjacent property. Run-off shall be properly channeled into a storm drain, watercourse, ponding area or other suitable facility.

(B) An approved drainage plan shall be submitted and approved for any new, redeveloped, or expanded commercial, industrial, multiple residential and institutional development, subject to the following requirements.

(1) A maximum storm water run-off coefficient of 0.6 for a five-year rainfall event (2.4 cubic feet per second per acre). When the development drains immediately into a stormwater trunk having a design capacity that can accommodate a run-off coefficient greater than 0.6, as determined by the City Engineer and in accordance with the adopted Apple Valley Master Stormwater Management Plan, the run-off coefficient of the drainage plan may be increased to no more than 0.9.

(2) On-site infiltration of the first one-half inch of storm water resulting from any rainfall event. The volume of infiltration necessary to achieve this standard is to be calculated with the formula: Volume of infiltration area (acres feet) = (0.042') x (number of acres). This requirement may be waived if the soil conditions are found to be unsuitable for infiltration or if the infiltration is already being accomplished within the drainage district (as identified within the adopted Apple Valley Master Stormwater Management Plan) in which the subject development property lies.

(C) The maximum impervious surface area on a lot or parcel with a one-family detached dwelling (house) or lots with two-family attached dwellings (twinhome) shall not exceed the following coverage:

Lot Size[1]	***Maximum Impervious Coverage Allowed***
9,000 sq. ft. or greater	35%
8,999 sq. ft. - 7,500 sq. ft.	40%
7,499 sq. ft. - 6,000 sq. ft.	45%
Less than 6,000 sq. ft.	50%

(1) Actual lot area shall be rounded up to the nearest whole number for determination of its lot size hereunder.

(2) (a) Lots located within a "PD" (Planned Development) zoning district on which an one-family detached dwelling (house) or lots with two-family attached dwellings (twin home) is a permitted use shall comply with the requirements above, unless impervious surface coverage is specifically addressed in the ordinance establishing the PD zoning district.

(b) Lots zoned for multi-family dwellings on which the dwelling units, attached or detached, comprises the lot of record and the open space or yard surrounding the unit is not exclusively owned by the dwelling unit owner and is instead owned as a CIC or other common property interests, are not subject to this clause.

(D) The maximum impervious surface area allowed hereunder may be increased up to an additional 5% upon a showing of circumstances supporting good cause for additional impervious surface area in excess of the limitations herein and upon the installation of a city approved on-site stormwater management facility.

(E) Any lot or parcel that has impervious surface area in excess of the maximum area allowed herein as of April 30, 2018, shall be deemed as legal nonconforming. The impervious surface area existing on a lot as of April 30, 2018, may be maintained, repaired or replaced, but may not be expanded. If the lot or parcel is redeveloped in its entirety, the impervious surface area restrictions set forth herein shall apply.

('81 Code, § A1-57) (Ord. 291, passed 4-21-83; Am. Ord. 760, passed 10-14-04; Ord. 1050, passed 10-11-18) Penalty, see § 155.999

Figure ADD-1
Antecedent Moisture Condition (AMC)

5-day Rainfall - NOAA Atlas 14
(50% of Total Rainfall Prior to Peak)*

*1/2 (11-day - 1-day) =
1/2 (([10-day] + (1/10 ([20-day] - [10-day]))) - [1-day])

5 0 5 10 15
Miles

N
W E
S

Growing Season
- AMC I
- AMC II
- AMC III

STATE HWY 127
I-15
US HWY 395
I-40
STATE HWY 247
STATE HWY 62

Appendix F

Soils Report

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for San Bernardino County, California, Mojave River Area

Apple Valley 146-AC site



August 9, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

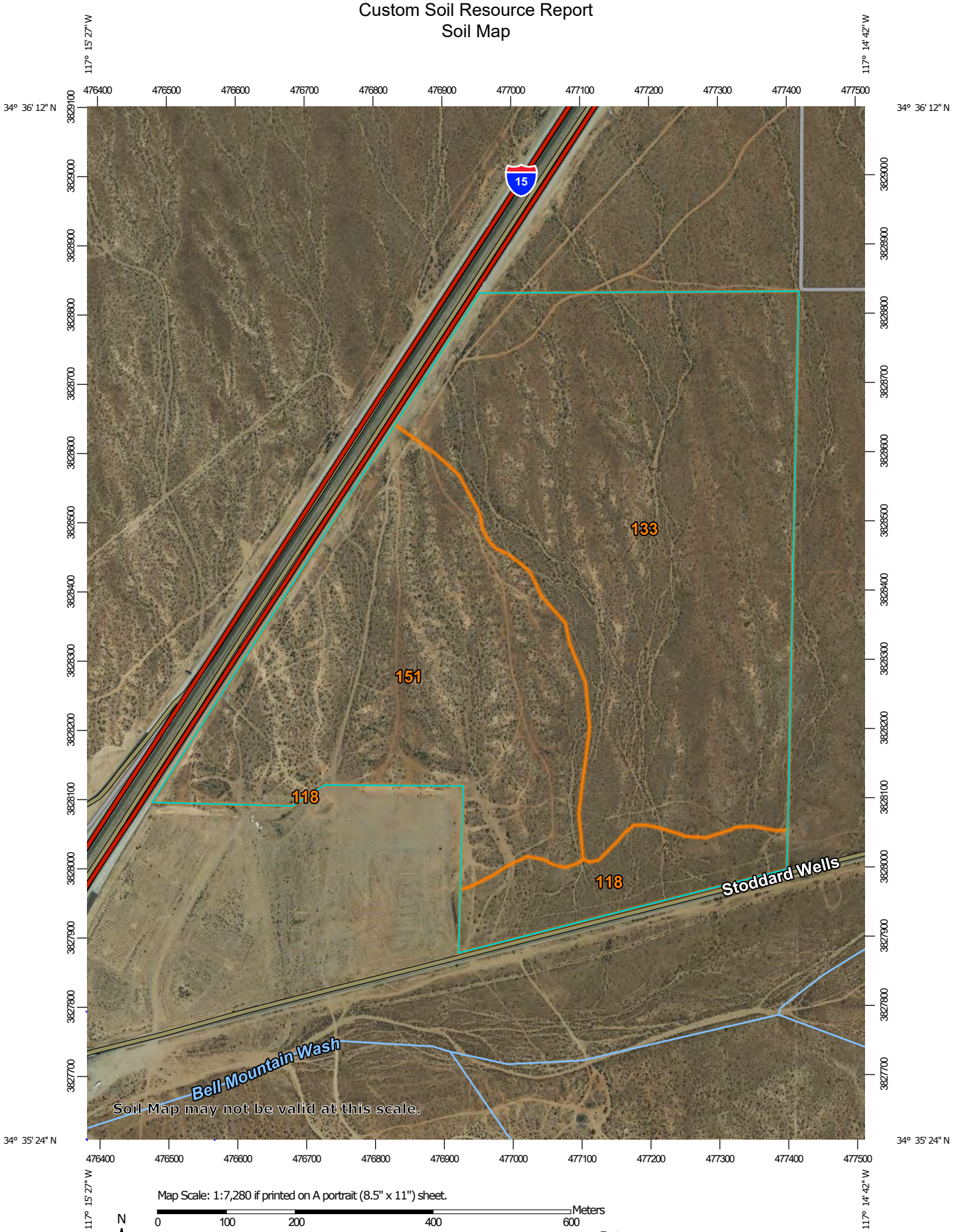
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:7,280 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 100 200 400 600

Feet
0 350 700 1400 2100

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

MAP LEGEND

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

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: San Bernardino County, California, Mojave River Area
Survey Area Data: Version 13, Sep 13, 2021

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

Date(s) aerial images were photographed: Mar 27, 2021—May 24, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
118	CAJON-ARIZO COMPLEX, 2 TO 15 PERCENT SLOPES*	10.8	7.5%
133	HELENDALE-BRYMAN LOAMY SANDS, 2 TO 5 PERCENT SLOPES*	79.5	55.2%
151	NEBONA-CUDDEBACK COMPLEX, 2 TO 9 PERCENT SLOPES*	53.7	37.3%
Totals for Area of Interest		**144.0**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate

pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

San Bernardino County, California, Mojave River Area

118—CAJON-ARIZO COMPLEX, 2 TO 15 PERCENT SLOPES*

Map Unit Setting

National map unit symbol: hkrq
Elevation: 2,800 to 3,300 feet
Mean annual precipitation: 3 to 6 inches
Mean annual air temperature: 59 to 66 degrees F
Frost-free period: 180 to 290 days
Farmland classification: Not prime farmland

Map Unit Composition

Cajon, gravelly surface, and similar soils: 55 percent
Arizo and similar soils: 30 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cajon, Gravelly Surface

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite sources

Typical profile

H1 - 0 to 6 inches: gravelly sand
H2 - 6 to 60 inches: gravelly sand

Properties and qualities

Slope: 2 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water supply, 0 to 60 inches: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: R030XF028CA - COBBLY SANDY
Hydric soil rating: No

Description of Arizo

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite sources

Typical profile

H1 - 0 to 6 inches: gravelly loamy sand
H2 - 6 to 60 inches: extremely gravelly loamy coarse sand

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: NoneOccasional
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A
Ecological site: R030XF025CA - GRAVELLY COARSE LOAMY
Hydric soil rating: No

Minor Components

Helendale

Percent of map unit: 4 percent
Hydric soil rating: No

Bryman

Percent of map unit: 4 percent
Hydric soil rating: No

Joshua

Percent of map unit: 4 percent
Hydric soil rating: No

Cajon, clayey substratum

Percent of map unit: 3 percent

133—HELENDALE-BRYMAN LOAMY SANDS, 2 TO 5 PERCENT SLOPES*

Map Unit Setting

National map unit symbol: hks6

Elevation: 2,500 to 4,000 feet
Mean annual precipitation: 3 to 6 inches
Mean annual air temperature: 59 to 63 degrees F
Frost-free period: 180 to 280 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Helendale and similar soils: 50 percent
Bryman and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Helendale

Setting

Landform: Fan remnants
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite sources

Typical profile

H1 - 0 to 6 inches: loamy sand
H2 - 6 to 30 inches: sandy loam
H3 - 30 to 66 inches: sandy loam
H4 - 66 to 99 inches: loamy sand

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: R030XF012CA - Sandy
Hydric soil rating: No

Description of Bryman

Setting

Landform: Fan remnants
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite sources

Typical profile

H1 - 0 to 8 inches: loamy sand
H2 - 8 to 12 inches: sandy loam
H3 - 12 to 44 inches: sandy clay loam
H4 - 44 to 60 inches: loamy sand

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: R030XF012CA - Sandy
Hydric soil rating: No

Minor Components

Cajon

Percent of map unit: 5 percent
Hydric soil rating: No

Mohave variant

Percent of map unit: 5 percent
Hydric soil rating: No

Unnamed soils

Percent of map unit: 5 percent
Hydric soil rating: No

151—NEBONA-CUDDEBACK COMPLEX, 2 TO 9 PERCENT SLOPES*

Map Unit Setting

National map unit symbol: hkss
Elevation: 1,800 to 3,400 feet
Mean annual precipitation: 3 to 5 inches
Mean annual air temperature: 63 to 66 degrees F
Frost-free period: 200 to 290 days
Farmland classification: Not prime farmland

Map Unit Composition

Nebona and similar soils: 60 percent
Cuddeback and similar soils: 20 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nebona

Setting

Landform: Fan remnants
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from mixed sources

Typical profile

H1 - 0 to 2 inches: sandy loam
H2 - 2 to 8 inches: fine sandy loam
H3 - 8 to 12 inches: indurated
H4 - 12 to 65 inches: stratified gravelly sand to loam

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: 6 to 14 inches to duripan
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Slightly saline to strongly saline (4.0 to 16.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 0.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: R030XF030CA - DESERT PAVEMENT
Hydric soil rating: No

Description of Cuddeback

Setting

Landform: Inset fans
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from mixed sources

Typical profile

H1 - 0 to 3 inches: sandy loam
H2 - 3 to 6 inches: sandy loam
H3 - 6 to 17 inches: gravelly sandy clay loam
H4 - 17 to 34 inches: gravelly sandy loam

H5 - 34 to 38 inches: indurated

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: 20 to 40 inches to duripan
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: R030XG024CA - DESERT PAVEMENT
Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 19 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 1 percent
Landform: Playas
Hydric soil rating: Yes

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

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

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

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

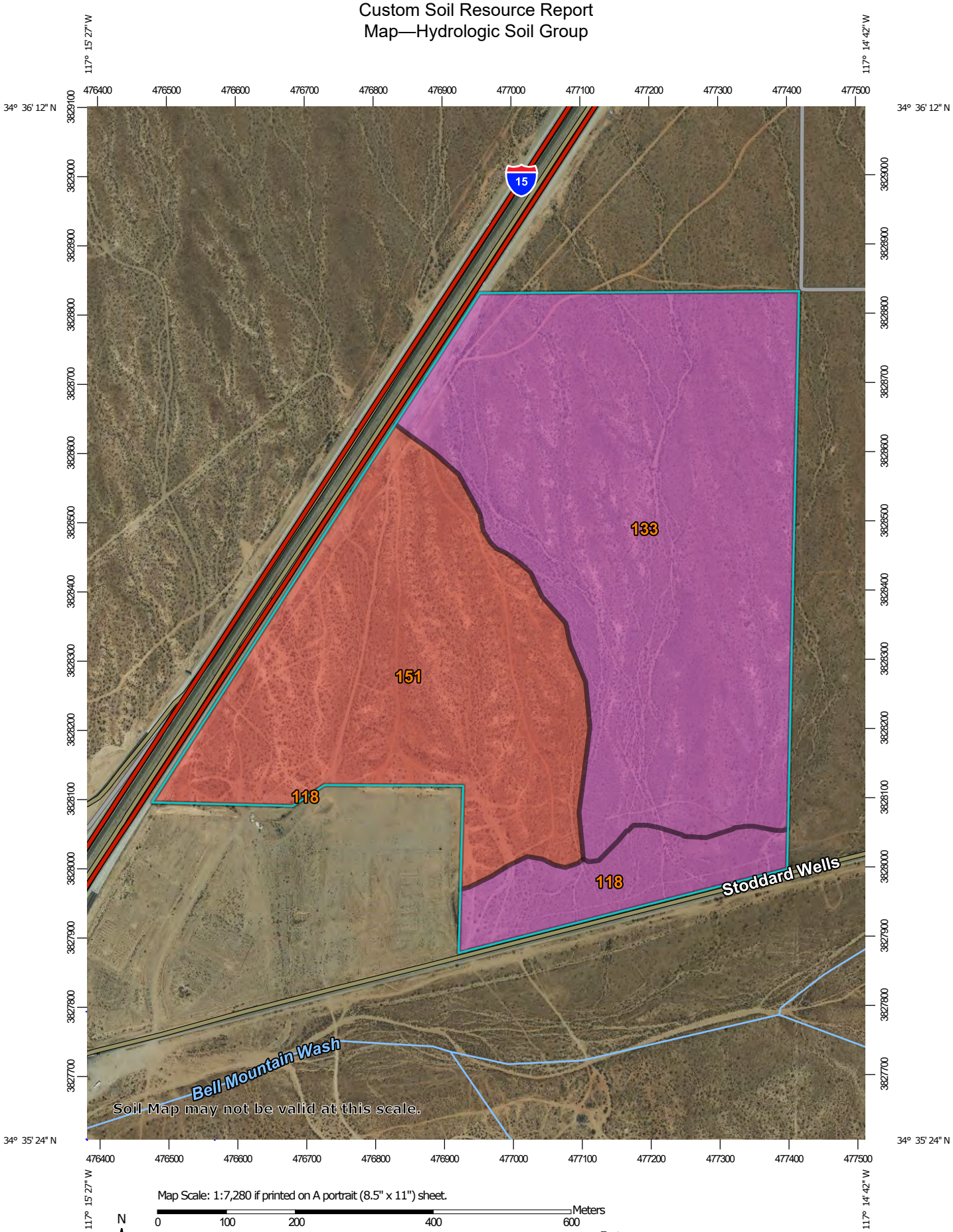
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

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

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

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

Custom Soil Resource Report
Map—Hydrologic Soil Group



Map Scale: 1:7,280 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 350 700 1400 2100

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: San Bernardino County, California, Mojave River Area
Survey Area Data: Version 13, Sep 13, 2021

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

Date(s) aerial images were photographed: Mar 27, 2021—May 24, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND	MAP INFORMATION
	imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
118	CAJON-ARIZO COMPLEX, 2 TO 15 PERCENT SLOPES*	A	10.8	7.5%
133	HELENDALE-BRYMAN LOAMY SANDS, 2 TO 5 PERCENT SLOPES*	A	79.5	55.2%
151	NEBONA-CUDDEBACK COMPLEX, 2 TO 9 PERCENT SLOPES*	D	53.7	37.3%
Totals for Area of Interest			**144.0**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

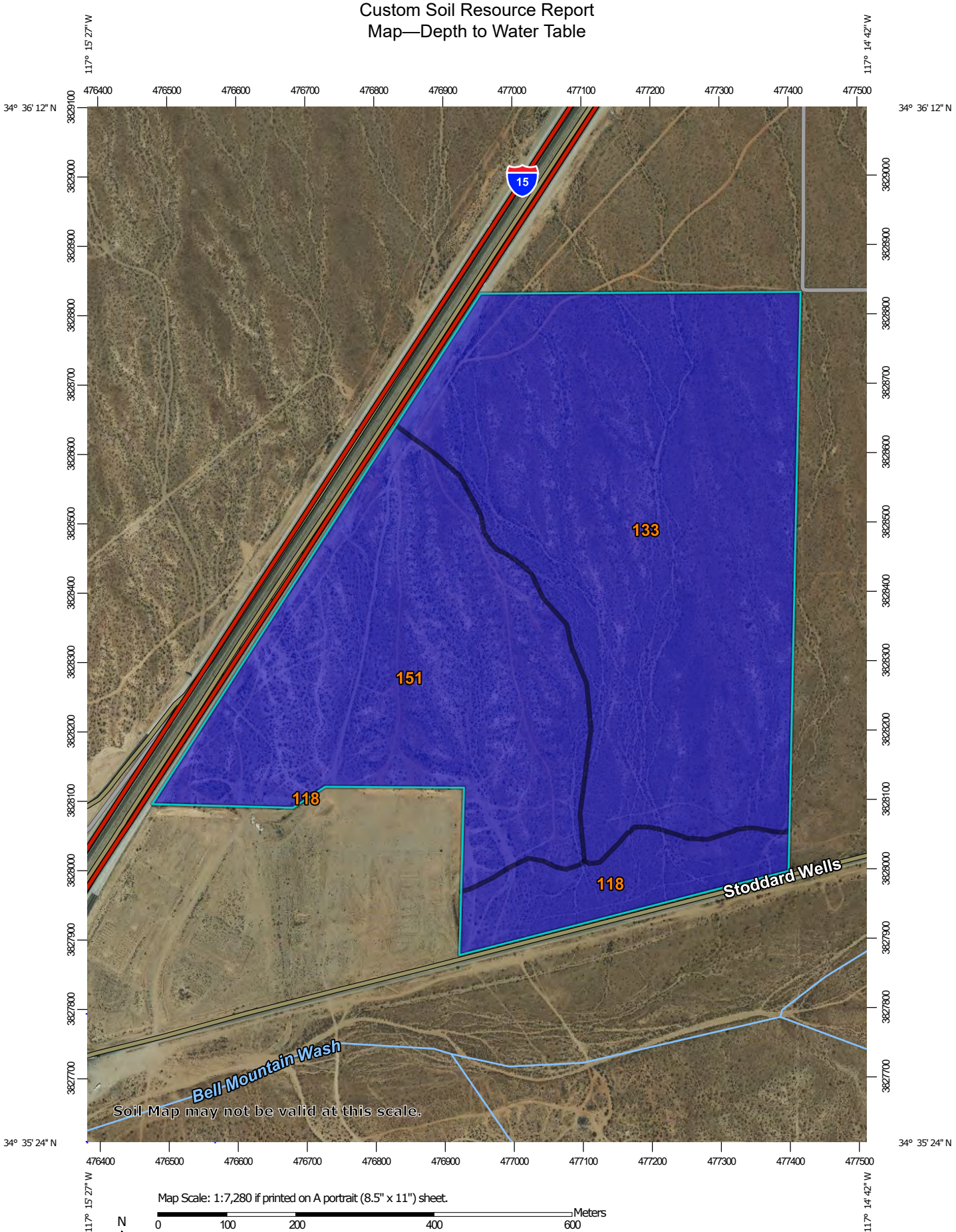
Water Features

Water Features include ponding frequency, flooding frequency, and depth to water table.

Depth to Water Table

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

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



Map Scale: 1:7,280 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 100 200 400 600

Feet
0 350 700 1400 2100

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Soil Rating Lines

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Soil Rating Points

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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Survey Area Data: Version 13, Sep 13, 2021

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Date(s) aerial images were photographed: Mar 27, 2021—May 24, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND	MAP INFORMATION
	imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Depth to Water Table

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
118	CAJON-ARIZO COMPLEX, 2 TO 15 PERCENT SLOPES*	>200	10.8	7.5%
133	HELENDALE-BRYMAN LOAMY SANDS, 2 TO 5 PERCENT SLOPES*	>200	79.5	55.2%
151	NEBONA-CUDDEBACK COMPLEX, 2 TO 9 PERCENT SLOPES*	>200	53.7	37.3%
Totals for Area of Interest			**144.0**	**100.0%**

Rating Options—Depth to Water Table

Units of Measure: centimeters

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Beginning Month: January

Ending Month: December

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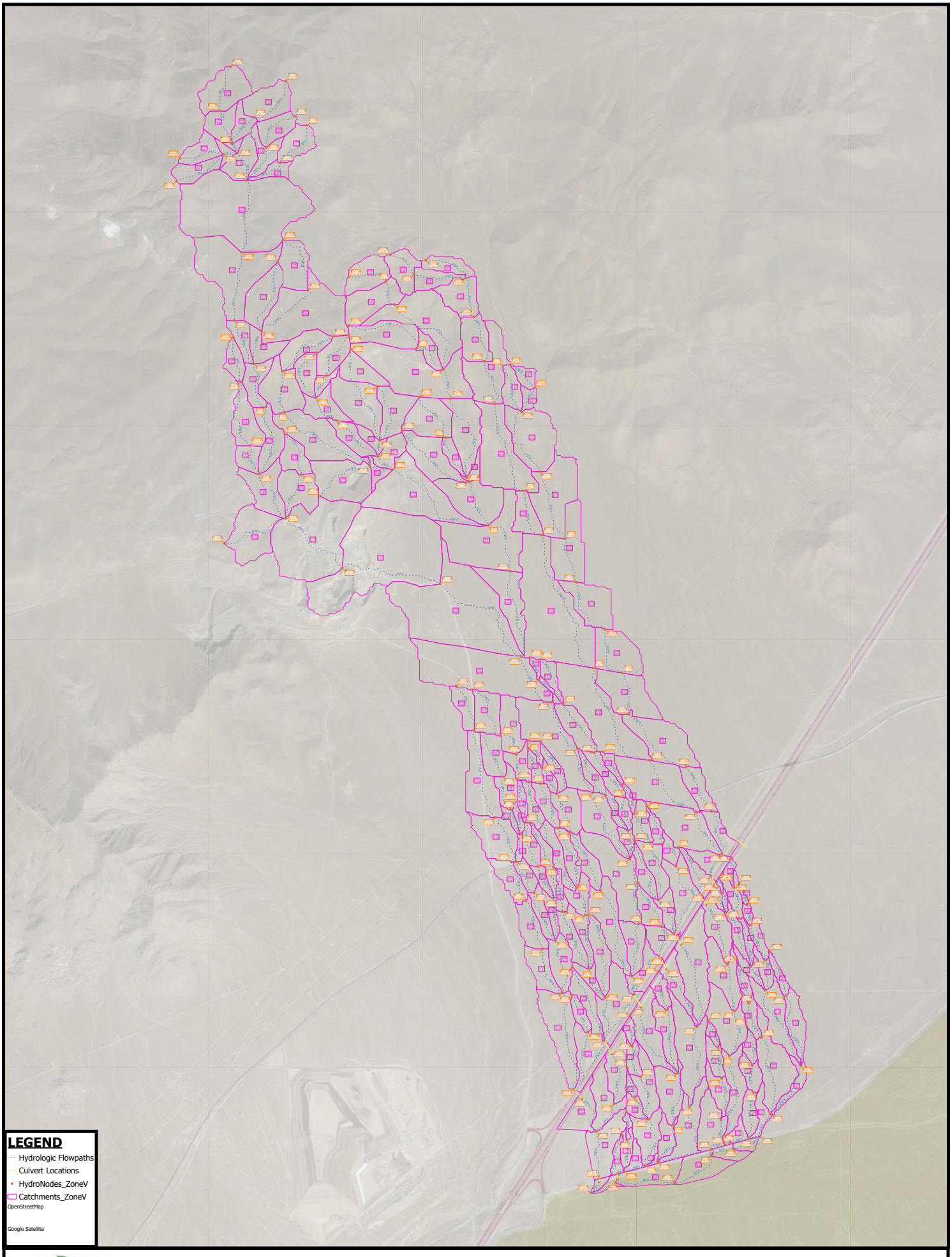
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Appendix G

Existing Condition Hydrology – Rational Method



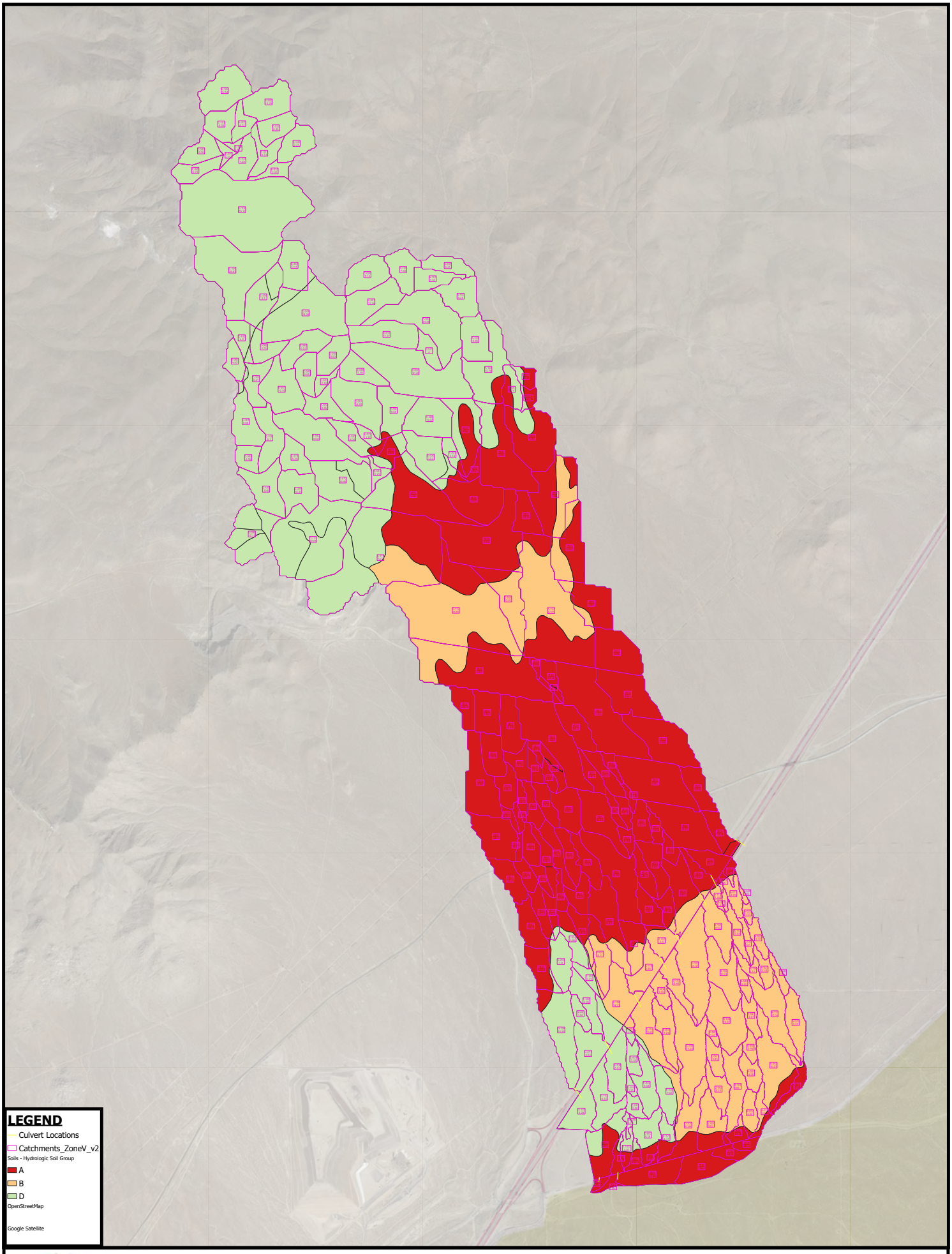
Town of Apple Valley California

0 1,000 2,000 ft

Q3 Consulting

Preliminary Drainage Exhibit - Existing Condition

Apple Valley 143-Acre Project, Apple Valley, California
For: Covington Development Partners, LLC
2022-08-25

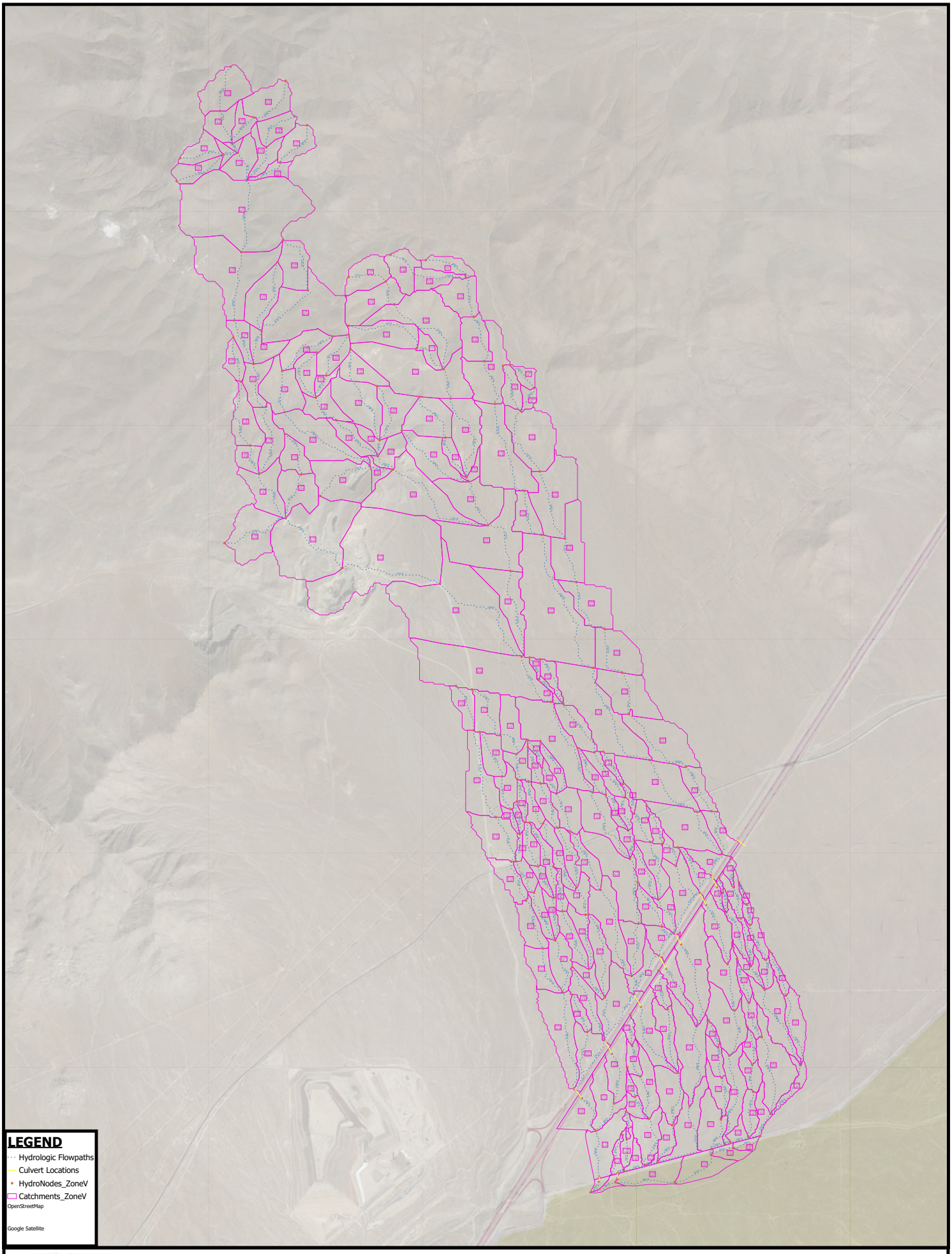


Town of Apple Valley California

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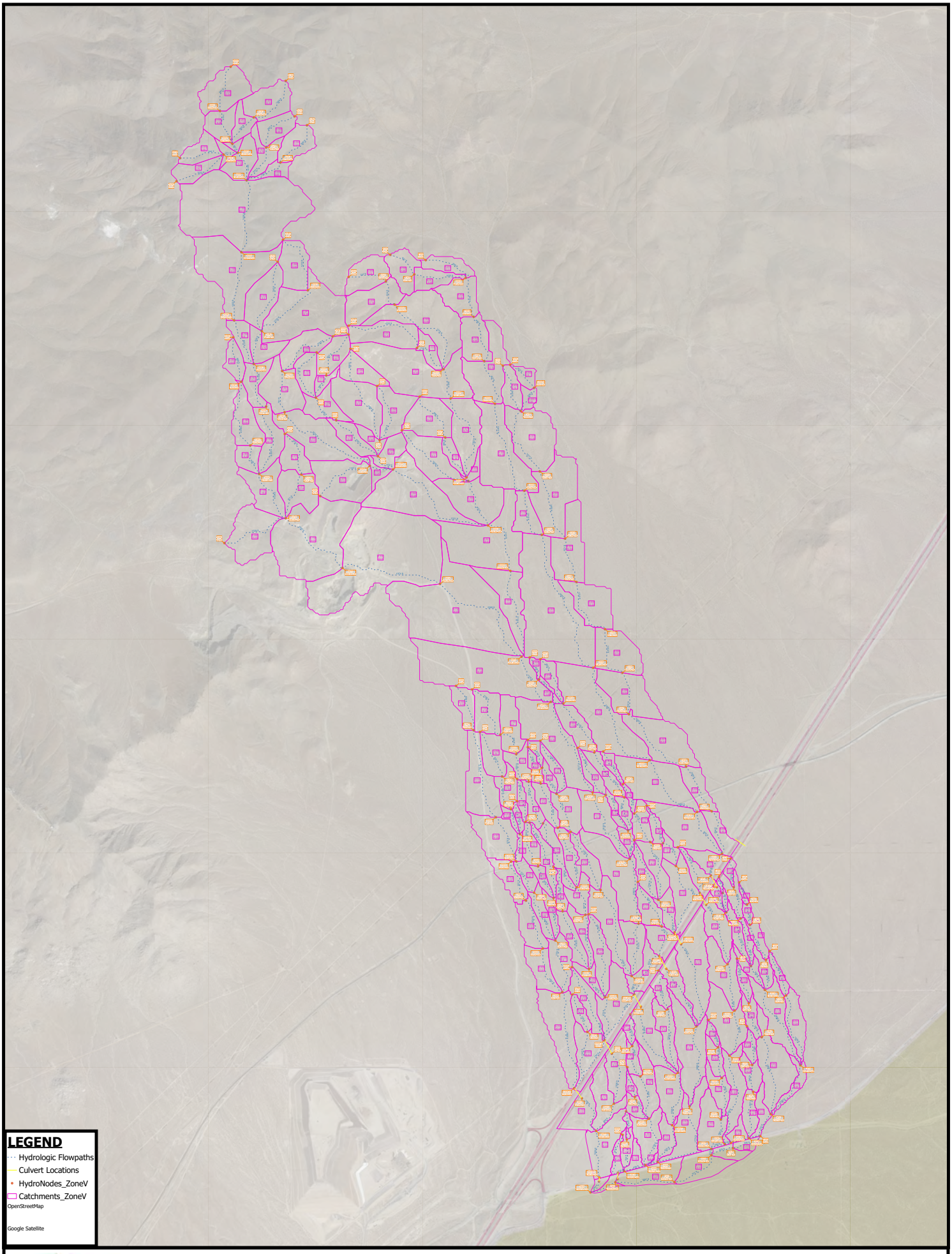
Preliminary Drainage Exhibit - Hydrologic Soil Groups

Apple Valley 143-Acre Project, Apple Valley, California
For: Covington Development Partners, LLC
2022-08-25



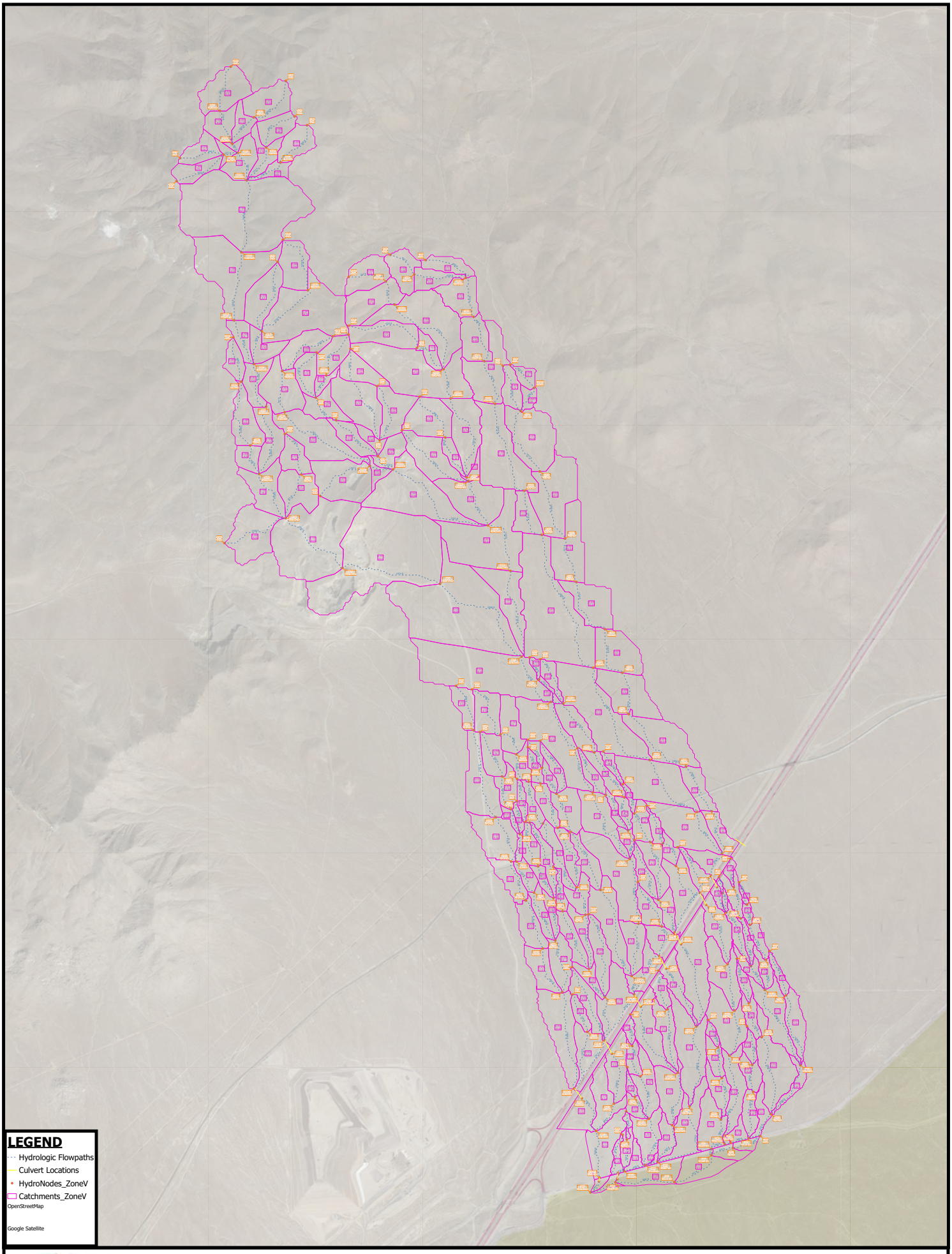
Preliminary Drainage Exhibit - Existing Condition - 10-Year Q

Apple Valley 143-Acre Project, Apple Valley, California
For: Covington Development Partners, LLC
2022-08-25



Preliminary Drainage Exhibit - Existing Condition - 100-Year Q

Apple Valley 143-Acre Project, Apple Valley, California
For: Covington Development Partners, LLC
2022-08-25



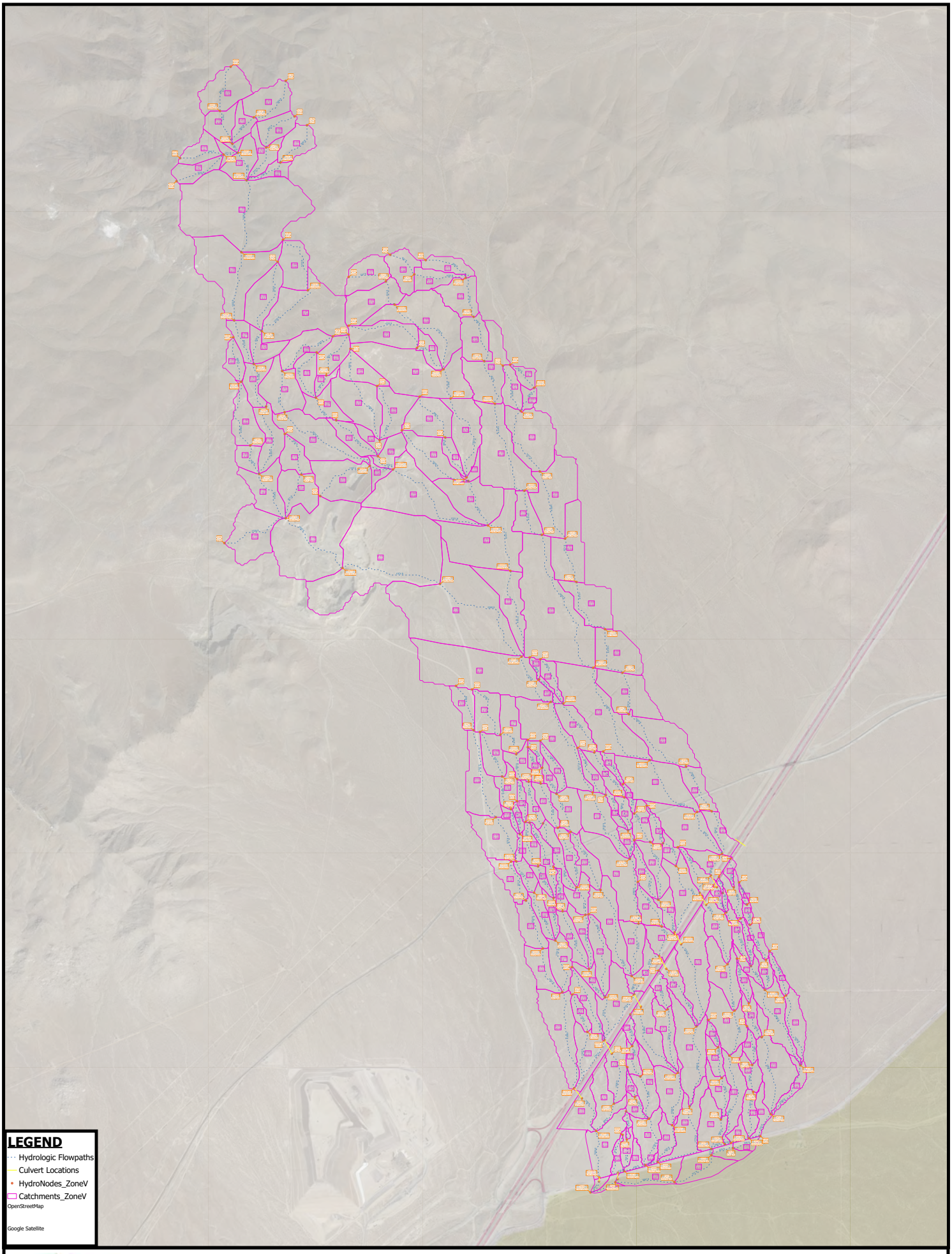
Town of Apple Valley California

0 1,000 2,000 ft

Preliminary Drainage Exhibit - Existing Condition - 10-Year Q

Apple Valley 143-Acre Project, Apple Valley, California
For: Covington Development Partners, LLC
2022-08-26

Q3 Consulting



Preliminary Drainage Exhibit - Existing Condition - 100-Year Q

Apple Valley 143-Acre Project, Apple Valley, California
For: Covington Development Partners, LLC
2022-08-25

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**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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            Ver. 22.0  Release Date: 07/01/2015  License ID 1673

                          Analysis prepared by:
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 ************************* DESCRIPTION OF STUDY *************************
* APPLE VALLEY 143 ACRES - EXISTING CONDITION                           *
* 10-YR RATIONAL METHOD - WATERSHEDS D & E                              *
* Q3 08/26/2022                                                         *
 ************************************************************************

  FILE NAME: APC_10E.DAT
  TIME/DATE OF STUDY: 18:17 08/26/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.7000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.6060

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 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.*
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  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE   3000.00 TO NODE   3001.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   732.00
  ELEVATION DATA: UPSTREAM(FEET) =   3162.40  DOWNSTREAM(FEET) =   3134.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.097
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.670
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  USER-DEFINED               -        2.10      0.44     1.000     -   14.10
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.33
  TOTAL AREA(ACRES) =      2.10   PEAK FLOW RATE(CFS) =      2.33

****************************************************************************
  FLOW PROCESS FROM NODE   3001.00 TO NODE   3002.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3134.30  DOWNSTREAM(FEET) =   3112.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   619.00   CHANNEL SLOPE =  0.0352
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0352 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.33
  FLOW VELOCITY(FEET/SEC) =   1.39 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.41   Tc(MIN.) =   21.51
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3002.00 =    1351.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3002.00 TO NODE   3002.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.51
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.243
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        1.33      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
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  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.33      SUBAREA RUNOFF(CFS) =    0.96
  EFFECTIVE AREA(ACRES) =      3.43   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.4       PEAK FLOW RATE(CFS) =       2.48

****************************************************************************
  FLOW PROCESS FROM NODE   3002.00 TO NODE   3003.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3112.50  DOWNSTREAM(FEET) =   3087.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   636.00   CHANNEL SLOPE =  0.0393
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.48
  FLOW VELOCITY(FEET/SEC) =   3.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.97   Tc(MIN.) =   24.48
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3003.00 =    1987.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3003.00 TO NODE   3003.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   24.48
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.135
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        4.92      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.92      SUBAREA RUNOFF(CFS) =    3.08
  EFFECTIVE AREA(ACRES) =      8.35   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        8.4       PEAK FLOW RATE(CFS) =       5.22

****************************************************************************
  FLOW PROCESS FROM NODE   3003.00 TO NODE   3004.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3087.50  DOWNSTREAM(FEET) =   3051.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1242.00   CHANNEL SLOPE =  0.0293
  CHANNEL FLOW THRU SUBAREA(CFS) =       5.22
  FLOW VELOCITY(FEET/SEC) =   3.65 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.67   Tc(MIN.) =   30.15
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3004.00 =    3229.00 FEET.
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****************************************************************************
  FLOW PROCESS FROM NODE   3004.00 TO NODE   3004.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   30.15
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.981
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        6.74      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    6.74      SUBAREA RUNOFF(CFS) =    3.28
  EFFECTIVE AREA(ACRES) =     15.09   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       15.1       PEAK FLOW RATE(CFS) =       7.35

****************************************************************************
  FLOW PROCESS FROM NODE   3004.00 TO NODE   3004.50 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3051.10  DOWNSTREAM(FEET) =   3028.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   734.00   CHANNEL SLOPE =  0.0308
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0308 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       7.35
  FLOW VELOCITY(FEET/SEC) =   1.91 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.41   Tc(MIN.) =   36.56
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3004.50 =    3963.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3004.50 TO NODE   3004.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   36.56
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.857
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        3.50      0.44     1.000     -
  COMMERCIAL                 B        0.42      0.75     0.100    56
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.09      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.906
  SUBAREA AREA(ACRES) =    4.01      SUBAREA RUNOFF(CFS) =    1.65
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  EFFECTIVE AREA(ACRES) =     19.10   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =       19.1       PEAK FLOW RATE(CFS) =       7.35
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   3004.50 TO NODE   3004.50 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3200.00 TO NODE   3201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   797.00
  ELEVATION DATA: UPSTREAM(FEET) =   3114.30  DOWNSTREAM(FEET) =   3086.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.825
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.612
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  USER-DEFINED               -        2.57      0.44     1.000     -   14.82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.71
  TOTAL AREA(ACRES) =      2.57   PEAK FLOW RATE(CFS) =      2.71

****************************************************************************
  FLOW PROCESS FROM NODE   3201.00 TO NODE   3202.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3086.10  DOWNSTREAM(FEET) =   3068.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   536.00   CHANNEL SLOPE =  0.0330
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0330 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.71
  FLOW VELOCITY(FEET/SEC) =   1.42 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.30   Tc(MIN.) =   21.12
  LONGEST FLOWPATH FROM NODE   3200.00 TO NODE   3202.00 =    1333.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3202.00 TO NODE   3202.00 IS CODE =  81
----------------------------------------------------------------------------
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  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   21.12
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.259
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        2.70      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.70      SUBAREA RUNOFF(CFS) =    1.99
  EFFECTIVE AREA(ACRES) =      5.27   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        5.3       PEAK FLOW RATE(CFS) =       3.88

********************************************************************************
  FLOW PROCESS FROM NODE   3202.00 TO NODE   3004.50 IS CODE =  53
--------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3068.40  DOWNSTREAM(FEET) =   3028.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1518.00   CHANNEL SLOPE =  0.0263
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0263 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.88
  FLOW VELOCITY(FEET/SEC) =   1.43 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  17.74   Tc(MIN.) =   38.86
  LONGEST FLOWPATH FROM NODE   3200.00 TO NODE   3004.50 =    2851.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE   3004.50 TO NODE   3004.50 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   38.86
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.821
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.64      0.98     0.100    32
  USER-DEFINED               -        4.52      0.44     1.000     -
  COMMERCIAL                 B        4.18      0.75     0.100    56
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.13      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.47
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.542
  SUBAREA AREA(ACRES) =    9.47      SUBAREA RUNOFF(CFS) =    4.83
  EFFECTIVE AREA(ACRES) =     14.74   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.71
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  TOTAL AREA(ACRES) =       14.7       PEAK FLOW RATE(CFS) =       6.64

****************************************************************************
  FLOW PROCESS FROM NODE   3004.50 TO NODE   3004.50 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        6.64   38.86    0.821  0.45( 0.32) 0.71      14.7    3200.00
  LONGEST FLOWPATH FROM NODE   3200.00 TO NODE   3004.50 =    2851.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        7.35   36.56    0.857  0.44( 0.43) 0.98      19.1    3000.00
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3004.50 =    3963.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       13.99   36.56    0.857  0.45( 0.39) 0.86      33.0    3000.00
      2       13.37   38.86    0.821  0.45( 0.38) 0.86      33.8    3200.00
    TOTAL AREA(ACRES) =        33.8

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       13.99  Tc(MIN.) =   36.559
  EFFECTIVE AREA(ACRES) =     32.97  AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =       33.8
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3004.50 =    3963.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3004.50 TO NODE   3004.50 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3004.50 TO NODE   3005.00 IS CODE =  37
----------------------------------------------------------------------------
  >>>>>COMPUTE CULVERT TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED CULVERT SIZE<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3028.50  DOWNSTREAM(FEET) =  3024.30
  FLOW LENGTH(FEET) =   250.00   MANNING'S N =  0.014
  Notes:
    1. Reference: "Hydraulic Charts for the Selection of
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      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.) =   7.91
  CULVERT-FLOW(CFS) =      13.99
  CULVERT-FLOW TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =   37.09
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3005.00 =    4213.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3005.00 TO NODE   3006.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3024.30  DOWNSTREAM(FEET) =   2975.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1729.00   CHANNEL SLOPE =  0.0284
  CHANNEL FLOW THRU SUBAREA(CFS) =      13.99
  FLOW VELOCITY(FEET/SEC) =   4.59 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.28   Tc(MIN.) =   43.36
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3006.00 =    5942.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3006.00 TO NODE   3006.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   43.36
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.761
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        3.97      0.75     0.100    56
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B       15.00      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.35
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.812
  SUBAREA AREA(ACRES) =   18.97      SUBAREA RUNOFF(CFS) =    8.08
  EFFECTIVE AREA(ACRES) =     51.94   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.41  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =       52.8       PEAK FLOW RATE(CFS) =      19.22

****************************************************************************
  FLOW PROCESS FROM NODE   3006.00 TO NODE   3006.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================
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****************************************************************************
  FLOW PROCESS FROM NODE   4000.00 TO NODE   4001.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   956.00
  ELEVATION DATA: UPSTREAM(FEET) =   3068.10  DOWNSTREAM(FEET) =   3035.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   16.023
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.527
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  USER-DEFINED               -        5.14      0.44     1.000     -   16.02
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      5.03
  TOTAL AREA(ACRES) =      5.14   PEAK FLOW RATE(CFS) =      5.03

****************************************************************************
  FLOW PROCESS FROM NODE   4001.00 TO NODE   4001.50 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3035.10  DOWNSTREAM(FEET) =   3016.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   657.00   CHANNEL SLOPE =  0.0277
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0277 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       5.03
  FLOW VELOCITY(FEET/SEC) =   1.60 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.86   Tc(MIN.) =   22.88
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4001.50 =    1613.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4001.50 TO NODE   4001.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   22.88
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.190
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        0.69      0.44     1.000     -
  COMMERCIAL                 B        3.10      0.75     0.100    56
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        1.97      0.34     1.000    82
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.41
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.516
  SUBAREA AREA(ACRES) =    5.76      SUBAREA RUNOFF(CFS) =    5.08
  EFFECTIVE AREA(ACRES) =     10.90   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  0.74
  TOTAL AREA(ACRES) =       10.9       PEAK FLOW RATE(CFS) =       8.55

****************************************************************************
  FLOW PROCESS FROM NODE   4001.50 TO NODE   4002.00 IS CODE =  37
----------------------------------------------------------------------------
  >>>>>COMPUTE CULVERT TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED CULVERT SIZE<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3016.90  DOWNSTREAM(FEET) =  3012.20
  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) =   1.25
  NUMBER OF BARREL(S) =   1
  CULVERT-FLOW VELOCITY(FEET/SEC.) =   6.96
  CULVERT-FLOW(CFS) =       8.55
  CULVERT-FLOW TRAVEL TIME(MIN.) =   0.60    Tc(MIN.) =   23.48
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4002.00 =    1863.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4002.00 TO NODE   3006.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3012.20  DOWNSTREAM(FEET) =   2975.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1303.00   CHANNEL SLOPE =  0.0284
  CHANNEL FLOW THRU SUBAREA(CFS) =       8.55
  FLOW VELOCITY(FEET/SEC) =   4.05 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.36   Tc(MIN.) =   28.85
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   3006.00 =    3166.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3006.00 TO NODE   3006.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   28.85
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.012
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                B        2.06      0.75     0.100    56
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        4.42      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.36
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.714
  SUBAREA AREA(ACRES) =    6.48      SUBAREA RUNOFF(CFS) =    4.39
  EFFECTIVE AREA(ACRES) =     17.38   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.73
  TOTAL AREA(ACRES) =       17.4       PEAK FLOW RATE(CFS) =      11.19

****************************************************************************
  FLOW PROCESS FROM NODE   3006.00 TO NODE   3006.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       11.19   28.85    1.012  0.40( 0.30) 0.73      17.4    4000.00
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   3006.00 =    3166.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       19.22   43.36    0.761  0.41( 0.35) 0.85      51.9    3000.00
      2       18.23   45.76    0.733  0.41( 0.35) 0.84      52.8    3200.00
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3006.00 =    5942.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       30.41   28.85    1.012  0.41( 0.33) 0.81      51.9    4000.00
      2       26.49   43.36    0.761  0.41( 0.34) 0.82      69.3    3000.00
      3       25.05   45.76    0.733  0.41( 0.34) 0.82      70.2    3200.00
    TOTAL AREA(ACRES) =        70.2

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       30.41  Tc(MIN.) =   28.846
  EFFECTIVE AREA(ACRES) =     51.93  AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.41  AREA-AVERAGED Ap =  0.81
  TOTAL AREA(ACRES) =       70.2
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3006.00 =    5942.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3006.00 TO NODE   3006.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   3006.00 TO NODE   3007.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2975.20  DOWNSTREAM(FEET) =   2938.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1685.00   CHANNEL SLOPE =  0.0220
  CHANNEL FLOW THRU SUBAREA(CFS) =      30.41
  FLOW VELOCITY(FEET/SEC) =   4.99 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.63   Tc(MIN.) =   34.48
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3007.00 =    7627.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3007.00 TO NODE   3007.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   34.48
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.893
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B       17.33      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   17.33      SUBAREA RUNOFF(CFS) =    8.56
  EFFECTIVE AREA(ACRES) =     69.26   AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.39  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =       87.5       PEAK FLOW RATE(CFS) =      34.81

****************************************************************************
  FLOW PROCESS FROM NODE   3007.00 TO NODE   3008.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2938.10  DOWNSTREAM(FEET) =   2910.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1770.00   CHANNEL SLOPE =  0.0157
  CHANNEL FLOW THRU SUBAREA(CFS) =      34.81
  FLOW VELOCITY(FEET/SEC) =   4.38 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.74   Tc(MIN.) =   41.22
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3008.00 =    9397.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3008.00 TO NODE   3008.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==========================================================================
  MAINLINE Tc(MIN.) =   41.22
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.788
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.82      0.98     0.100    32
  USER-DEFINED               -        3.42      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        7.32      0.34     1.000    82
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        0.08      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.38
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.937
  SUBAREA AREA(ACRES) =   11.64      SUBAREA RUNOFF(CFS) =    4.55
  EFFECTIVE AREA(ACRES) =     80.90   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.39  AREA-AVERAGED Ap =  0.87
  TOTAL AREA(ACRES) =       99.2       PEAK FLOW RATE(CFS) =      34.81
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

**************************************************************************
  FLOW PROCESS FROM NODE   3008.00 TO NODE   3008.00 IS CODE =  10
--------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
==========================================================================

**************************************************************************
  FLOW PROCESS FROM NODE   5000.00 TO NODE   5001.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   881.00
  ELEVATION DATA: UPSTREAM(FEET) =   3981.30  DOWNSTREAM(FEET) =   3901.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.783
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.789
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       12.54      0.18     1.000    91   12.78
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     18.16
  TOTAL AREA(ACRES) =     12.54   PEAK FLOW RATE(CFS) =     18.16

**************************************************************************
  FLOW PROCESS FROM NODE   5001.00 TO NODE   5002.00 IS CODE =  53
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3901.40  DOWNSTREAM(FEET) =   3874.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   710.00   CHANNEL SLOPE =  0.0379
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0379 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      18.16
  FLOW VELOCITY(FEET/SEC) =   2.86 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.13   Tc(MIN.) =   16.92
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5002.00 =    1591.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5002.00 TO NODE   5002.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.92
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.470
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        6.39      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    6.39      SUBAREA RUNOFF(CFS) =    7.42
  EFFECTIVE AREA(ACRES) =     18.93   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       18.9       PEAK FLOW RATE(CFS) =      21.98

****************************************************************************
  FLOW PROCESS FROM NODE   5002.00 TO NODE   5002.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5100.00 TO NODE   5101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1024.00
  ELEVATION DATA: UPSTREAM(FEET) =   4046.20  DOWNSTREAM(FEET) =   3936.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.124
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.756
```

```
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       10.29      0.18     1.000    91   13.12
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     14.60
  TOTAL AREA(ACRES) =     10.29   PEAK FLOW RATE(CFS) =     14.60

****************************************************************************
  FLOW PROCESS FROM NODE   5101.00 TO NODE   5002.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3936.20  DOWNSTREAM(FEET) =   3874.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   642.00   CHANNEL SLOPE =  0.0961
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0961 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      14.60
  FLOW VELOCITY(FEET/SEC) =   4.24 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.52   Tc(MIN.) =   15.65
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5002.00 =    1666.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5002.00 TO NODE   5002.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.65
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.553
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        4.12      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.12      SUBAREA RUNOFF(CFS) =    5.09
  EFFECTIVE AREA(ACRES) =     14.41   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       14.4       PEAK FLOW RATE(CFS) =      17.80

****************************************************************************
  FLOW PROCESS FROM NODE   5002.00 TO NODE   5002.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================
```

```
  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       17.80   15.65    1.553  0.18( 0.18) 1.00      14.4    5100.00
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5002.00 =    1666.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       21.98   16.92    1.470  0.18( 0.18) 1.00      18.9    5000.00
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5002.00 =    1591.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       39.43   15.65    1.553  0.18( 0.18) 1.00      31.9    5100.00
      2       38.71   16.92    1.470  0.18( 0.18) 1.00      33.3    5000.00
    TOTAL AREA(ACRES) =        33.3

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       39.43  Tc(MIN.) =   15.648
  EFFECTIVE AREA(ACRES) =     31.92  AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       33.3
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5002.00 =    1666.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5002.00 TO NODE   5002.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5002.00 TO NODE   5003.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3874.50  DOWNSTREAM(FEET) =   3860.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   201.00   CHANNEL SLOPE =  0.0711
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0711 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      39.43
  FLOW VELOCITY(FEET/SEC) =   5.08 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.66   Tc(MIN.) =   16.31
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5003.00 =    1867.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5003.00 TO NODE   5003.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   16.31
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.508
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        7.28      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    7.28      SUBAREA RUNOFF(CFS) =    8.70
  EFFECTIVE AREA(ACRES) =     39.20   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       40.6       PEAK FLOW RATE(CFS) =      46.86

********************************************************************************
  FLOW PROCESS FROM NODE   5003.00 TO NODE   5003.00 IS CODE =  10
--------------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
================================================================================

********************************************************************************
  FLOW PROCESS FROM NODE   5200.00 TO NODE   5201.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1032.00
  ELEVATION DATA: UPSTREAM(FEET) =   4207.30  DOWNSTREAM(FEET) =   3894.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.697
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.026
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        5.75      0.18     1.000    91   10.70
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      9.55
  TOTAL AREA(ACRES) =      5.75   PEAK FLOW RATE(CFS) =      9.55

********************************************************************************
  FLOW PROCESS FROM NODE   5201.00 TO NODE   5201.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   10.70
```

```
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.026
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        6.08      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    6.08      SUBAREA RUNOFF(CFS) =   10.10
  EFFECTIVE AREA(ACRES) =     11.83   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       11.8       PEAK FLOW RATE(CFS) =      19.66

****************************************************************************
  FLOW PROCESS FROM NODE   5201.00 TO NODE   5003.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3894.30  DOWNSTREAM(FEET) =   3860.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   271.00   CHANNEL SLOPE =  0.1258
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1189 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      19.66
  FLOW VELOCITY(FEET/SEC) =   5.21 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.87   Tc(MIN.) =   11.56
  LONGEST FLOWPATH FROM NODE   5200.00 TO NODE   5003.00 =    1303.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5003.00 TO NODE   5003.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.56
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.919
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        1.71      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.71      SUBAREA RUNOFF(CFS) =    2.68
  EFFECTIVE AREA(ACRES) =     13.54   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       13.5       PEAK FLOW RATE(CFS) =      21.19

****************************************************************************
  FLOW PROCESS FROM NODE   5003.00 TO NODE   5003.00 IS CODE =  11
----------------------------------------------------------------------------
```

```
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
================================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       21.19   11.56    1.919  0.18( 0.18) 1.00      13.5    5200.00
  LONGEST FLOWPATH FROM NODE   5200.00 TO NODE   5003.00 =    1303.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       46.86   16.31    1.508  0.18( 0.18) 1.00      39.2    5100.00
      2       45.73   17.58    1.431  0.18( 0.18) 1.00      40.6    5000.00
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5003.00 =    1867.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       64.68   11.56    1.919  0.18( 0.18) 1.00      41.3    5200.00
      2       63.05   16.31    1.508  0.18( 0.18) 1.00      52.7    5100.00
      3       60.98   17.58    1.431  0.18( 0.18) 1.00      54.2    5000.00
    TOTAL AREA(ACRES) =        54.2

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       64.68  Tc(MIN.) =   11.565
  EFFECTIVE AREA(ACRES) =     41.34  AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       54.2
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5003.00 =    1867.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5003.00 TO NODE   5003.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5003.00 TO NODE   5004.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3860.20  DOWNSTREAM(FEET) =   3840.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   567.00   CHANNEL SLOPE =  0.0342
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0342 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      64.68
  FLOW VELOCITY(FEET/SEC) =   4.15 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.28   Tc(MIN.) =   13.84
```

```
 LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5004.00 =    2434.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5004.00 TO NODE   5004.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.84
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.692
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL DESERT COVER
 "DESERT BRUSH"   (30.0%)   D        7.28      0.18     1.000    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    7.28      SUBAREA RUNOFF(CFS) =    9.91
 EFFECTIVE AREA(ACRES) =     48.62   AREA-AVERAGED Fm(INCH/HR) =  0.18
 AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       61.4       PEAK FLOW RATE(CFS) =      66.16

****************************************************************************
 FLOW PROCESS FROM NODE   5004.00 TO NODE   5004.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE   5230.00 TO NODE   5231.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   887.00
 ELEVATION DATA: UPSTREAM(FEET) =   4040.50  DOWNSTREAM(FEET) =   3880.90

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.177
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.965
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL DESERT COVER
 "DESERT BRUSH"   (30.0%)   D        6.35      0.18     1.000    91   11.18
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =     10.20
 TOTAL AREA(ACRES) =      6.35   PEAK FLOW RATE(CFS) =     10.20

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

```
  FLOW PROCESS FROM NODE   5231.00 TO NODE   5004.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3880.90  DOWNSTREAM(FEET) =   3840.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   757.00   CHANNEL SLOPE =  0.0530
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0530 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      10.20
  FLOW VELOCITY(FEET/SEC) =   2.79 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.52   Tc(MIN.) =   15.69
  LONGEST FLOWPATH FROM NODE   5230.00 TO NODE   5004.00 =    1644.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5004.00 TO NODE   5004.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.69
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.549
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        5.73      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.73      SUBAREA RUNOFF(CFS) =    7.06
  EFFECTIVE AREA(ACRES) =     12.08   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       12.1       PEAK FLOW RATE(CFS) =      14.89

****************************************************************************
  FLOW PROCESS FROM NODE   5004.00 TO NODE   5004.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       14.89   15.69    1.549  0.18( 0.18) 1.00      12.1    5230.00
  LONGEST FLOWPATH FROM NODE   5230.00 TO NODE   5004.00 =    1644.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       66.16   13.84    1.692  0.18( 0.18) 1.00      48.6    5200.00
      2       64.58   18.60    1.376  0.18( 0.18) 1.00      60.0    5100.00
```

```
     3       62.60   19.90    1.312  0.18( 0.18) 1.00      61.4    5000.00
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5004.00 =    2434.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       80.65   13.84    1.692  0.18( 0.18) 1.00      59.3    5200.00
      2       80.43   15.69    1.549  0.18( 0.18) 1.00      65.1    5230.00
      3       77.58   18.60    1.376  0.18( 0.18) 1.00      72.1    5100.00
      4       74.90   19.90    1.312  0.18( 0.18) 1.00      73.5    5000.00
    TOTAL AREA(ACRES) =        73.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       80.65  Tc(MIN.) =   13.840
  EFFECTIVE AREA(ACRES) =     59.27  AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       73.5
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5004.00 =    2434.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5004.00 TO NODE   5004.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5004.00 TO NODE   5004.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5240.00 TO NODE   5241.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   948.00
  ELEVATION DATA: UPSTREAM(FEET) =   4077.00  DOWNSTREAM(FEET) =   3886.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.225
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.959
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        7.21      0.18     1.000    91   11.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
```

```
  SUBAREA RUNOFF(CFS) =     11.54
  TOTAL AREA(ACRES) =      7.21   PEAK FLOW RATE(CFS) =     11.54

****************************************************************************
  FLOW PROCESS FROM NODE   5241.00 TO NODE   5004.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3886.30  DOWNSTREAM(FEET) =   3840.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   772.00   CHANNEL SLOPE =  0.0589
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0589 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      11.54
  FLOW VELOCITY(FEET/SEC) =   3.07 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.19   Tc(MIN.) =   15.42
  LONGEST FLOWPATH FROM NODE   5240.00 TO NODE   5004.00 =    1720.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5004.00 TO NODE   5004.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.42
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.569
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        3.05      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.05      SUBAREA RUNOFF(CFS) =    3.81
  EFFECTIVE AREA(ACRES) =     10.26   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       10.3       PEAK FLOW RATE(CFS) =      12.83

****************************************************************************
  FLOW PROCESS FROM NODE   5004.00 TO NODE   5004.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       12.83   15.42    1.569  0.18( 0.18) 1.00      10.3    5240.00
  LONGEST FLOWPATH FROM NODE   5240.00 TO NODE   5004.00 =    1720.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
```

```
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1       80.65   13.84    1.692  0.18( 0.18) 1.00      59.3    5200.00
    2       80.43   15.69    1.549  0.18( 0.18) 1.00      65.1    5230.00
    3       77.58   18.60    1.376  0.18( 0.18) 1.00      72.1    5100.00
    4       74.90   19.90    1.312  0.18( 0.18) 1.00      73.5    5000.00
LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5004.00 =    2434.00 FEET.

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1       93.19   13.84    1.692  0.18( 0.18) 1.00      68.5    5200.00
    2       93.29   15.42    1.569  0.18( 0.18) 1.00      74.5    5240.00
    3       93.08   15.69    1.549  0.18( 0.18) 1.00      75.4    5230.00
    4       88.62   18.60    1.376  0.18( 0.18) 1.00      82.4    5100.00
    5       85.36   19.90    1.312  0.18( 0.18) 1.00      83.8    5000.00
  TOTAL AREA(ACRES) =        83.8

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =       93.29  Tc(MIN.) =   15.416
EFFECTIVE AREA(ACRES) =     74.51  AREA-AVERAGED Fm(INCH/HR) =  0.18
AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =       83.8
LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5004.00 =    2434.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   5004.00 TO NODE   5005.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   3840.80  DOWNSTREAM(FEET) =   3764.30
CHANNEL LENGTH THRU SUBAREA(FEET) =  1426.00   CHANNEL SLOPE =  0.0536
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .0536 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =      93.29
FLOW VELOCITY(FEET/SEC) =   5.87 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   4.05   Tc(MIN.) =   19.46
LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5005.00 =    3860.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   5005.00 TO NODE   5005.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   19.46
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.333
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       58.12      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   58.12      SUBAREA RUNOFF(CFS) =   60.30
  EFFECTIVE AREA(ACRES) =    132.63   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      141.9       PEAK FLOW RATE(CFS) =     137.61

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      140.58   17.89    1.414  0.18( 0.18) 1.00     126.6    5200.00
      2      137.61   19.46    1.333  0.18( 0.18) 1.00     132.6    5240.00
      3      136.92   19.74    1.319  0.18( 0.18) 1.00     133.5    5230.00
      4      128.44   22.72    1.196  0.18( 0.18) 1.00     140.5    5100.00
      5      123.69   24.07    1.149  0.18( 0.18) 1.00     141.9    5000.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =     140.58  Tc(MIN.) =   17.89
  AREA-AVERAGED Fm(INCH/HR) =  0.18  AREA-AVERAGED Fp(INCH/HR) =  0.18
  AREA-AVERAGED Ap =  1.00  EFFECTIVE AREA(ACRES) =     126.60

****************************************************************************
  FLOW PROCESS FROM NODE   5005.00 TO NODE   5006.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3764.30  DOWNSTREAM(FEET) =   3700.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1322.00   CHANNEL SLOPE =  0.0486
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0486 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     140.58
  FLOW VELOCITY(FEET/SEC) =   6.41 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.44   Tc(MIN.) =   21.33
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5006.00 =    5182.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5006.00 TO NODE   5006.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.33
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.250
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       28.61      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   28.61      SUBAREA RUNOFF(CFS) =   27.55
  EFFECTIVE AREA(ACRES) =    155.21   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      170.5       PEAK FLOW RATE(CFS) =     149.47

****************************************************************************
  FLOW PROCESS FROM NODE   5006.00 TO NODE   5007.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3700.10  DOWNSTREAM(FEET) =   3655.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   937.00   CHANNEL SLOPE =  0.0478
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0478 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     149.47
  FLOW VELOCITY(FEET/SEC) =   6.49 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.41   Tc(MIN.) =   23.73
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5007.00 =    6119.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5007.00 TO NODE   5007.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   23.73
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.160
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        4.80      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.80      SUBAREA RUNOFF(CFS) =    4.23
  EFFECTIVE AREA(ACRES) =    160.01   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      175.3       PEAK FLOW RATE(CFS) =     149.47
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5007.00 TO NODE   5007.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5340.00 TO NODE   5341.00 IS CODE =  21
----------------------------------------------------------------------------
```

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1215.00
  ELEVATION DATA: UPSTREAM(FEET) =   3872.40  DOWNSTREAM(FEET) =   3746.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.152
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.666
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        9.44      0.18     1.000    91   14.15
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     12.62
  TOTAL AREA(ACRES) =      9.44   PEAK FLOW RATE(CFS) =     12.62

********************************************************************************
  FLOW PROCESS FROM NODE   5341.00 TO NODE   5342.00 IS CODE =  53
--------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3746.40  DOWNSTREAM(FEET) =   3686.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1270.00   CHANNEL SLOPE =  0.0474
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0474 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      12.62
  FLOW VELOCITY(FEET/SEC) =   2.84 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.46   Tc(MIN.) =   21.61
  LONGEST FLOWPATH FROM NODE   5340.00 TO NODE   5342.00 =    2485.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE   5342.00 TO NODE   5342.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   21.61
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.238
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       28.36      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   28.36      SUBAREA RUNOFF(CFS) =   27.01
  EFFECTIVE AREA(ACRES) =     37.80   AREA-AVERAGED Fm(INCH/HR) =  0.18
```

```
 AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       37.8       PEAK FLOW RATE(CFS) =      36.01

****************************************************************************
 FLOW PROCESS FROM NODE   5342.00 TO NODE   5342.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   21.61
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.238
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL DESERT COVER
 "DESERT BRUSH"   (30.0%)   D       11.29      0.18     1.000    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   11.29      SUBAREA RUNOFF(CFS) =   10.75
 EFFECTIVE AREA(ACRES) =     49.09   AREA-AVERAGED Fm(INCH/HR) =  0.18
 AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       49.1       PEAK FLOW RATE(CFS) =      46.76

****************************************************************************
 FLOW PROCESS FROM NODE   5342.00 TO NODE   5007.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   3686.20  DOWNSTREAM(FEET) =   3655.30
 CHANNEL LENGTH THRU SUBAREA(FEET) =   635.00   CHANNEL SLOPE =  0.0487
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0487 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =      46.76
 FLOW VELOCITY(FEET/SEC) =   4.44 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.38   Tc(MIN.) =   24.00
 LONGEST FLOWPATH FROM NODE   5340.00 TO NODE   5007.00 =    3120.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5007.00 TO NODE   5007.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   24.00
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.151
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL DESERT COVER
 "DESERT BRUSH"   (30.0%)   D        5.76      0.18     1.000    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.76      SUBAREA RUNOFF(CFS) =    5.03
  EFFECTIVE AREA(ACRES) =     54.85   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       54.8       PEAK FLOW RATE(CFS) =      47.93

****************************************************************************
  FLOW PROCESS FROM NODE   5007.00 TO NODE   5007.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       47.93   24.00    1.151  0.18( 0.18) 1.00      54.8    5340.00
  LONGEST FLOWPATH FROM NODE   5340.00 TO NODE   5007.00 =    3120.00 FEET.

  ** MEMORY BANK #  3 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      149.47   23.73    1.160  0.18( 0.18) 1.00     160.0    5200.00
      2      146.33   25.35    1.108  0.18( 0.18) 1.00     166.0    5240.00
      3      145.63   25.64    1.099  0.18( 0.18) 1.00     166.9    5230.00
      4      137.04   28.74    1.014  0.18( 0.18) 1.00     173.9    5100.00
      5      132.29   30.17    0.981  0.18( 0.18) 1.00     175.3    5000.00
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5007.00 =    6119.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      197.32   23.73    1.160  0.18( 0.18) 1.00     214.3    5200.00
      2      196.90   24.00    1.151  0.18( 0.18) 1.00     215.8    5340.00
      3      192.13   25.35    1.108  0.18( 0.18) 1.00     220.9    5240.00
      4      190.99   25.64    1.099  0.18( 0.18) 1.00     221.8    5230.00
      5      178.23   28.74    1.014  0.18( 0.18) 1.00     228.7    5100.00
      6      171.81   30.17    0.981  0.18( 0.18) 1.00     230.2    5000.00
    TOTAL AREA(ACRES) =       230.2

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      197.32  Tc(MIN.) =   23.735
  EFFECTIVE AREA(ACRES) =    214.27  AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      230.2
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5007.00 =    6119.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5007.00 TO NODE   5007.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
```

```
==========================================================================

**************************************************************************
  FLOW PROCESS FROM NODE   5007.00 TO NODE   5007.00 IS CODE =  12
--------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 3 <<<<<
==========================================================================

**************************************************************************
  FLOW PROCESS FROM NODE   5007.00 TO NODE   5008.00 IS CODE =  53
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3655.30  DOWNSTREAM(FEET) =   3610.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   932.00   CHANNEL SLOPE =  0.0486
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0486 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     197.32
  FLOW VELOCITY(FEET/SEC) =   7.17 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.16   Tc(MIN.) =   25.90
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5008.00 =    7051.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE   5008.00 TO NODE   5008.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   25.90
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.091
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        6.41      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    6.41      SUBAREA RUNOFF(CFS) =    5.26
  EFFECTIVE AREA(ACRES) =    220.68   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      236.6       PEAK FLOW RATE(CFS) =     197.32
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

**************************************************************************
  FLOW PROCESS FROM NODE   5008.00 TO NODE   5009.00 IS CODE =  53
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3610.00  DOWNSTREAM(FEET) =   3540.50
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1439.00   CHANNEL SLOPE =  0.0483
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0483 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     197.32
  FLOW VELOCITY(FEET/SEC) =   7.15 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.35   Tc(MIN.) =   29.25
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5009.00 =    8490.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5009.00 TO NODE   5009.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   29.25
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.002
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        9.10      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    9.10      SUBAREA RUNOFF(CFS) =    6.73
  EFFECTIVE AREA(ACRES) =    229.78   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      245.7       PEAK FLOW RATE(CFS) =     197.32
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5009.00 TO NODE   5009.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5360.00 TO NODE   5361.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   868.00
  ELEVATION DATA: UPSTREAM(FEET) =   3687.40  DOWNSTREAM(FEET) =   3638.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.965
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.681
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
```

```
  "DESERT BRUSH"   (30.0%)   D        4.43      0.18     1.000    91   13.97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      5.99
  TOTAL AREA(ACRES) =      4.43   PEAK FLOW RATE(CFS) =      5.99

****************************************************************************
  FLOW PROCESS FROM NODE   5361.00 TO NODE   5362.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3638.30  DOWNSTREAM(FEET) =   3565.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1354.00   CHANNEL SLOPE =  0.0535
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0535 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       5.99
  FLOW VELOCITY(FEET/SEC) =   2.35 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   9.60   Tc(MIN.) =   23.56
  LONGEST FLOWPATH FROM NODE   5360.00 TO NODE   5362.00 =    2222.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5362.00 TO NODE   5362.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   23.56
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.166
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        9.66      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    9.66      SUBAREA RUNOFF(CFS) =    8.57
  EFFECTIVE AREA(ACRES) =     14.09   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       14.1       PEAK FLOW RATE(CFS) =      12.50

****************************************************************************
  FLOW PROCESS FROM NODE   5362.00 TO NODE   5009.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3565.80  DOWNSTREAM(FEET) =   3540.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   628.00   CHANNEL SLOPE =  0.0403
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0403 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
  CHANNEL FLOW THRU SUBAREA(CFS) =      12.50
  FLOW VELOCITY(FEET/SEC) =   2.61 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.02   Tc(MIN.) =   27.58
  LONGEST FLOWPATH FROM NODE   5360.00 TO NODE   5009.00 =    2850.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5009.00 TO NODE   5009.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.58
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.044
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        4.35      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.35      SUBAREA RUNOFF(CFS) =    3.38
  EFFECTIVE AREA(ACRES) =     18.44   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       18.4       PEAK FLOW RATE(CFS) =      14.34

****************************************************************************
  FLOW PROCESS FROM NODE   5009.00 TO NODE   5009.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       14.34   27.58    1.044  0.18( 0.18) 1.00      18.4    5360.00
  LONGEST FLOWPATH FROM NODE   5360.00 TO NODE   5009.00 =    2850.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      197.32   29.25    1.002  0.18( 0.18) 1.00     229.8    5200.00
      2      196.90   29.52    0.996  0.18( 0.18) 1.00     231.3    5340.00
      3      192.13   30.92    0.964  0.18( 0.18) 1.00     236.4    5240.00
      4      190.99   31.22    0.957  0.18( 0.18) 1.00     237.3    5230.00
      5      178.23   34.45    0.894  0.18( 0.18) 1.00     244.2    5100.00
      6      171.81   35.94    0.867  0.18( 0.18) 1.00     245.7    5000.00
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5009.00 =    8490.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
```

```
      1      209.92   27.58    1.044  0.18( 0.18) 1.00     235.1    5360.00
      2      210.96   29.25    1.002  0.18( 0.18) 1.00     248.2    5200.00
      3      210.44   29.52    0.996  0.18( 0.18) 1.00     249.8    5340.00
      4      205.14   30.92    0.964  0.18( 0.18) 1.00     254.8    5240.00
      5      203.89   31.22    0.957  0.18( 0.18) 1.00     255.7    5230.00
      6      190.08   34.45    0.894  0.18( 0.18) 1.00     262.7    5100.00
      7      183.22   35.94    0.867  0.18( 0.18) 1.00     264.1    5000.00
    TOTAL AREA(ACRES) =       264.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      210.96  Tc(MIN.) =   29.253
  EFFECTIVE AREA(ACRES) =    248.22  AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      264.1
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5009.00 =    8490.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5009.00 TO NODE   5010.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3540.50  DOWNSTREAM(FEET) =   3480.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1063.00   CHANNEL SLOPE =  0.0568
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0568 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     210.96
  FLOW VELOCITY(FEET/SEC) =   7.93 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.23   Tc(MIN.) =   31.49
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5010.00 =    9553.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5010.00 TO NODE   5010.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5010.00 TO NODE   5010.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   31.49
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.952
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       10.80      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   10.80      SUBAREA RUNOFF(CFS) =    7.50
  EFFECTIVE AREA(ACRES) =    259.02   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      274.9       PEAK FLOW RATE(CFS) =     210.96
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5010.00 TO NODE   5010.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5370.00 TO NODE   5371.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   879.00
  ELEVATION DATA: UPSTREAM(FEET) =   3601.50  DOWNSTREAM(FEET) =   3541.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.518
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.720
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        6.19      0.18     1.000    91   13.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      8.58
  TOTAL AREA(ACRES) =      6.19   PEAK FLOW RATE(CFS) =      8.58

****************************************************************************
  FLOW PROCESS FROM NODE   5371.00 TO NODE   5010.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3541.50  DOWNSTREAM(FEET) =   3480.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   911.00   CHANNEL SLOPE =  0.0674
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0674 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       8.58
  FLOW VELOCITY(FEET/SEC) =   2.97 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.11   Tc(MIN.) =   18.62
  LONGEST FLOWPATH FROM NODE   5370.00 TO NODE   5010.00 =    1790.00 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   5010.00 TO NODE   5010.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.62
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.374
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL DESERT COVER
 "DESERT BRUSH"   (30.0%)   D       10.37      0.18     1.000    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   10.37      SUBAREA RUNOFF(CFS) =   11.15
 EFFECTIVE AREA(ACRES) =     16.56   AREA-AVERAGED Fm(INCH/HR) =  0.18
 AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       16.6       PEAK FLOW RATE(CFS) =      17.80

****************************************************************************
 FLOW PROCESS FROM NODE   5010.00 TO NODE   5010.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       17.80   18.62    1.374  0.18( 0.18) 1.00      16.6    5370.00
 LONGEST FLOWPATH FROM NODE   5370.00 TO NODE   5010.00 =    1790.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      209.92   29.82    0.989  0.18( 0.18) 1.00     245.9    5360.00
     2      210.96   31.49    0.952  0.18( 0.18) 1.00     259.0    5200.00
     3      210.44   31.75    0.946  0.18( 0.18) 1.00     260.6    5340.00
     4      205.14   33.17    0.918  0.18( 0.18) 1.00     265.6    5240.00
     5      203.89   33.48    0.912  0.18( 0.18) 1.00     266.5    5230.00
     6      190.08   36.76    0.854  0.18( 0.18) 1.00     273.5    5100.00
     7      183.22   38.29    0.830  0.18( 0.18) 1.00     274.9    5000.00
 LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5010.00 =    9553.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      211.47   18.62    1.374  0.18( 0.18) 1.00     170.1    5370.00
     2      221.97   29.82    0.989  0.18( 0.18) 1.00     262.4    5360.00
     3      222.46   31.49    0.952  0.18( 0.18) 1.00     275.6    5200.00
     4      221.85   31.75    0.946  0.18( 0.18) 1.00     277.1    5340.00
```

```
      5      216.13   33.17    0.918  0.18( 0.18) 1.00     282.2    5240.00
      6      214.79   33.48    0.912  0.18( 0.18) 1.00     283.1    5230.00
      7      200.12   36.76    0.854  0.18( 0.18) 1.00     290.0    5100.00
      8      192.91   38.29    0.830  0.18( 0.18) 1.00     291.5    5000.00
    TOTAL AREA(ACRES) =       291.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      222.46  Tc(MIN.) =   31.486
  EFFECTIVE AREA(ACRES) =    275.58  AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      291.5
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5010.00 =    9553.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5010.00 TO NODE   5010.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5010.00 TO NODE   5010.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   31.49
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.952
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       15.18      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   15.18      SUBAREA RUNOFF(CFS) =   10.54
  EFFECTIVE AREA(ACRES) =    290.76   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      306.6       PEAK FLOW RATE(CFS) =     222.46
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5010.00 TO NODE   5011.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3480.10  DOWNSTREAM(FEET) =   3397.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1630.00   CHANNEL SLOPE =  0.0507
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0507 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     222.46
```

```
  FLOW VELOCITY(FEET/SEC) =   7.63 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.56   Tc(MIN.) =   35.05
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5011.00 =   11183.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5011.00 TO NODE   5011.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   35.05
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.883
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       39.04      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   39.04      SUBAREA RUNOFF(CFS) =   24.70
  EFFECTIVE AREA(ACRES) =    329.80   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      345.7       PEAK FLOW RATE(CFS) =     222.46
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5011.00 TO NODE   5012.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3397.40  DOWNSTREAM(FEET) =   3341.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1974.00   CHANNEL SLOPE =  0.0284
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0284 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     222.46
  FLOW VELOCITY(FEET/SEC) =   5.71 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.76   Tc(MIN.) =   40.81
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5012.00 =   13157.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5012.00 TO NODE   5012.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   40.81
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.794
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       18.59      0.44     1.000     -
```

```
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B       12.22      0.34     1.000    82
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       33.09      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   63.90      SUBAREA RUNOFF(CFS) =   29.14
  EFFECTIVE AREA(ACRES) =    393.70   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      409.6       PEAK FLOW RATE(CFS) =     222.46
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5012.00 TO NODE   5013.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3341.30  DOWNSTREAM(FEET) =   3261.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2368.00   CHANNEL SLOPE =  0.0337
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0337 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     222.46
  FLOW VELOCITY(FEET/SEC) =   6.22 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.34   Tc(MIN.) =   47.15
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5013.00 =   15525.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5013.00 TO NODE   5013.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   47.15
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.717
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       11.90      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B       44.78      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.36
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   56.68      SUBAREA RUNOFF(CFS) =   18.02
  EFFECTIVE AREA(ACRES) =    450.38   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      466.3       PEAK FLOW RATE(CFS) =     222.46
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5013.00 TO NODE   5013.00 IS CODE =  10
```

```
------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
========================================================================

************************************************************************
  FLOW PROCESS FROM NODE   5500.00 TO NODE   5501.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   737.00
  ELEVATION DATA: UPSTREAM(FEET) =   3782.70  DOWNSTREAM(FEET) =   3681.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.944
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.994
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        9.15      0.18     1.000    91   10.94
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     14.94
  TOTAL AREA(ACRES) =      9.15   PEAK FLOW RATE(CFS) =     14.94

************************************************************************
  FLOW PROCESS FROM NODE   5501.00 TO NODE   5502.00 IS CODE =  53
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3681.00  DOWNSTREAM(FEET) =   3638.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   514.00   CHANNEL SLOPE =  0.0821
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0821 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      14.94
  FLOW VELOCITY(FEET/SEC) =   3.95 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.17   Tc(MIN.) =   13.11
  LONGEST FLOWPATH FROM NODE   5500.00 TO NODE   5502.00 =    1251.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE   5502.00 TO NODE   5502.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   13.11
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.757
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       11.74      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   11.74      SUBAREA RUNOFF(CFS) =   16.66
  EFFECTIVE AREA(ACRES) =     20.89   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       20.9       PEAK FLOW RATE(CFS) =      29.65

****************************************************************************
  FLOW PROCESS FROM NODE   5502.00 TO NODE   5503.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3638.80  DOWNSTREAM(FEET) =   3519.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1774.00   CHANNEL SLOPE =  0.0671
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0671 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      29.65
  FLOW VELOCITY(FEET/SEC) =   4.49 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.59   Tc(MIN.) =   19.70
  LONGEST FLOWPATH FROM NODE   5500.00 TO NODE   5503.00 =    3025.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5503.00 TO NODE   5503.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.70
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.321
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       23.66      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   23.66      SUBAREA RUNOFF(CFS) =   24.30
  EFFECTIVE AREA(ACRES) =     44.55   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       44.5       PEAK FLOW RATE(CFS) =      45.76

****************************************************************************
  FLOW PROCESS FROM NODE   5503.00 TO NODE   5503.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   5550.00 TO NODE   5551.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1533.00
  ELEVATION DATA: UPSTREAM(FEET) =   3940.20  DOWNSTREAM(FEET) =   3559.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.039
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.764
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       11.37      0.18     1.000    91   13.04
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     16.21
  TOTAL AREA(ACRES) =     11.37   PEAK FLOW RATE(CFS) =     16.21

****************************************************************************
  FLOW PROCESS FROM NODE   5551.00 TO NODE   5503.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3559.00  DOWNSTREAM(FEET) =   3519.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   712.00   CHANNEL SLOPE =  0.0552
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0552 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      16.21
  FLOW VELOCITY(FEET/SEC) =   3.33 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.57   Tc(MIN.) =   16.61
  LONGEST FLOWPATH FROM NODE   5550.00 TO NODE   5503.00 =    2245.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5503.00 TO NODE   5503.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.61
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.489
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        4.00      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.00      SUBAREA RUNOFF(CFS) =    4.71
  EFFECTIVE AREA(ACRES) =     15.37   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       15.4       PEAK FLOW RATE(CFS) =      18.11

****************************************************************************
  FLOW PROCESS FROM NODE   5503.00 TO NODE   5503.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       18.11   16.61    1.489  0.18( 0.18) 1.00      15.4    5550.00
  LONGEST FLOWPATH FROM NODE   5550.00 TO NODE   5503.00 =    2245.00 FEET.

  ** MEMORY BANK #  3 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       45.76   19.70    1.321  0.18( 0.18) 1.00      44.5    5500.00
  LONGEST FLOWPATH FROM NODE   5500.00 TO NODE   5503.00 =    3025.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       62.35   16.61    1.489  0.18( 0.18) 1.00      52.9    5550.00
      2       61.54   19.70    1.321  0.18( 0.18) 1.00      59.9    5500.00
    TOTAL AREA(ACRES) =        59.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       62.35  Tc(MIN.) =   16.607
  EFFECTIVE AREA(ACRES) =     52.92  AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       59.9
  LONGEST FLOWPATH FROM NODE   5500.00 TO NODE   5503.00 =    3025.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5503.00 TO NODE   5503.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5503.00 TO NODE   5504.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   3519.70  DOWNSTREAM(FEET) =   3482.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   605.00   CHANNEL SLOPE =  0.0608
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0608 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      62.35
  FLOW VELOCITY(FEET/SEC) =   5.47 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.84   Tc(MIN.) =   18.45
  LONGEST FLOWPATH FROM NODE   5500.00 TO NODE   5504.00 =    3630.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5504.00 TO NODE   5504.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.45
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.383
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       30.48      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   30.48      SUBAREA RUNOFF(CFS) =   33.01
  EFFECTIVE AREA(ACRES) =     83.40   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       90.4       PEAK FLOW RATE(CFS) =      90.33

****************************************************************************
  FLOW PROCESS FROM NODE   5504.00 TO NODE   5505.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3482.90  DOWNSTREAM(FEET) =   3406.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1762.00   CHANNEL SLOPE =  0.0432
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0432 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      90.33
  FLOW VELOCITY(FEET/SEC) =   5.22 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.63   Tc(MIN.) =   24.08
  LONGEST FLOWPATH FROM NODE   5500.00 TO NODE   5505.00 =    5392.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5505.00 TO NODE   5505.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   24.08
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.148
```

```
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        6.62      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        7.17      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   13.79      SUBAREA RUNOFF(CFS) =   10.47
  EFFECTIVE AREA(ACRES) =     97.19   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      104.2       PEAK FLOW RATE(CFS) =      90.33
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5505.00 TO NODE   5506.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3406.70  DOWNSTREAM(FEET) =   3402.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =    78.00   CHANNEL SLOPE =  0.0526
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0526 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      90.33
  FLOW VELOCITY(FEET/SEC) =   5.75 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.23   Tc(MIN.) =   24.30
  LONGEST FLOWPATH FROM NODE   5500.00 TO NODE   5506.00 =    5470.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5506.00 TO NODE   5506.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   24.30
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.141
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        1.72      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.72      SUBAREA RUNOFF(CFS) =    1.08
  EFFECTIVE AREA(ACRES) =     98.91   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      105.9       PEAK FLOW RATE(CFS) =      90.33
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5506.00 TO NODE   5506.00 IS CODE =  81
```

```
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   24.30
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.141
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        0.54      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       14.51      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.19
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   15.05      SUBAREA RUNOFF(CFS) =   12.89
  EFFECTIVE AREA(ACRES) =    113.96   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      121.0       PEAK FLOW RATE(CFS) =      96.46

****************************************************************************
  FLOW PROCESS FROM NODE   5506.00 TO NODE   5506.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   24.30
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.141
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        0.72      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       11.59      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   12.31      SUBAREA RUNOFF(CFS) =   10.48
  EFFECTIVE AREA(ACRES) =    126.27   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      133.3       PEAK FLOW RATE(CFS) =     106.93

****************************************************************************
  FLOW PROCESS FROM NODE   5506.00 TO NODE   5507.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3402.60  DOWNSTREAM(FEET) =   3366.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   973.00   CHANNEL SLOPE =  0.0376
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0376 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     106.93
  FLOW VELOCITY(FEET/SEC) =   5.15 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
  TRAVEL TIME(MIN.) =   3.15   Tc(MIN.) =   27.46
  LONGEST FLOWPATH FROM NODE   5500.00 TO NODE   5507.00 =    6443.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5507.00 TO NODE   5507.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.46
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.047
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       27.90      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.73      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   28.63      SUBAREA RUNOFF(CFS) =   15.71
  EFFECTIVE AREA(ACRES) =    154.90   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      161.9       PEAK FLOW RATE(CFS) =     112.04

****************************************************************************
  FLOW PROCESS FROM NODE   5507.00 TO NODE   5507.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5540.00 TO NODE   5541.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1255.00
  ELEVATION DATA: UPSTREAM(FEET) =   3873.90  DOWNSTREAM(FEET) =   3664.90

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.041
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.764
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        8.22      0.18     1.000    91   13.04
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     11.72
  TOTAL AREA(ACRES) =      8.22   PEAK FLOW RATE(CFS) =     11.72
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   5541.00 TO NODE   5542.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3664.90  DOWNSTREAM(FEET) =   3596.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   791.00   CHANNEL SLOPE =  0.0871
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0871 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      11.72
  FLOW VELOCITY(FEET/SEC) =   3.75 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.51   Tc(MIN.) =   16.56
  LONGEST FLOWPATH FROM NODE   5540.00 TO NODE   5542.00 =    2046.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5542.00 TO NODE   5542.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.56
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.492
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       12.39      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   12.39      SUBAREA RUNOFF(CFS) =   14.64
  EFFECTIVE AREA(ACRES) =     20.61   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       20.6       PEAK FLOW RATE(CFS) =      24.35

****************************************************************************
  FLOW PROCESS FROM NODE   5542.00 TO NODE   5543.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3596.00  DOWNSTREAM(FEET) =   3482.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2024.00   CHANNEL SLOPE =  0.0562
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0562 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      24.35
  FLOW VELOCITY(FEET/SEC) =   3.84 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   8.78   Tc(MIN.) =   25.33
  LONGEST FLOWPATH FROM NODE   5540.00 TO NODE   5543.00 =    4070.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   5543.00 TO NODE   5543.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   25.33
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.108
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       18.61      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   18.61      SUBAREA RUNOFF(CFS) =   15.54
  EFFECTIVE AREA(ACRES) =     39.22   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       39.2       PEAK FLOW RATE(CFS) =      32.76

****************************************************************************
  FLOW PROCESS FROM NODE   5543.00 TO NODE   5543.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   25.33
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.108
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       16.49      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   16.49      SUBAREA RUNOFF(CFS) =   13.77
  EFFECTIVE AREA(ACRES) =     55.71   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       55.7       PEAK FLOW RATE(CFS) =      46.53

****************************************************************************
  FLOW PROCESS FROM NODE   5543.00 TO NODE   5544.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3482.30  DOWNSTREAM(FEET) =   3471.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   431.00   CHANNEL SLOPE =  0.0241
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0241 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      46.53
  FLOW VELOCITY(FEET/SEC) =   3.12 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
  TRAVEL TIME(MIN.) =   2.30   Tc(MIN.) =   27.63
  LONGEST FLOWPATH FROM NODE   5540.00 TO NODE   5544.00 =    4501.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5544.00 TO NODE   5544.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.63
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.043
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        0.01      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        2.27      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.28      SUBAREA RUNOFF(CFS) =    1.77
  EFFECTIVE AREA(ACRES) =     57.99   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       58.0       PEAK FLOW RATE(CFS) =      46.53
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5544.00 TO NODE   5544.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.63
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.043
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        4.01      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       63.69      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   67.70      SUBAREA RUNOFF(CFS) =   51.63
  EFFECTIVE AREA(ACRES) =    125.69   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.19  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      125.7       PEAK FLOW RATE(CFS) =      96.65

****************************************************************************
  FLOW PROCESS FROM NODE   5544.00 TO NODE   5507.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   3471.90  DOWNSTREAM(FEET) =   3366.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2321.00   CHANNEL SLOPE =  0.0456
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0456 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      96.65
  FLOW VELOCITY(FEET/SEC) =   5.48 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.06   Tc(MIN.) =   34.69
  LONGEST FLOWPATH FROM NODE   5540.00 TO NODE   5507.00 =    6822.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5507.00 TO NODE   5507.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   34.69
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.889
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       18.84      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        8.14      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.36
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   26.98      SUBAREA RUNOFF(CFS) =   12.81
  EFFECTIVE AREA(ACRES) =    152.67   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      152.7       PEAK FLOW RATE(CFS) =      96.65
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5507.00 TO NODE   5507.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       96.65   34.69    0.889  0.22( 0.22) 1.00     152.7    5540.00
  LONGEST FLOWPATH FROM NODE   5540.00 TO NODE   5507.00 =    6822.00 FEET.

  ** MEMORY BANK #  3 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      112.04   27.46    1.047  0.24( 0.24) 1.00     154.9    5550.00
      2      106.02   30.70    0.969  0.24( 0.24) 1.00     161.9    5500.00
  LONGEST FLOWPATH FROM NODE   5500.00 TO NODE   5507.00 =    6443.00 FEET.

  ** PEAK FLOW RATE TABLE **
```

```
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      206.59   27.46    1.047  0.23( 0.23) 1.00     275.7    5550.00
     2      201.69   30.70    0.969  0.23( 0.23) 1.00     297.0    5500.00
     3      191.11   34.69    0.889  0.23( 0.23) 1.00     314.6    5540.00
   TOTAL AREA(ACRES) =       314.6

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      206.59  Tc(MIN.) =   27.455
  EFFECTIVE AREA(ACRES) =    275.72  AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      314.6
  LONGEST FLOWPATH FROM NODE   5540.00 TO NODE   5507.00 =    6822.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5507.00 TO NODE   5507.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5507.00 TO NODE   5508.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3366.00  DOWNSTREAM(FEET) =   3323.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1133.00   CHANNEL SLOPE =  0.0372
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0372 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     206.59
  FLOW VELOCITY(FEET/SEC) =   6.37 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.96   Tc(MIN.) =   30.42
  LONGEST FLOWPATH FROM NODE   5540.00 TO NODE   5508.00 =    7955.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5508.00 TO NODE   5508.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   30.42
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.975
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       27.90      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.73      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
```

```
  SUBAREA AREA(ACRES) =   28.63      SUBAREA RUNOFF(CFS) =   13.84
  EFFECTIVE AREA(ACRES) =    304.35   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      343.2       PEAK FLOW RATE(CFS) =     206.59
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5508.00 TO NODE   5013.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3323.90  DOWNSTREAM(FEET) =   3261.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1718.00   CHANNEL SLOPE =  0.0364
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0364 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     206.59
  FLOW VELOCITY(FEET/SEC) =   6.30 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.54   Tc(MIN.) =   34.96
  LONGEST FLOWPATH FROM NODE   5540.00 TO NODE   5013.00 =    9673.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5013.00 TO NODE   5013.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   34.96
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.884
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        2.95      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B       10.56      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.36
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   13.51      SUBAREA RUNOFF(CFS) =    6.32
  EFFECTIVE AREA(ACRES) =    317.86   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      356.7       PEAK FLOW RATE(CFS) =     206.59
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5013.00 TO NODE   5013.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

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

```
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1      206.59   34.96    0.884  0.26( 0.26) 1.00     317.9    5550.00
    2      201.69   38.27    0.830  0.25( 0.25) 1.00     339.2    5500.00
    3      191.11   42.40    0.773  0.25( 0.25) 1.00     356.7    5540.00
  LONGEST FLOWPATH FROM NODE   5540.00 TO NODE   5013.00 =    9673.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1      214.48   34.53    0.892  0.23( 0.23) 1.00     344.9    5370.00
    2      221.97   45.49    0.736  0.22( 0.22) 1.00     437.2    5360.00
    3      222.46   47.15    0.717  0.22( 0.22) 1.00     450.4    5200.00
    4      221.85   47.43    0.714  0.22( 0.22) 1.00     451.9    5340.00
    5      216.13   48.99    0.698  0.22( 0.22) 1.00     457.0    5240.00
    6      214.79   49.33    0.695  0.22( 0.22) 1.00     457.9    5230.00
    7      200.12   52.99    0.661  0.22( 0.22) 1.00     464.8    5100.00
    8      192.91   54.71    0.646  0.22( 0.22) 1.00     466.3    5000.00
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5013.00 =   15525.00 FEET.

  ** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1      421.03   34.53    0.892  0.24( 0.24) 1.00     658.8    5370.00
    2      421.37   34.96    0.884  0.24( 0.24) 1.00     666.5    5550.00
    3      418.72   38.27    0.830  0.24( 0.24) 1.00     715.6    5500.00
    4      410.97   42.40    0.773  0.24( 0.24) 1.00     767.9    5540.00
    5      399.42   45.49    0.736  0.23( 0.23) 1.00     793.9    5360.00
    6      393.23   47.15    0.717  0.23( 0.23) 1.00     807.1    5200.00
    7      391.53   47.43    0.714  0.23( 0.23) 1.00     808.7    5340.00
    8      379.95   48.99    0.698  0.23( 0.23) 1.00     813.7    5240.00
    9      377.38   49.33    0.695  0.23( 0.23) 1.00     814.6    5230.00
   10      350.23   52.99    0.661  0.23( 0.23) 1.00     821.6    5100.00
   11      337.65   54.71    0.646  0.23( 0.23) 1.00     823.0    5000.00
   TOTAL AREA(ACRES) =       823.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      421.37  Tc(MIN.) =   34.963
  EFFECTIVE AREA(ACRES) =    666.47  AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      823.0
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5013.00 =   15525.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5013.00 TO NODE   5013.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5013.00 TO NODE   5014.00 IS CODE =  53
```

```
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3261.40  DOWNSTREAM(FEET) =   3215.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1118.00   CHANNEL SLOPE =  0.0411
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0411 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     421.37
  FLOW VELOCITY(FEET/SEC) =   8.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.19   Tc(MIN.) =   37.16
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5014.00 =   16643.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5014.00 TO NODE   5014.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   37.16
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.848
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       26.88      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B       11.57      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.41
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   38.45      SUBAREA RUNOFF(CFS) =   15.10
  EFFECTIVE AREA(ACRES) =    704.92   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      861.4       PEAK FLOW RATE(CFS) =     421.37
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5014.00 TO NODE   5015.00 IS CODE =  53
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3215.40  DOWNSTREAM(FEET) =   3137.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2017.00   CHANNEL SLOPE =  0.0385
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0385 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     421.37
  FLOW VELOCITY(FEET/SEC) =   8.22 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.09   Tc(MIN.) =   41.25
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5015.00 =   18660.00 FEET.

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

```
 FLOW PROCESS FROM NODE   5015.00 TO NODE   5015.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   41.25
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.788
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -       22.25      0.44     1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   22.25      SUBAREA RUNOFF(CFS) =    6.96
 EFFECTIVE AREA(ACRES) =    727.17   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      883.7       PEAK FLOW RATE(CFS) =     421.37
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE   5015.00 TO NODE   5016.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   3137.80  DOWNSTREAM(FEET) =   3082.10
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1618.00   CHANNEL SLOPE =  0.0344
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0344 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =     421.37
 FLOW VELOCITY(FEET/SEC) =   7.77 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   3.47   Tc(MIN.) =   44.71
 LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5016.00 =   20278.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5016.00 TO NODE   5016.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   44.71
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.745
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -       11.60      0.44     1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   11.60      SUBAREA RUNOFF(CFS) =    3.18
 EFFECTIVE AREA(ACRES) =    738.77   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      895.3       PEAK FLOW RATE(CFS) =     421.37
```

```
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5016.00 TO NODE   5016.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5600.00 TO NODE   5601.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   456.00
  ELEVATION DATA: UPSTREAM(FEET) =   3620.20  DOWNSTREAM(FEET) =   3242.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.312
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.931
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        5.85      0.18     1.000    91    6.31
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     14.49
  TOTAL AREA(ACRES) =      5.85   PEAK FLOW RATE(CFS) =     14.49

****************************************************************************
  FLOW PROCESS FROM NODE   5601.00 TO NODE   5602.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3242.80  DOWNSTREAM(FEET) =   3211.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   701.00   CHANNEL SLOPE =  0.0444
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0444 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      14.49
  FLOW VELOCITY(FEET/SEC) =   2.87 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.07   Tc(MIN.) =   10.38
  LONGEST FLOWPATH FROM NODE   5600.00 TO NODE   5602.00 =    1157.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5602.00 TO NODE   5602.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
  MAINLINE Tc(MIN.) =   10.38
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.070
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        1.09      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.09      SUBAREA RUNOFF(CFS) =    1.60
  EFFECTIVE AREA(ACRES) =      6.94   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        6.9       PEAK FLOW RATE(CFS) =      14.49
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5602.00 TO NODE   5602.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.38
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.070
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        3.44      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.44      SUBAREA RUNOFF(CFS) =    5.04
  EFFECTIVE AREA(ACRES) =     10.38   AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       10.4       PEAK FLOW RATE(CFS) =      16.59

****************************************************************************
  FLOW PROCESS FROM NODE   5602.00 TO NODE   5603.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3211.70  DOWNSTREAM(FEET) =   3164.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1125.00   CHANNEL SLOPE =  0.0423
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0423 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      16.59
  FLOW VELOCITY(FEET/SEC) =   2.94 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.39   Tc(MIN.) =   16.77
  LONGEST FLOWPATH FROM NODE   5600.00 TO NODE   5603.00 =    2282.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5603.00 TO NODE   5603.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   16.77
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.479
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        7.86      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    7.86      SUBAREA RUNOFF(CFS) =    7.35
  EFFECTIVE AREA(ACRES) =     18.24   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       18.2       PEAK FLOW RATE(CFS) =      18.43

********************************************************************************
  FLOW PROCESS FROM NODE   5603.00 TO NODE   5604.00 IS CODE =  53
--------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3164.10  DOWNSTREAM(FEET) =   3125.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1044.00   CHANNEL SLOPE =  0.0375
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0375 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      18.43
  FLOW VELOCITY(FEET/SEC) =   2.86 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.08   Tc(MIN.) =   22.85
  LONGEST FLOWPATH FROM NODE   5600.00 TO NODE   5604.00 =    3326.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE   5604.00 TO NODE   5604.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   22.85
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.191
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        5.09      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.09      SUBAREA RUNOFF(CFS) =    3.44
  EFFECTIVE AREA(ACRES) =     23.33   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       23.3       PEAK FLOW RATE(CFS) =      18.43
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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

```
 FLOW PROCESS FROM NODE   5604.00 TO NODE   5605.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   3125.00  DOWNSTREAM(FEET) =   3101.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   698.00   CHANNEL SLOPE =  0.0341
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0341 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =      18.43
 FLOW VELOCITY(FEET/SEC) =   2.73 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   4.26   Tc(MIN.) =   27.11
 LONGEST FLOWPATH FROM NODE   5600.00 TO NODE   5605.00 =    4024.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5605.00 TO NODE   5605.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   27.11
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.057
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        2.58      0.44     1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    2.58      SUBAREA RUNOFF(CFS) =    1.43
 EFFECTIVE AREA(ACRES) =     25.91   AREA-AVERAGED Fm(INCH/HR) =  0.38
 AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       25.9       PEAK FLOW RATE(CFS) =      18.43
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE   5605.00 TO NODE   5605.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   27.11
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.057
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        6.01      0.44     1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    6.01      SUBAREA RUNOFF(CFS) =    3.33
 EFFECTIVE AREA(ACRES) =     31.92   AREA-AVERAGED Fm(INCH/HR) =  0.39
 AREA-AVERAGED Fp(INCH/HR) =  0.39  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       31.9       PEAK FLOW RATE(CFS) =      19.08
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   5605.00 TO NODE   5016.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3101.20  DOWNSTREAM(FEET) =   3082.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   599.00   CHANNEL SLOPE =  0.0319
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0319 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      19.08
  FLOW VELOCITY(FEET/SEC) =   2.67 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.74   Tc(MIN.) =   30.85
  LONGEST FLOWPATH FROM NODE   5600.00 TO NODE   5016.00 =    4623.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5016.00 TO NODE   5016.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   30.85
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.965
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        2.30      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.30      SUBAREA RUNOFF(CFS) =    1.09
  EFFECTIVE AREA(ACRES) =     34.22   AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       34.2       PEAK FLOW RATE(CFS) =      19.08
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5016.00 TO NODE   5016.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       19.08   30.85    0.965  0.40( 0.40) 1.00      34.2    5600.00
  LONGEST FLOWPATH FROM NODE   5600.00 TO NODE   5016.00 =    4623.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
```

```
     1      421.03   44.28    0.750  0.26( 0.26) 1.00     731.1    5370.00
     2      421.37   44.71    0.745  0.26( 0.26) 1.00     738.8    5550.00
     3      418.72   48.04    0.708  0.26( 0.26) 1.00     787.9    5500.00
     4      410.97   52.23    0.668  0.25( 0.25) 1.00     840.2    5540.00
     5      399.42   55.42    0.641  0.25( 0.25) 1.00     866.2    5360.00
     6      393.23   57.13    0.627  0.25( 0.25) 1.00     879.4    5200.00
     7      391.53   57.43    0.625  0.25( 0.25) 1.00     881.0    5340.00
     8      379.95   59.08    0.613  0.25( 0.25) 1.00     886.0    5240.00
     9      377.38   59.44    0.610  0.25( 0.25) 1.00     886.9    5230.00
    10      350.23   63.36    0.583  0.25( 0.25) 1.00     893.9    5100.00
    11      337.65   65.21    0.572  0.25( 0.25) 1.00     895.3    5000.00
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5016.00 =   20278.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      440.11   30.85    0.965  0.27( 0.27) 1.00     543.7    5600.00
     2      432.88   44.28    0.750  0.27( 0.27) 1.00     765.3    5370.00
     3      433.05   44.71    0.745  0.27( 0.27) 1.00     773.0    5550.00
     4      429.19   48.04    0.708  0.26( 0.26) 1.00     822.1    5500.00
     5      420.08   52.23    0.668  0.26( 0.26) 1.00     874.4    5540.00
     6      407.63   55.42    0.641  0.26( 0.26) 1.00     900.5    5360.00
     7      400.98   57.13    0.627  0.25( 0.25) 1.00     913.6    5200.00
     8      399.20   57.43    0.625  0.25( 0.25) 1.00     915.2    5340.00
     9      387.21   59.08    0.613  0.25( 0.25) 1.00     920.2    5240.00
    10      384.56   59.44    0.610  0.25( 0.25) 1.00     921.1    5230.00
    11      356.52   63.36    0.583  0.25( 0.25) 1.00     928.1    5100.00
    12      343.54   65.21    0.572  0.25( 0.25) 1.00     929.5    5000.00
    TOTAL AREA(ACRES) =       929.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      440.11  Tc(MIN.) =   30.854
  EFFECTIVE AREA(ACRES) =    543.67  AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      929.5
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5016.00 =   20278.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5016.00 TO NODE   5016.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5016.00 TO NODE   5017.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3082.10  DOWNSTREAM(FEET) =   3040.60
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1260.00   CHANNEL SLOPE =  0.0329
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0329 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     440.11
  FLOW VELOCITY(FEET/SEC) =   7.71 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.72   Tc(MIN.) =   33.58
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5017.00 =   21538.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5017.00 TO NODE   5017.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   33.58
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.910
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       18.40      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   18.40      SUBAREA RUNOFF(CFS) =    7.78
  EFFECTIVE AREA(ACRES) =    562.07   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      947.9       PEAK FLOW RATE(CFS) =     440.11
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5017.00 TO NODE   5018.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3040.60  DOWNSTREAM(FEET) =   3012.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1072.00   CHANNEL SLOPE =  0.0266
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0266 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     440.11
  FLOW VELOCITY(FEET/SEC) =   6.93 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.58   Tc(MIN.) =   36.15
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5018.00 =   22610.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5018.00 TO NODE   5018.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   36.15
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.864
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        4.04      0.44      1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        2.92      0.34      1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    6.96      SUBAREA RUNOFF(CFS) =    2.91
  EFFECTIVE AREA(ACRES) =    569.03   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      954.9       PEAK FLOW RATE(CFS) =     440.11
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5018.00 TO NODE   5018.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5700.00 TO NODE   5701.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   613.00
  ELEVATION DATA: UPSTREAM(FEET) =   3198.30  DOWNSTREAM(FEET) =   3169.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.620
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.805
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
        LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  USER-DEFINED                -        1.60      0.44      1.000     -   12.62
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.97
  TOTAL AREA(ACRES) =      1.60   PEAK FLOW RATE(CFS) =      1.97

****************************************************************************
  FLOW PROCESS FROM NODE   5701.00 TO NODE   5702.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3169.60  DOWNSTREAM(FEET) =   3146.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   572.00   CHANNEL SLOPE =  0.0400
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0400 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.97
  FLOW VELOCITY(FEET/SEC) =   1.40 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.79   Tc(MIN.) =   19.41
  LONGEST FLOWPATH FROM NODE   5700.00 TO NODE   5702.00 =    1185.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5702.00 TO NODE   5702.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.41
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.335
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        2.19      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.19      SUBAREA RUNOFF(CFS) =    1.76
  EFFECTIVE AREA(ACRES) =      3.79   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.8       PEAK FLOW RATE(CFS) =       3.05

****************************************************************************
  FLOW PROCESS FROM NODE   5702.00 TO NODE   5702.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.41
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.335
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        3.46      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.46      SUBAREA RUNOFF(CFS) =    2.79
  EFFECTIVE AREA(ACRES) =      7.25   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        7.2       PEAK FLOW RATE(CFS) =       5.84

****************************************************************************
  FLOW PROCESS FROM NODE   5702.00 TO NODE   5703.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3146.70  DOWNSTREAM(FEET) =   3116.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   781.00   CHANNEL SLOPE =  0.0382
  SLOPE ADJUSTMENT CURVE USED:
```

```
  EFFECTIVE SLOPE = .0382 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       5.84
  FLOW VELOCITY(FEET/SEC) =   1.97 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.61   Tc(MIN.) =   26.03
  LONGEST FLOWPATH FROM NODE   5700.00 TO NODE   5703.00 =    1966.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5703.00 TO NODE   5703.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   26.03
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.087
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        7.75      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    7.75      SUBAREA RUNOFF(CFS) =    4.51
  EFFECTIVE AREA(ACRES) =     15.00   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       15.0       PEAK FLOW RATE(CFS) =       8.74

****************************************************************************
  FLOW PROCESS FROM NODE   5703.00 TO NODE   5704.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3116.90  DOWNSTREAM(FEET) =   3071.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1259.00   CHANNEL SLOPE =  0.0364
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0364 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       8.74
  FLOW VELOCITY(FEET/SEC) =   2.20 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   9.54   Tc(MIN.) =   35.57
  LONGEST FLOWPATH FROM NODE   5700.00 TO NODE   5704.00 =    3225.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5704.00 TO NODE   5704.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   35.57
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.874
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        6.04      0.44     1.000     -
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    6.04      SUBAREA RUNOFF(CFS) =    2.36
  EFFECTIVE AREA(ACRES) =     21.04   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       21.0       PEAK FLOW RATE(CFS) =       8.74
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5704.00 TO NODE   5018.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3071.10  DOWNSTREAM(FEET) =   3012.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1836.00   CHANNEL SLOPE =  0.0321
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0321 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       8.74
  FLOW VELOCITY(FEET/SEC) =   2.07 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  14.81   Tc(MIN.) =   50.38
  LONGEST FLOWPATH FROM NODE   5700.00 TO NODE   5018.00 =    5061.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5018.00 TO NODE   5018.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   50.38
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.685
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       10.73      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        3.49      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   14.22      SUBAREA RUNOFF(CFS) =    3.43
  EFFECTIVE AREA(ACRES) =     35.26   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       35.3       PEAK FLOW RATE(CFS) =       8.74
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5018.00 TO NODE   5018.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================
```

```
 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        8.74   50.38    0.685  0.43( 0.43) 1.00      35.3    5700.00
 LONGEST FLOWPATH FROM NODE   5700.00 TO NODE   5018.00 =    5061.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      440.11   36.15    0.864  0.28( 0.28) 1.00     569.0    5600.00
     2      432.88   49.61    0.692  0.27( 0.27) 1.00     790.7    5370.00
     3      433.05   50.04    0.688  0.27( 0.27) 1.00     798.3    5550.00
     4      429.19   53.39    0.658  0.27( 0.27) 1.00     847.5    5500.00
     5      420.08   57.61    0.623  0.26( 0.26) 1.00     899.7    5540.00
     6      407.63   60.86    0.600  0.26( 0.26) 1.00     925.8    5360.00
     7      400.98   62.60    0.588  0.26( 0.26) 1.00     939.0    5200.00
     8      399.20   62.90    0.586  0.26( 0.26) 1.00     940.5    5340.00
     9      387.21   64.61    0.575  0.26( 0.26) 1.00     945.6    5240.00
    10      384.56   64.99    0.573  0.26( 0.26) 1.00     946.5    5230.00
    11      356.52   69.05    0.549  0.26( 0.26) 1.00     953.4    5100.00
    12      343.54   70.97    0.539  0.26( 0.26) 1.00     954.9    5000.00
 LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5018.00 =   22610.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      448.85   36.15    0.864  0.28( 0.28) 1.00     594.3    5600.00
     2      441.62   49.61    0.692  0.28( 0.28) 1.00     825.4    5370.00
     3      441.79   50.04    0.688  0.28( 0.28) 1.00     833.4    5550.00
     4      441.40   50.38    0.685  0.28( 0.28) 1.00     838.6    5700.00
     5      436.99   53.39    0.658  0.27( 0.27) 1.00     882.8    5500.00
     6      426.71   57.61    0.623  0.27( 0.27) 1.00     935.0    5540.00
     7      413.45   60.86    0.600  0.27( 0.27) 1.00     961.1    5360.00
     8      406.40   62.60    0.588  0.27( 0.27) 1.00     974.2    5200.00
     9      404.56   62.90    0.586  0.27( 0.27) 1.00     975.8    5340.00
    10      392.19   64.61    0.575  0.26( 0.26) 1.00     980.9    5240.00
    11      389.45   64.99    0.573  0.26( 0.26) 1.00     981.7    5230.00
    12      360.60   69.05    0.549  0.26( 0.26) 1.00     988.7    5100.00
    13      347.26   70.97    0.539  0.26( 0.26) 1.00     990.1    5000.00
   TOTAL AREA(ACRES) =       990.1

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      448.85  Tc(MIN.) =   36.154
 EFFECTIVE AREA(ACRES) =    594.33  AREA-AVERAGED Fm(INCH/HR) =  0.28
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      990.1
 LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5018.00 =   22610.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5018.00 TO NODE   5018.00 IS CODE =  12
```

```
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5018.00 TO NODE   5018.50 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3012.10  DOWNSTREAM(FEET) =   3000.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   384.00   CHANNEL SLOPE =  0.0302
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0302 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     448.85
  FLOW VELOCITY(FEET/SEC) =   7.44 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.86   Tc(MIN.) =   37.01
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5018.50 =   22994.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5018.50 TO NODE   5018.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   37.01
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.850
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        0.11      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        2.27      0.34     1.000    82
  COMMERCIAL                 B        4.47      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.41
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.413
  SUBAREA AREA(ACRES) =    6.85      SUBAREA RUNOFF(CFS) =    4.19
  EFFECTIVE AREA(ACRES) =    601.18   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =      997.0       PEAK FLOW RATE(CFS) =     448.85
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5018.50 TO NODE   5019.00 IS CODE =  37
----------------------------------------------------------------------------
  >>>>>COMPUTE CULVERT TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED CULVERT SIZE<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3000.50  DOWNSTREAM(FEET) =  2998.80
  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) =   7.50
  NUMBER OF BARREL(S) =   1
  CULVERT-FLOW VELOCITY(FEET/SEC.) =  10.16
  CULVERT-FLOW(CFS) =     448.85
  CULVERT-FLOW TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =   37.42
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5019.00 =   23244.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5019.00 TO NODE   5020.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2998.80  DOWNSTREAM(FEET) =   2954.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1589.00   CHANNEL SLOPE =  0.0281
  CHANNEL FLOW THRU SUBAREA(CFS) =     448.85
  FLOW VELOCITY(FEET/SEC) =  12.69 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.09   Tc(MIN.) =   39.51
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5020.00 =   24833.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5020.00 TO NODE   5020.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   39.51
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.812
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        2.16      0.75     0.100    56
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        8.47      0.34     1.000    82
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        1.00      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.833
  SUBAREA AREA(ACRES) =   11.63      SUBAREA RUNOFF(CFS) =    5.57
  EFFECTIVE AREA(ACRES) =    612.81   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =     1008.6       PEAK FLOW RATE(CFS) =     448.85
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5020.00 TO NODE   5020.00 IS CODE =  10
```

```
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5800.00 TO NODE   5801.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1000.00
  ELEVATION DATA: UPSTREAM(FEET) =   2999.30  DOWNSTREAM(FEET) =   2973.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.020
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.121
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.20      0.34     1.000    82   17.31
  COMMERCIAL                 B        0.62      0.75     0.100    56   10.02
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        0.66      0.18     1.000    91   17.31
  COMMERCIAL                 D        0.27      0.47     0.100    75   10.02
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.542
  SUBAREA RUNOFF(CFS) =      3.12
  TOTAL AREA(ACRES) =      1.75   PEAK FLOW RATE(CFS) =      3.12

****************************************************************************
  FLOW PROCESS FROM NODE   5801.00 TO NODE   5020.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2973.60  DOWNSTREAM(FEET) =   2954.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1323.00   CHANNEL SLOPE =  0.0147
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.12
  FLOW VELOCITY(FEET/SEC) =   2.30 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   9.59   Tc(MIN.) =   19.61
  LONGEST FLOWPATH FROM NODE   5800.00 TO NODE   5020.00 =    2323.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5020.00 TO NODE   5020.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.61
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.326
```

```
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        3.18      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.18      SUBAREA RUNOFF(CFS) =    3.28
  EFFECTIVE AREA(ACRES) =      4.93   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.84
  TOTAL AREA(ACRES) =        4.9       PEAK FLOW RATE(CFS) =       5.14

****************************************************************************
  FLOW PROCESS FROM NODE   5020.00 TO NODE   5020.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        5.14   19.61    1.326  0.20( 0.17) 0.84       4.9    5800.00
  LONGEST FLOWPATH FROM NODE   5800.00 TO NODE   5020.00 =    2323.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      448.85   39.51    0.812  0.28( 0.28) 0.99     612.8    5600.00
      2      441.62   52.99    0.661  0.28( 0.28) 0.99     843.9    5370.00
      3      441.79   53.42    0.657  0.28( 0.28) 0.99     851.9    5550.00
      4      441.40   53.76    0.654  0.28( 0.28) 0.99     857.1    5700.00
      5      436.99   56.73    0.630  0.27( 0.27) 0.99     901.2    5500.00
      6      426.71   60.98    0.599  0.27( 0.27) 0.99     953.5    5540.00
      7      413.45   64.27    0.578  0.27( 0.27) 0.99     979.6    5360.00
      8      406.40   66.04    0.567  0.27( 0.26) 0.99     992.7    5200.00
      9      404.56   66.35    0.565  0.27( 0.26) 0.99     994.3    5340.00
     10      392.19   68.10    0.555  0.27( 0.26) 0.99     999.3    5240.00
     11      389.45   68.49    0.552  0.27( 0.26) 0.99    1000.2    5230.00
     12      360.60   72.59    0.530  0.27( 0.26) 0.99    1007.2    5100.00
     13      347.26   74.57    0.520  0.27( 0.26) 0.99    1008.6    5000.00
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5020.00 =   24833.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      443.84   19.61    1.326  0.28( 0.28) 0.99     309.1    5800.00
      2      451.71   39.51    0.812  0.28( 0.28) 0.99     617.7    5600.00
      3      443.82   52.99    0.661  0.28( 0.28) 0.99     848.8    5370.00
      4      443.97   53.42    0.657  0.28( 0.28) 0.99     856.8    5550.00
      5      443.57   53.76    0.654  0.28( 0.28) 0.99     862.0    5700.00
```

```
     6      439.05   56.73    0.630  0.27( 0.27) 0.99     906.2    5500.00
     7      428.63   60.98    0.599  0.27( 0.27) 0.99     958.4    5540.00
     8      415.28   64.27    0.578  0.27( 0.27) 0.99     984.5    5360.00
     9      408.18   66.04    0.567  0.27( 0.26) 0.99     997.6    5200.00
    10      406.32   66.35    0.565  0.27( 0.26) 0.99     999.2    5340.00
    11      393.91   68.10    0.555  0.27( 0.26) 0.99    1004.3    5240.00
    12      391.16   68.49    0.552  0.27( 0.26) 0.99    1005.1    5230.00
    13      362.21   72.59    0.530  0.26( 0.26) 0.99    1012.1    5100.00
    14      348.83   74.57    0.520  0.26( 0.26) 0.99    1013.5    5000.00
  TOTAL AREA(ACRES) =      1013.5

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      451.71  Tc(MIN.) =   39.512
 EFFECTIVE AREA(ACRES) =    617.74  AREA-AVERAGED Fm(INCH/HR) =  0.28
 AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.99
 TOTAL AREA(ACRES) =     1013.5
 LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5020.00 =   24833.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5020.00 TO NODE   5020.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE   5020.00 TO NODE   5021.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   2954.10  DOWNSTREAM(FEET) =   2930.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1098.00   CHANNEL SLOPE =  0.0219
 CHANNEL FLOW THRU SUBAREA(CFS) =     451.71
 FLOW VELOCITY(FEET/SEC) =  11.23 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.63   Tc(MIN.) =   41.14
 LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5021.00 =   25931.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5021.00 TO NODE   5021.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   41.14
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.789
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL DESERT COVER
 "DESERT BRUSH"   (30.0%)   B        2.99      0.34     1.000    82
 NATURAL DESERT COVER
```

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  "DESERT BRUSH"   (30.0%)   D        9.40      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   12.39      SUBAREA RUNOFF(CFS) =    6.35
  EFFECTIVE AREA(ACRES) =    630.13   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =     1025.9       PEAK FLOW RATE(CFS) =     451.71
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5021.00 TO NODE   3008.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2930.00  DOWNSTREAM(FEET) =   2910.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1179.00   CHANNEL SLOPE =  0.0167
  CHANNEL FLOW THRU SUBAREA(CFS) =     451.71
  FLOW VELOCITY(FEET/SEC) =   9.80 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.01   Tc(MIN.) =   43.15
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   3008.00 =   27110.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3008.00 TO NODE   3008.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   43.15
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.763
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.01      0.98     0.100    32
  USER-DEFINED               -        1.82      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.09      0.34     1.000    82
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        5.56      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.999
  SUBAREA AREA(ACRES) =    7.48      SUBAREA RUNOFF(CFS) =    3.49
  EFFECTIVE AREA(ACRES) =    637.61   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =     1033.4       PEAK FLOW RATE(CFS) =     451.71
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   3008.00 TO NODE   3008.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
```

==========

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	443.84	23.27	1.176	0.28(0.28)	0.99	328.9	5800.00
2	451.71	43.15	0.763	0.28(0.28)	0.99	637.6	5600.00
3	443.82	56.65	0.631	0.28(0.28)	0.99	868.7	5370.00
4	443.97	57.08	0.628	0.28(0.28)	0.99	876.7	5550.00
5	443.57	57.42	0.625	0.28(0.28)	0.99	881.9	5700.00
6	439.05	60.40	0.603	0.27(0.27)	0.99	926.0	5500.00
7	428.63	64.68	0.575	0.27(0.27)	0.99	978.3	5540.00
8	415.28	68.01	0.555	0.27(0.26)	0.99	1004.4	5360.00
9	408.18	69.79	0.545	0.27(0.26)	0.99	1017.5	5200.00
10	406.32	70.11	0.543	0.27(0.26)	0.99	1019.1	5340.00
11	393.91	71.90	0.534	0.26(0.26)	0.99	1024.1	5240.00
12	391.16	72.29	0.532	0.26(0.26)	0.99	1025.0	5230.00
13	362.21	76.49	0.511	0.26(0.26)	0.99	1032.0	5100.00
14	348.83	78.51	0.502	0.26(0.26)	0.99	1033.4	5000.00

LONGEST FLOWPATH FROM NODE 5100.00 TO NODE 3008.00 = 27110.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	34.81	41.22	0.788	0.39(0.34)	0.87	80.9	4000.00
2	27.96	56.38	0.633	0.39(0.34)	0.86	98.3	3000.00
3	26.39	58.99	0.613	0.39(0.34)	0.86	99.2	3200.00

LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3008.00 = 9397.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	478.65	23.27	1.176	0.29(0.28)	0.97	374.6	5800.00
2	485.76	41.22	0.788	0.29(0.29)	0.97	688.6	4000.00
3	485.65	43.15	0.763	0.29(0.29)	0.98	720.7	5600.00
4	471.93	56.38	0.633	0.29(0.28)	0.98	962.5	3000.00
5	471.62	56.65	0.631	0.29(0.28)	0.98	967.1	5370.00
6	471.51	57.08	0.628	0.29(0.28)	0.98	975.2	5550.00
7	470.90	57.42	0.625	0.29(0.28)	0.98	980.5	5700.00
8	467.57	58.99	0.613	0.29(0.28)	0.98	1004.3	3200.00
9	464.47	60.40	0.603	0.28(0.28)	0.98	1025.2	5500.00
10	451.33	64.68	0.575	0.28(0.27)	0.98	1077.4	5540.00
11	436.06	68.01	0.555	0.28(0.27)	0.98	1103.5	5360.00
12	428.00	69.79	0.545	0.28(0.27)	0.98	1116.7	5200.00
13	425.98	70.11	0.543	0.28(0.27)	0.98	1118.2	5340.00
14	412.65	71.90	0.534	0.27(0.27)	0.98	1123.3	5240.00
15	409.71	72.29	0.532	0.27(0.27)	0.98	1124.2	5230.00
16	378.77	76.49	0.511	0.27(0.27)	0.98	1131.1	5100.00
17	364.50	78.51	0.502	0.27(0.27)	0.98	1132.6	5000.00

TOTAL AREA(ACRES) = 1132.6

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      485.76  Tc(MIN.) =   41.220
  EFFECTIVE AREA(ACRES) =    688.59  AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =     1132.6
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   3008.00 =   27110.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3008.00 TO NODE   3008.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3008.00 TO NODE   3009.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2910.30  DOWNSTREAM(FEET) =   2906.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   230.00   CHANNEL SLOPE =  0.0187
  CHANNEL FLOW THRU SUBAREA(CFS) =     485.76
  FLOW VELOCITY(FEET/SEC) =  10.61 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.36   Tc(MIN.) =   41.58
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   3009.00 =   27340.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3009.00 TO NODE   3009.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   41.58
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.783
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.20      0.98     0.100    32
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        3.18      0.18     1.000    91
  USER-DEFINED               -        0.25      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.950
  SUBAREA AREA(ACRES) =    3.63      SUBAREA RUNOFF(CFS) =    1.93
  EFFECTIVE AREA(ACRES) =    692.22   AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =     1136.2       PEAK FLOW RATE(CFS) =     485.76
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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

```
  FLOW PROCESS FROM NODE   3009.00 TO NODE   3009.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5900.00 TO NODE   5901.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   950.00
  ELEVATION DATA: UPSTREAM(FEET) =   2999.30  DOWNSTREAM(FEET) =   2973.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.717
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.167
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.20      0.34     1.000    82   16.78
  COMMERCIAL                 B        0.62      0.75     0.100    56    9.72
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        0.66      0.18     1.000    91   16.78
  COMMERCIAL                 D        0.27      0.47     0.100    75    9.72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.542
  SUBAREA RUNOFF(CFS) =      3.19
  TOTAL AREA(ACRES) =      1.75   PEAK FLOW RATE(CFS) =      3.19

****************************************************************************
  FLOW PROCESS FROM NODE   5901.00 TO NODE   5902.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2973.60  DOWNSTREAM(FEET) =   2955.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   836.00   CHANNEL SLOPE =  0.0219
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.19
  FLOW VELOCITY(FEET/SEC) =   2.82 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.95   Tc(MIN.) =   14.66
  LONGEST FLOWPATH FROM NODE   5900.00 TO NODE   5902.00 =    1786.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5902.00 TO NODE   5902.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.66
```

```
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.625
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        3.18      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.18      SUBAREA RUNOFF(CFS) =    4.14
  EFFECTIVE AREA(ACRES) =      4.93   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.84
  TOTAL AREA(ACRES) =        4.9       PEAK FLOW RATE(CFS) =       6.47

****************************************************************************
  FLOW PROCESS FROM NODE   5902.00 TO NODE   5903.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2955.30  DOWNSTREAM(FEET) =   2932.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   906.00   CHANNEL SLOPE =  0.0256
  CHANNEL FLOW THRU SUBAREA(CFS) =       6.47
  FLOW VELOCITY(FEET/SEC) =   3.59 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.21   Tc(MIN.) =   18.87
  LONGEST FLOWPATH FROM NODE   5900.00 TO NODE   5903.00 =    2692.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5903.00 TO NODE   5903.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.87
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.362
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        8.04      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    8.04      SUBAREA RUNOFF(CFS) =    8.55
  EFFECTIVE AREA(ACRES) =     12.97   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.19  AREA-AVERAGED Ap =  0.94
  TOTAL AREA(ACRES) =       13.0       PEAK FLOW RATE(CFS) =      13.86

****************************************************************************
  FLOW PROCESS FROM NODE   5903.00 TO NODE   5903.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   5910.00 TO NODE   5911.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   600.00
  ELEVATION DATA: UPSTREAM(FEET) =   2975.30  DOWNSTREAM(FEET) =   2948.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.621
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.805
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        1.31      0.18     1.000    91   12.62
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.92
  TOTAL AREA(ACRES) =      1.31   PEAK FLOW RATE(CFS) =      1.92

****************************************************************************
  FLOW PROCESS FROM NODE   5911.00 TO NODE   5912.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2948.40  DOWNSTREAM(FEET) =   2932.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   531.00   CHANNEL SLOPE =  0.0307
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.92
  FLOW VELOCITY(FEET/SEC) =   2.99 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.96   Tc(MIN.) =   15.58
  LONGEST FLOWPATH FROM NODE   5910.00 TO NODE   5912.00 =    1131.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5912.00 TO NODE   5912.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.58
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.557
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        2.59      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
```

```
  SUBAREA AREA(ACRES) =    2.59      SUBAREA RUNOFF(CFS) =    3.21
  EFFECTIVE AREA(ACRES) =      3.90   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.9       PEAK FLOW RATE(CFS) =       4.83

****************************************************************************
  FLOW PROCESS FROM NODE   5903.00 TO NODE   5903.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        4.83   15.58    1.557  0.18( 0.18) 1.00       3.9    5910.00
  LONGEST FLOWPATH FROM NODE   5910.00 TO NODE   5903.00 =    1131.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       13.86   18.87    1.362  0.19( 0.17) 0.94      13.0    5900.00
  LONGEST FLOWPATH FROM NODE   5900.00 TO NODE   5903.00 =    2692.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       18.16   15.58    1.557  0.18( 0.18) 0.95      14.6    5910.00
      2       18.01   18.87    1.362  0.18( 0.18) 0.95      16.9    5900.00
    TOTAL AREA(ACRES) =        16.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       18.16  Tc(MIN.) =   15.583
  EFFECTIVE AREA(ACRES) =     14.61  AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =       16.9
  LONGEST FLOWPATH FROM NODE   5900.00 TO NODE   5903.00 =    2692.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5903.00 TO NODE   3009.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2932.10  DOWNSTREAM(FEET) =   2906.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1139.00   CHANNEL SLOPE =  0.0229
  CHANNEL FLOW THRU SUBAREA(CFS) =      18.16
  FLOW VELOCITY(FEET/SEC) =   4.42 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.30   Tc(MIN.) =   19.88
  LONGEST FLOWPATH FROM NODE   5900.00 TO NODE   3009.00 =    3831.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   3009.00 TO NODE   3009.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.88
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.313
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        1.88      0.44     1.000     -
  COMMERCIAL                 A        0.05      0.98     0.100    32
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        6.24      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.994
  SUBAREA AREA(ACRES) =    8.17      SUBAREA RUNOFF(CFS) =    7.90
  EFFECTIVE AREA(ACRES) =     22.78   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =       25.0       PEAK FLOW RATE(CFS) =      22.85

****************************************************************************
  FLOW PROCESS FROM NODE   3009.00 TO NODE   3009.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       22.85   19.88    1.313  0.21( 0.20) 0.97      22.8    5910.00
      2       22.15   23.17    1.179  0.20( 0.20) 0.97      25.0    5900.00
  LONGEST FLOWPATH FROM NODE   5900.00 TO NODE   3009.00 =    3831.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      478.65   23.63    1.164  0.29( 0.28) 0.97     378.2    5800.00
      2      485.76   41.58    0.783  0.29( 0.29) 0.97     692.2    4000.00
      3      485.65   43.51    0.759  0.29( 0.29) 0.98     724.4    5600.00
      4      471.93   56.74    0.630  0.29( 0.28) 0.98     966.1    3000.00
      5      471.62   57.01    0.628  0.29( 0.28) 0.98     970.7    5370.00
      6      471.51   57.44    0.625  0.29( 0.28) 0.98     978.8    5550.00
      7      470.90   57.78    0.622  0.29( 0.28) 0.98     984.1    5700.00
      8      467.57   59.35    0.611  0.29( 0.28) 0.98    1007.9    3200.00
      9      464.47   60.76    0.601  0.28( 0.28) 0.98    1028.8    5500.00
     10      451.33   65.05    0.573  0.28( 0.27) 0.98    1081.1    5540.00
     11      436.06   68.38    0.553  0.28( 0.27) 0.98    1107.1    5360.00
     12      428.00   70.17    0.543  0.28( 0.27) 0.98    1120.3    5200.00
     13      425.98   70.48    0.541  0.28( 0.27) 0.98    1121.9    5340.00
```

```
    14      412.65   72.28    0.532  0.27( 0.27) 0.98    1126.9    5240.00
    15      409.71   72.67    0.530  0.27( 0.27) 0.98    1127.8    5230.00
    16      378.77   76.88    0.509  0.27( 0.27) 0.98    1134.8    5100.00
    17      364.50   78.91    0.500  0.27( 0.27) 0.98    1136.2    5000.00
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   3009.00 =   27340.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      493.98   19.88    1.313  0.29( 0.28) 0.97     341.0    5910.00
      2      500.08   23.17    1.179  0.29( 0.28) 0.97     396.0    5900.00
      3      500.44   23.63    1.164  0.29( 0.28) 0.97     403.3    5800.00
      4      498.98   41.58    0.783  0.29( 0.28) 0.97     717.3    4000.00
      5      498.32   43.51    0.759  0.29( 0.28) 0.97     749.4    5600.00
      6      481.70   56.74    0.630  0.29( 0.28) 0.98     991.1    3000.00
      7      481.34   57.01    0.628  0.29( 0.28) 0.98     995.8    5370.00
      8      481.15   57.44    0.625  0.29( 0.28) 0.98    1003.8    5550.00
      9      480.49   57.78    0.622  0.29( 0.28) 0.98    1009.2    5700.00
     10      476.90   59.35    0.611  0.28( 0.28) 0.98    1033.0    3200.00
     11      473.57   60.76    0.601  0.28( 0.28) 0.98    1053.9    5500.00
     12      459.81   65.05    0.573  0.28( 0.27) 0.98    1106.1    5540.00
     13      444.09   68.38    0.553  0.27( 0.27) 0.98    1132.2    5360.00
     14      435.81   70.17    0.543  0.27( 0.27) 0.98    1145.3    5200.00
     15      433.75   70.48    0.541  0.27( 0.27) 0.98    1146.9    5340.00
     16      420.21   72.28    0.532  0.27( 0.27) 0.98    1152.0    5240.00
     17      417.22   72.67    0.530  0.27( 0.27) 0.98    1152.8    5230.00
     18      385.82   76.88    0.509  0.27( 0.27) 0.98    1159.8    5100.00
     19      371.34   78.91    0.500  0.27( 0.27) 0.98    1161.2    5000.00
    TOTAL AREA(ACRES) =      1161.2

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      500.44  Tc(MIN.) =   23.629
  EFFECTIVE AREA(ACRES) =    403.28  AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =     1161.2
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   3009.00 =   27340.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3009.00 TO NODE   3009.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3009.00 TO NODE   3009.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

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

```
  FLOW PROCESS FROM NODE   3009.00 TO NODE   3010.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2906.00  DOWNSTREAM(FEET) =   2901.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   434.00   CHANNEL SLOPE =  0.0099
  CHANNEL FLOW THRU SUBAREA(CFS) =     500.44
  FLOW VELOCITY(FEET/SEC) =   7.80 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.93   Tc(MIN.) =   24.56
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   3010.00 =   27774.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3010.00 TO NODE   3010.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   24.56
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.133
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        1.31      0.44     1.000     -
  COMMERCIAL                 A        0.49      0.98     0.100    32
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        0.47      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.39
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.806
  SUBAREA AREA(ACRES) =    2.27      SUBAREA RUNOFF(CFS) =    1.68
  EFFECTIVE AREA(ACRES) =    405.55   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =     1163.5       PEAK FLOW RATE(CFS) =     500.44
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   3010.00 TO NODE   3010.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5950.00 TO NODE   5951.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   530.00
  ELEVATION DATA: UPSTREAM(FEET) =   2957.20  DOWNSTREAM(FEET) =   2923.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
```

```
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.186
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.964
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        0.94      0.18     1.000    91   11.19
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.51
  TOTAL AREA(ACRES) =      0.94   PEAK FLOW RATE(CFS) =      1.51

****************************************************************************
  FLOW PROCESS FROM NODE   5951.00 TO NODE   3010.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2923.30  DOWNSTREAM(FEET) =   2901.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   704.00   CHANNEL SLOPE =  0.0307
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.51
  FLOW VELOCITY(FEET/SEC) =   2.85 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.12   Tc(MIN.) =   15.31
  LONGEST FLOWPATH FROM NODE   5950.00 TO NODE   3010.00 =    1234.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3010.00 TO NODE   3010.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.31
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.577
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -        1.10      0.44     1.000     -
  COMMERCIAL                A        0.01      0.98     0.100    32
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        1.76      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.997
  SUBAREA AREA(ACRES) =    2.87      SUBAREA RUNOFF(CFS) =    3.35
  EFFECTIVE AREA(ACRES) =      3.81   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.8       PEAK FLOW RATE(CFS) =       4.53

****************************************************************************
  FLOW PROCESS FROM NODE   3010.00 TO NODE   3010.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
```

==========

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	4.53	15.31	1.577	0.26(0.25)	1.00	3.8	5950.00

LONGEST FLOWPATH FROM NODE 5950.00 TO NODE 3010.00 = 1234.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	493.98	20.81	1.272	0.29(0.28)	0.97	343.2	5910.00
2	500.08	24.10	1.147	0.29(0.28)	0.97	398.3	5900.00
3	500.44	24.56	1.133	0.29(0.28)	0.97	405.5	5800.00
4	498.98	42.51	0.771	0.29(0.28)	0.97	719.5	4000.00
5	498.32	44.44	0.748	0.29(0.28)	0.97	751.7	5600.00
6	481.70	57.68	0.623	0.29(0.28)	0.98	993.4	3000.00
7	481.34	57.95	0.621	0.29(0.28)	0.98	998.0	5370.00
8	481.15	58.38	0.618	0.29(0.28)	0.98	1006.1	5550.00
9	480.49	58.72	0.615	0.29(0.28)	0.98	1011.4	5700.00
10	476.90	60.29	0.604	0.28(0.28)	0.98	1035.2	3200.00
11	473.57	61.71	0.594	0.28(0.28)	0.98	1056.1	5500.00
12	459.81	66.00	0.567	0.28(0.27)	0.98	1108.4	5540.00
13	444.09	69.34	0.548	0.28(0.27)	0.98	1134.5	5360.00
14	435.81	71.14	0.538	0.27(0.27)	0.98	1147.6	5200.00
15	433.75	71.45	0.536	0.27(0.27)	0.98	1149.2	5340.00
16	420.21	73.26	0.527	0.27(0.27)	0.98	1154.2	5240.00
17	417.22	73.66	0.525	0.27(0.27)	0.98	1155.1	5230.00
18	385.82	77.89	0.505	0.27(0.27)	0.98	1162.1	5100.00
19	371.34	79.93	0.496	0.27(0.27)	0.98	1163.5	5000.00

LONGEST FLOWPATH FROM NODE 5100.00 TO NODE 3010.00 = 27774.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	479.41	15.31	1.577	0.29(0.28)	0.97	256.3	5950.00
2	497.46	20.81	1.272	0.29(0.28)	0.97	347.1	5910.00
3	503.14	24.10	1.147	0.29(0.28)	0.97	402.1	5900.00
4	503.45	24.56	1.133	0.29(0.28)	0.97	409.4	5800.00
5	500.75	42.51	0.771	0.29(0.28)	0.97	723.3	4000.00
6	500.01	44.44	0.748	0.29(0.28)	0.97	755.5	5600.00
7	482.96	57.68	0.623	0.29(0.28)	0.98	997.2	3000.00
8	482.59	57.95	0.621	0.29(0.28)	0.98	1001.8	5370.00
9	482.40	58.38	0.618	0.29(0.28)	0.98	1009.9	5550.00
10	481.72	58.72	0.615	0.29(0.28)	0.98	1015.2	5700.00
11	478.10	60.29	0.604	0.28(0.28)	0.98	1039.0	3200.00
12	474.73	61.71	0.594	0.28(0.28)	0.98	1060.0	5500.00
13	460.88	66.00	0.567	0.28(0.27)	0.98	1112.2	5540.00
14	445.10	69.34	0.548	0.27(0.27)	0.98	1138.3	5360.00
15	436.78	71.14	0.538	0.27(0.27)	0.98	1151.4	5200.00

```
     16      434.72   71.45    0.536  0.27( 0.27) 0.98    1153.0    5340.00
     17      421.14   73.26    0.527  0.27( 0.27) 0.98    1158.0    5240.00
     18      418.15   73.66    0.525  0.27( 0.27) 0.98    1158.9    5230.00
     19      386.68   77.89    0.505  0.27( 0.27) 0.98    1165.9    5100.00
     20      372.17   79.93    0.496  0.27( 0.27) 0.98    1167.3    5000.00
    TOTAL AREA(ACRES) =      1167.3

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      503.45  Tc(MIN.) =   24.557
  EFFECTIVE AREA(ACRES) =    409.36  AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =     1167.3
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   3010.00 =   27774.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3010.00 TO NODE   3010.50 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2901.70  DOWNSTREAM(FEET) =   2900.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   118.00   CHANNEL SLOPE =  0.0085
  CHANNEL FLOW THRU SUBAREA(CFS) =     503.45
  FLOW VELOCITY(FEET/SEC) =   7.22 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.27   Tc(MIN.) =   24.83
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   3010.50 =   27892.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3010.50 TO NODE   3010.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   24.83
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.124
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        1.56      0.44     1.000     -
  COMMERCIAL                 A        0.31      0.98     0.100    32
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        0.39      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.877
  SUBAREA AREA(ACRES) =    2.26      SUBAREA RUNOFF(CFS) =    1.58
  EFFECTIVE AREA(ACRES) =    411.62   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =     1169.6       PEAK FLOW RATE(CFS) =     503.45
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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

```
  FLOW PROCESS FROM NODE   3010.50 TO NODE   3011.00 IS CODE =  37
----------------------------------------------------------------------------
  >>>>>COMPUTE CULVERT TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED CULVERT SIZE<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2900.70  DOWNSTREAM(FEET) =  2898.50
  FLOW LENGTH(FEET) =   100.00   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) =   7.50
  NUMBER OF BARREL(S) =   1
  CULVERT-FLOW VELOCITY(FEET/SEC.) =  11.40
  CULVERT-FLOW(CFS) =     503.45
  CULVERT-FLOW TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   24.98
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   3011.00 =   27992.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3011.00 TO NODE   1024.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2898.50  DOWNSTREAM(FEET) =   2896.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =    72.00   CHANNEL SLOPE =  0.0292
  CHANNEL FLOW THRU SUBAREA(CFS) =     503.45
  FLOW VELOCITY(FEET/SEC) =  13.40 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.09   Tc(MIN.) =   25.06
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   1024.00 =   28064.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     1169.6  TC(MIN.) =     25.06
  EFFECTIVE AREA(ACRES) =    411.62  AREA-AVERAGED Fm(INCH/HR)=  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap = 0.972
  PEAK FLOW RATE(CFS)   =     503.45

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      479.41   15.83    1.540  0.29( 0.28) 0.97     258.6    5950.00
      2      497.46   21.32    1.250  0.29( 0.28) 0.97     349.3    5910.00
      3      503.14   24.61    1.131  0.29( 0.28) 0.97     404.3    5900.00
      4      503.45   25.06    1.116  0.29( 0.28) 0.97     411.6    5800.00
      5      500.75   43.02    0.765  0.29( 0.28) 0.97     725.6    4000.00
      6      500.01   44.95    0.742  0.29( 0.28) 0.97     757.7    5600.00
      7      482.96   58.20    0.619  0.29( 0.28) 0.98     999.5    3000.00
      8      482.59   58.47    0.617  0.29( 0.28) 0.98    1004.1    5370.00
```

9	482.40	58.90	0.614	0.29(0.28) 0.98	1012.2	5550.00
10	481.72	59.24	0.611	0.29(0.28) 0.98	1017.5	5700.00
11	478.10	60.82	0.600	0.28(0.28) 0.98	1041.3	3200.00
12	474.73	62.23	0.591	0.28(0.28) 0.98	1062.2	5500.00
13	460.88	66.53	0.564	0.28(0.27) 0.98	1114.5	5540.00
14	445.10	69.89	0.545	0.28(0.27) 0.98	1140.5	5360.00
15	436.78	71.66	0.535	0.27(0.27) 0.98	1153.7	5200.00
16	434.72	71.98	0.533	0.27(0.27) 0.98	1155.2	5340.00
17	421.14	73.80	0.524	0.27(0.27) 0.98	1160.3	5240.00
18	418.15	74.19	0.522	0.27(0.27) 0.98	1161.2	5230.00
19	386.68	78.45	0.502	0.27(0.27) 0.98	1168.1	5100.00
20	372.17	80.48	0.493	0.27(0.27) 0.98	1169.6	5000.00

END OF RATIONAL METHOD ANALYSIS

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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            Ver. 22.0  Release Date: 07/01/2015  License ID 1673

                          Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* APPLE VALLEY 143 ACRES - EXISTING CONDITION                           *
* 10-yr RATIONAL METHOD - WATERSHEDS F & G                              *
* Q3 08/26/2022                                                         *
 ************************************************************************

  FILE NAME: APF_10E.DAT
  TIME/DATE OF STUDY: 18:16 08/26/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.7000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.6060

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 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.*
```

```
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE   6000.00 TO NODE   6001.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   988.00
  ELEVATION DATA: UPSTREAM(FEET) =   3252.70  DOWNSTREAM(FEET) =   3208.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.387
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.571
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  USER-DEFINED               -        8.15      0.44     1.000     -   15.39
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      8.30
  TOTAL AREA(ACRES) =      8.15   PEAK FLOW RATE(CFS) =      8.30

****************************************************************************
  FLOW PROCESS FROM NODE   6001.00 TO NODE   6002.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3208.10  DOWNSTREAM(FEET) =   3185.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   595.00   CHANNEL SLOPE =  0.0380
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0380 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       8.30
  FLOW VELOCITY(FEET/SEC) =   2.21 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.49   Tc(MIN.) =   19.88
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6002.00 =    1583.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6002.00 TO NODE   6002.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.88
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.313
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        8.30      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    8.30      SUBAREA RUNOFF(CFS) =    6.52
  EFFECTIVE AREA(ACRES) =     16.45   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       16.5       PEAK FLOW RATE(CFS) =      12.93

****************************************************************************
  FLOW PROCESS FROM NODE   6002.00 TO NODE   6003.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3185.50  DOWNSTREAM(FEET) =   3162.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   650.00   CHANNEL SLOPE =  0.0355
  CHANNEL FLOW THRU SUBAREA(CFS) =      12.93
  FLOW VELOCITY(FEET/SEC) =   5.03 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.15   Tc(MIN.) =   22.03
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6003.00 =    2233.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6003.00 TO NODE   6003.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   22.03
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.222
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        4.51      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.51      SUBAREA RUNOFF(CFS) =    3.17
  EFFECTIVE AREA(ACRES) =     20.96   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       21.0       PEAK FLOW RATE(CFS) =      14.75

****************************************************************************
  FLOW PROCESS FROM NODE   6003.00 TO NODE   6004.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3162.40  DOWNSTREAM(FEET) =   3129.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   905.00   CHANNEL SLOPE =  0.0369
  CHANNEL FLOW THRU SUBAREA(CFS) =      14.75
  FLOW VELOCITY(FEET/SEC) =   5.31 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.84   Tc(MIN.) =   24.87
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6004.00 =    3138.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   6004.00 TO NODE   6004.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   24.87
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.122
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        4.13      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.13      SUBAREA RUNOFF(CFS) =    2.54
  EFFECTIVE AREA(ACRES) =     25.09   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       25.1       PEAK FLOW RATE(CFS) =      15.41

****************************************************************************
  FLOW PROCESS FROM NODE   6004.00 TO NODE   6005.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3129.00  DOWNSTREAM(FEET) =   3076.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1568.00   CHANNEL SLOPE =  0.0338
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0338 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      15.41
  FLOW VELOCITY(FEET/SEC) =   2.56 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  10.21   Tc(MIN.) =   35.08
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6005.00 =    4706.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6005.00 TO NODE   6005.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   35.08
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.882
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        5.74      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.74      SUBAREA RUNOFF(CFS) =    2.28
  EFFECTIVE AREA(ACRES) =     30.83   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       30.8       PEAK FLOW RATE(CFS) =      15.41
```

```
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   6005.00 TO NODE   6005.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   6200.00 TO NODE   6201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   709.00
  ELEVATION DATA: UPSTREAM(FEET) =   3189.00  DOWNSTREAM(FEET) =   3158.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.623
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.711
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  USER-DEFINED               -        2.57      0.44     1.000     -   13.62
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.94
  TOTAL AREA(ACRES) =      2.57   PEAK FLOW RATE(CFS) =      2.94

****************************************************************************
  FLOW PROCESS FROM NODE   6201.00 TO NODE   6202.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3158.70  DOWNSTREAM(FEET) =   3122.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   906.00   CHANNEL SLOPE =  0.0397
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0397 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.94
  FLOW VELOCITY(FEET/SEC) =   1.60 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   9.45   Tc(MIN.) =   23.07
  LONGEST FLOWPATH FROM NODE   6200.00 TO NODE   6202.00 =    1615.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6202.00 TO NODE   6202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   23.07
```

```
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.183
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        4.81      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.81      SUBAREA RUNOFF(CFS) =    3.22
  EFFECTIVE AREA(ACRES) =      7.38   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        7.4       PEAK FLOW RATE(CFS) =       4.94

****************************************************************************
  FLOW PROCESS FROM NODE   6202.00 TO NODE   6005.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3122.70  DOWNSTREAM(FEET) =   3076.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1225.00   CHANNEL SLOPE =  0.0381
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0381 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       4.94
  FLOW VELOCITY(FEET/SEC) =   1.86 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  10.97   Tc(MIN.) =   34.04
  LONGEST FLOWPATH FROM NODE   6200.00 TO NODE   6005.00 =    2840.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6005.00 TO NODE   6005.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   34.04
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.901
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        5.33      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.33      SUBAREA RUNOFF(CFS) =    2.21
  EFFECTIVE AREA(ACRES) =     12.71   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       12.7       PEAK FLOW RATE(CFS) =       5.27

****************************************************************************
  FLOW PROCESS FROM NODE   6005.00 TO NODE   6005.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================
```

```
 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        5.27   34.04    0.901  0.44( 0.44) 1.00      12.7    6200.00
 LONGEST FLOWPATH FROM NODE   6200.00 TO NODE   6005.00 =    2840.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       15.41   35.08    0.882  0.44( 0.44) 1.00      30.8    6000.00
 LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6005.00 =    4706.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       20.68   34.04    0.901  0.44( 0.44) 1.00      42.6    6200.00
     2       20.47   35.08    0.882  0.44( 0.44) 1.00      43.5    6000.00
   TOTAL AREA(ACRES) =        43.5

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       20.68  Tc(MIN.) =   34.042
 EFFECTIVE AREA(ACRES) =     42.63  AREA-AVERAGED Fm(INCH/HR) =  0.44
 AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       43.5
 LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6005.00 =    4706.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   6005.00 TO NODE   6005.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE   6005.00 TO NODE   6006.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   3076.00  DOWNSTREAM(FEET) =   3057.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   567.00   CHANNEL SLOPE =  0.0335
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0335 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =      20.68
 FLOW VELOCITY(FEET/SEC) =   2.81 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   3.36   Tc(MIN.) =   37.40
 LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6006.00 =    5273.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   6006.00 TO NODE   6006.00 IS CODE =  81
```

```
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   37.40
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.844
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        4.90      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.90      SUBAREA RUNOFF(CFS) =    1.78
  EFFECTIVE AREA(ACRES) =     47.53   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       48.4       PEAK FLOW RATE(CFS) =      20.68
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

************************************************************************
  FLOW PROCESS FROM NODE   6006.00 TO NODE   6007.00 IS CODE =  53
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3057.00  DOWNSTREAM(FEET) =   3024.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1037.00   CHANNEL SLOPE =  0.0318
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0318 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      20.68
  FLOW VELOCITY(FEET/SEC) =   2.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.31   Tc(MIN.) =   43.71
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6007.00 =    6310.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE   6007.00 TO NODE   6007.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   43.71
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.756
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.73      0.34     1.000    82
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        2.49      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.22      SUBAREA RUNOFF(CFS) =    1.56
  EFFECTIVE AREA(ACRES) =     50.75   AREA-AVERAGED Fm(INCH/HR) =  0.43
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       51.7       PEAK FLOW RATE(CFS) =      20.68
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   6007.00 TO NODE   6007.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   6300.00 TO NODE   6301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   892.00
  ELEVATION DATA: UPSTREAM(FEET) =   3096.70  DOWNSTREAM(FEET) =   3063.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.379
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.572
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  USER-DEFINED               -        2.51      0.44     1.000     -   15.38
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.56
  TOTAL AREA(ACRES) =      2.51   PEAK FLOW RATE(CFS) =      2.56

****************************************************************************
  FLOW PROCESS FROM NODE   6301.00 TO NODE   6007.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3063.80  DOWNSTREAM(FEET) =   3024.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1228.00   CHANNEL SLOPE =  0.0324
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0324 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.56
  FLOW VELOCITY(FEET/SEC) =   1.38 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  14.85   Tc(MIN.) =   30.23
  LONGEST FLOWPATH FROM NODE   6300.00 TO NODE   6007.00 =    2120.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6007.00 TO NODE   6007.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==========================================================================
  MAINLINE Tc(MIN.) =   30.23
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.979
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        2.31      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        3.65      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.96      SUBAREA RUNOFF(CFS) =    3.75
  EFFECTIVE AREA(ACRES) =      8.47   AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.33  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        8.5       PEAK FLOW RATE(CFS) =       4.96

**************************************************************************
  FLOW PROCESS FROM NODE   6007.00 TO NODE   6007.00 IS CODE =  11
--------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
==========================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        4.96   30.23    0.979  0.33( 0.33) 1.00       8.5    6300.00
  LONGEST FLOWPATH FROM NODE   6300.00 TO NODE   6007.00 =    2120.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       20.68   43.71    0.756  0.43( 0.43) 1.00      50.7    6200.00
      2       20.47   44.79    0.744  0.43( 0.43) 1.00      51.7    6000.00
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6007.00 =    6310.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       25.64   30.23    0.979  0.41( 0.41) 1.00      43.6    6300.00
      2       23.95   43.71    0.756  0.41( 0.41) 1.00      59.2    6200.00
      3       23.63   44.79    0.744  0.41( 0.41) 1.00      60.1    6000.00
    TOTAL AREA(ACRES) =        60.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       25.64  Tc(MIN.) =   30.232
  EFFECTIVE AREA(ACRES) =     43.57  AREA-AVERAGED Fm(INCH/HR) =  0.41
  AREA-AVERAGED Fp(INCH/HR) =  0.41  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       60.1
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6007.00 =    6310.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   6007.00 TO NODE   6007.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   6007.00 TO NODE   6008.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3024.00  DOWNSTREAM(FEET) =   3004.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   655.00   CHANNEL SLOPE =  0.0301
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0301 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      25.64
  FLOW VELOCITY(FEET/SEC) =   2.86 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.82   Tc(MIN.) =   34.05
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6008.00 =    6965.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6008.00 TO NODE   6008.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   34.05
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.901
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.73      0.34     1.000    82
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        2.49      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.22      SUBAREA RUNOFF(CFS) =    1.98
  EFFECTIVE AREA(ACRES) =     46.79   AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.39  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       63.4       PEAK FLOW RATE(CFS) =      25.64
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   6008.00 TO NODE   6008.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   34.05
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.901
```

```
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        2.17      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        5.93      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.37
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    8.10      SUBAREA RUNOFF(CFS) =    3.87
  EFFECTIVE AREA(ACRES) =     54.89   AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.39  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       71.5       PEAK FLOW RATE(CFS) =      25.64
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   6008.00 TO NODE   6008.50 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3004.30  DOWNSTREAM(FEET) =   2979.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   873.00   CHANNEL SLOPE =  0.0281
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0281 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      25.64
  FLOW VELOCITY(FEET/SEC) =   2.76 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.27   Tc(MIN.) =   39.31
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6008.50 =    7838.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6008.50 TO NODE   6008.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   39.31
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.815
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        2.61      0.75     0.100    56
  USER-DEFINED               -        7.23      0.44     1.000     -
  COMMERCIAL                 D        1.52      0.47     0.100    75
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        2.86      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.38
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.739
  SUBAREA AREA(ACRES) =   14.22      SUBAREA RUNOFF(CFS) =    6.86
  EFFECTIVE AREA(ACRES) =     69.11   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.39  AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =       85.7       PEAK FLOW RATE(CFS) =      27.82
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   6008.50 TO NODE   6008.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   39.31
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.815
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        6.81      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    6.81      SUBAREA RUNOFF(CFS) =    3.89
  EFFECTIVE AREA(ACRES) =     75.92   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =       92.5       PEAK FLOW RATE(CFS) =      31.71

****************************************************************************
  FLOW PROCESS FROM NODE   6008.50 TO NODE   6009.00 IS CODE =  37
----------------------------------------------------------------------------
  >>>>>COMPUTE CULVERT TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED CULVERT SIZE<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2979.80  DOWNSTREAM(FEET) =  2973.40
  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) =   2.25
  NUMBER OF BARREL(S) =   1
  CULVERT-FLOW VELOCITY(FEET/SEC.) =   7.98
  CULVERT-FLOW(CFS) =      31.71
  CULVERT-FLOW TRAVEL TIME(MIN.) =   0.52    Tc(MIN.) =   39.84
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6009.00 =    8088.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6009.00 TO NODE   6010.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2973.40  DOWNSTREAM(FEET) =   2940.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1008.00   CHANNEL SLOPE =  0.0326
  CHANNEL FLOW THRU SUBAREA(CFS) =      31.71
```

```
  FLOW VELOCITY(FEET/SEC) =   6.14 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.73   Tc(MIN.) =   42.57
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6010.00 =    9096.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6010.00 TO NODE   6010.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   42.57
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.771
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        1.93      0.47     0.100    75
  NATURAL DESERT COVER
  "DESERT BRUSH"   ( 7.0%)   D        6.99      0.16     1.000    92
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.17
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.805
  SUBAREA AREA(ACRES) =    8.92      SUBAREA RUNOFF(CFS) =    5.10
  EFFECTIVE AREA(ACRES) =     84.84   AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.35  AREA-AVERAGED Ap =  0.94
  TOTAL AREA(ACRES) =      101.4       PEAK FLOW RATE(CFS) =      33.80

****************************************************************************
  FLOW PROCESS FROM NODE   6010.00 TO NODE   6011.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2940.50  DOWNSTREAM(FEET) =   2922.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =   669.00   CHANNEL SLOPE =  0.0268
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0268 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      33.80
  FLOW VELOCITY(FEET/SEC) =   2.96 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.77   Tc(MIN.) =   46.34
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6011.00 =    9765.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6011.00 TO NODE   6011.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   46.34
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.726
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        0.05      0.44     1.000     -
```

```
  COMMERCIAL                 D        1.31      0.47     0.100    75
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        7.77      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.19
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.871
  SUBAREA AREA(ACRES) =    9.13      SUBAREA RUNOFF(CFS) =    4.63
  EFFECTIVE AREA(ACRES) =     93.97   AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  0.93
  TOTAL AREA(ACRES) =      110.5       PEAK FLOW RATE(CFS) =      35.04

****************************************************************************
  FLOW PROCESS FROM NODE   6011.00 TO NODE   6011.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   7000.00 TO NODE   7001.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   936.00
  ELEVATION DATA: UPSTREAM(FEET) =   3259.80  DOWNSTREAM(FEET) =   3220.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.277
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.579
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  USER-DEFINED               -        5.56      0.44     1.000     -   15.28
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      5.70
  TOTAL AREA(ACRES) =      5.56   PEAK FLOW RATE(CFS) =      5.70

****************************************************************************
  FLOW PROCESS FROM NODE   7001.00 TO NODE   7002.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3220.50  DOWNSTREAM(FEET) =   3142.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1747.00   CHANNEL SLOPE =  0.0447
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0447 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       5.70
  FLOW VELOCITY(FEET/SEC) =   2.11 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  13.78   Tc(MIN.) =   29.05
```

```
 LONGEST FLOWPATH FROM NODE   7000.00 TO NODE   7002.00 =    2683.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7002.00 TO NODE   7002.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   29.05
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.007
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -       14.64      0.44     1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   14.64      SUBAREA RUNOFF(CFS) =    7.47
 EFFECTIVE AREA(ACRES) =     20.20   AREA-AVERAGED Fm(INCH/HR) =  0.44
 AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       20.2       PEAK FLOW RATE(CFS) =      10.30

****************************************************************************
 FLOW PROCESS FROM NODE   7002.00 TO NODE   7003.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   3142.40  DOWNSTREAM(FEET) =   3105.70
 CHANNEL LENGTH THRU SUBAREA(FEET) =   975.00   CHANNEL SLOPE =  0.0376
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0376 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =      10.30
 FLOW VELOCITY(FEET/SEC) =   2.36 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   6.88   Tc(MIN.) =   35.93
 LONGEST FLOWPATH FROM NODE   7000.00 TO NODE   7003.00 =    3658.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7003.00 TO NODE   7003.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   35.93
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.868
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -       11.99      0.44     1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   11.99      SUBAREA RUNOFF(CFS) =    4.61
 EFFECTIVE AREA(ACRES) =     32.19   AREA-AVERAGED Fm(INCH/HR) =  0.44
```

```
 AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       32.2       PEAK FLOW RATE(CFS) =      12.39

****************************************************************************
 FLOW PROCESS FROM NODE   7003.00 TO NODE   7004.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   3105.70  DOWNSTREAM(FEET) =   3076.40
 CHANNEL LENGTH THRU SUBAREA(FEET) =   821.00   CHANNEL SLOPE =  0.0357
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0357 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =      12.39
 FLOW VELOCITY(FEET/SEC) =   2.45 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   5.59   Tc(MIN.) =   41.53
 LONGEST FLOWPATH FROM NODE   7000.00 TO NODE   7004.00 =    4479.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7004.00 TO NODE   7004.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   41.53
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.784
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        6.49      0.44     1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    6.49      SUBAREA RUNOFF(CFS) =    2.01
 EFFECTIVE AREA(ACRES) =     38.68   AREA-AVERAGED Fm(INCH/HR) =  0.44
 AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       38.7       PEAK FLOW RATE(CFS) =      12.39
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE   7004.00 TO NODE   7005.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   3076.40  DOWNSTREAM(FEET) =   3042.80
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1024.00   CHANNEL SLOPE =  0.0328
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0328 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =      12.39
 FLOW VELOCITY(FEET/SEC) =   2.35 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   7.28   Tc(MIN.) =   48.80
```

```
 LONGEST FLOWPATH FROM NODE   7000.00 TO NODE   7005.00 =    5503.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7005.00 TO NODE   7005.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   48.80
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.700
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        7.13      0.44     1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    7.13      SUBAREA RUNOFF(CFS) =    1.67
 EFFECTIVE AREA(ACRES) =     45.81   AREA-AVERAGED Fm(INCH/HR) =  0.44
 AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       45.8       PEAK FLOW RATE(CFS) =      12.39
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE   7005.00 TO NODE   7006.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   3042.80  DOWNSTREAM(FEET) =   3012.30
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1002.00   CHANNEL SLOPE =  0.0304
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0304 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =      12.39
 FLOW VELOCITY(FEET/SEC) =   2.26 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   7.39   Tc(MIN.) =   56.20
 LONGEST FLOWPATH FROM NODE   7000.00 TO NODE   7006.00 =    6505.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7006.00 TO NODE   7006.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   56.20
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.634
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        6.39      0.44     1.000     -
 NATURAL DESERT COVER
 "DESERT BRUSH"   (30.0%)   D        0.79      0.18     1.000    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.41
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    7.18      SUBAREA RUNOFF(CFS) =    1.44
  EFFECTIVE AREA(ACRES) =     52.99   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       53.0       PEAK FLOW RATE(CFS) =      12.39
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   7006.00 TO NODE   7006.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   7200.00 TO NODE   7201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   932.00
  ELEVATION DATA: UPSTREAM(FEET) =   3218.00  DOWNSTREAM(FEET) =   3171.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.734
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.619
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  USER-DEFINED               -        6.73      0.44     1.000     -   14.73
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      7.14
  TOTAL AREA(ACRES) =      6.73   PEAK FLOW RATE(CFS) =      7.14

****************************************************************************
  FLOW PROCESS FROM NODE   7201.00 TO NODE   7202.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3171.50  DOWNSTREAM(FEET) =   3143.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   660.00   CHANNEL SLOPE =  0.0426
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0426 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       7.14
  FLOW VELOCITY(FEET/SEC) =   2.22 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.95   Tc(MIN.) =   19.68
  LONGEST FLOWPATH FROM NODE   7200.00 TO NODE   7202.00 =    1592.00 FEET.

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

```
 FLOW PROCESS FROM NODE   7202.00 TO NODE   7202.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.68
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.322
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        5.15      0.44     1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    5.15      SUBAREA RUNOFF(CFS) =    4.09
 EFFECTIVE AREA(ACRES) =     11.88   AREA-AVERAGED Fm(INCH/HR) =  0.44
 AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       11.9       PEAK FLOW RATE(CFS) =       9.43

****************************************************************************
 FLOW PROCESS FROM NODE   7202.00 TO NODE   7203.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   3143.40  DOWNSTREAM(FEET) =   3125.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   511.00   CHANNEL SLOPE =  0.0356
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0356 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =       9.43
 FLOW VELOCITY(FEET/SEC) =   2.23 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   3.82   Tc(MIN.) =   23.50
 LONGEST FLOWPATH FROM NODE   7200.00 TO NODE   7203.00 =    2103.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7203.00 TO NODE   7203.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   23.50
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.168
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        2.93      0.44     1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    2.93      SUBAREA RUNOFF(CFS) =    1.92
 EFFECTIVE AREA(ACRES) =     14.81   AREA-AVERAGED Fm(INCH/HR) =  0.44
 AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       14.8       PEAK FLOW RATE(CFS) =       9.70
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   7203.00 TO NODE   7204.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3125.20  DOWNSTREAM(FEET) =   3106.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =   552.00   CHANNEL SLOPE =  0.0337
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0337 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       9.70
  FLOW VELOCITY(FEET/SEC) =   2.19 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.20   Tc(MIN.) =   27.70
  LONGEST FLOWPATH FROM NODE   7200.00 TO NODE   7204.00 =    2655.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7204.00 TO NODE   7204.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.70
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.041
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        1.24      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.24      SUBAREA RUNOFF(CFS) =    0.67
  EFFECTIVE AREA(ACRES) =     16.05   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       16.1       PEAK FLOW RATE(CFS) =       9.70
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   7204.00 TO NODE   7205.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3106.60  DOWNSTREAM(FEET) =   3079.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =   732.00   CHANNEL SLOPE =  0.0369
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0369 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       9.70
  FLOW VELOCITY(FEET/SEC) =   2.29 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.32   Tc(MIN.) =   33.02
  LONGEST FLOWPATH FROM NODE   7200.00 TO NODE   7205.00 =    3387.00 FEET.

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

```
 FLOW PROCESS FROM NODE   7205.00 TO NODE   7205.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   33.02
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.921
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        3.39      0.44     1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    3.39      SUBAREA RUNOFF(CFS) =    1.47
 EFFECTIVE AREA(ACRES) =     19.44   AREA-AVERAGED Fm(INCH/HR) =  0.44
 AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       19.4       PEAK FLOW RATE(CFS) =       9.70
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE   7205.00 TO NODE   7206.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   3079.60  DOWNSTREAM(FEET) =   3045.40
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1048.00   CHANNEL SLOPE =  0.0326
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0326 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =       9.70
 FLOW VELOCITY(FEET/SEC) =   2.16 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   8.10   Tc(MIN.) =   41.12
 LONGEST FLOWPATH FROM NODE   7200.00 TO NODE   7206.00 =    4435.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7206.00 TO NODE   7206.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   41.12
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.789
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        4.49      0.44     1.000     -
 NATURAL DESERT COVER
 "DESERT BRUSH"   (30.0%)   D        0.17      0.18     1.000    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    4.66      SUBAREA RUNOFF(CFS) =    1.51
 EFFECTIVE AREA(ACRES) =     24.10   AREA-AVERAGED Fm(INCH/HR) =  0.44
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       24.1       PEAK FLOW RATE(CFS) =       9.70
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   7206.00 TO NODE   7206.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   7220.00 TO NODE   7221.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   854.00
  ELEVATION DATA: UPSTREAM(FEET) =   3168.50  DOWNSTREAM(FEET) =   3135.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.965
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.602
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  USER-DEFINED               -        2.26      0.44     1.000     -   14.96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.36
  TOTAL AREA(ACRES) =      2.26   PEAK FLOW RATE(CFS) =      2.36

****************************************************************************
  FLOW PROCESS FROM NODE   7221.00 TO NODE   7222.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3135.40  DOWNSTREAM(FEET) =   3095.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   902.00   CHANNEL SLOPE =  0.0442
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0442 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.36
  FLOW VELOCITY(FEET/SEC) =   1.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   9.59   Tc(MIN.) =   24.55
  LONGEST FLOWPATH FROM NODE   7220.00 TO NODE   7222.00 =    1756.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7222.00 TO NODE   7222.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==========================================================================
  MAINLINE Tc(MIN.) =   24.55
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.133
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        4.32      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.32      SUBAREA RUNOFF(CFS) =    2.69
  EFFECTIVE AREA(ACRES) =      6.58   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        6.6       PEAK FLOW RATE(CFS) =       4.10

**************************************************************************
  FLOW PROCESS FROM NODE   7222.00 TO NODE   7223.00 IS CODE =  53
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3095.50  DOWNSTREAM(FEET) =   3074.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   683.00   CHANNEL SLOPE =  0.0310
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0310 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       4.10
  FLOW VELOCITY(FEET/SEC) =   1.58 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.21   Tc(MIN.) =   31.76
  LONGEST FLOWPATH FROM NODE   7220.00 TO NODE   7223.00 =    2439.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE   7223.00 TO NODE   7223.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   31.76
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.946
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        2.32      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.32      SUBAREA RUNOFF(CFS) =    1.06
  EFFECTIVE AREA(ACRES) =      8.90   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        8.9       PEAK FLOW RATE(CFS) =       4.10
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

**************************************************************************
  FLOW PROCESS FROM NODE   7223.00 TO NODE   7223.00 IS CODE =  81
```

```
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   31.76
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.946
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        4.93      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.93      SUBAREA RUNOFF(CFS) =    2.24
  EFFECTIVE AREA(ACRES) =     13.83   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       13.8       PEAK FLOW RATE(CFS) =       6.30

****************************************************************************
  FLOW PROCESS FROM NODE   7223.00 TO NODE   7206.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3074.30  DOWNSTREAM(FEET) =   3045.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   843.00   CHANNEL SLOPE =  0.0343
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0343 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       6.30
  FLOW VELOCITY(FEET/SEC) =   1.91 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.34   Tc(MIN.) =   39.10
  LONGEST FLOWPATH FROM NODE   7220.00 TO NODE   7206.00 =    3282.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7206.00 TO NODE   7206.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   39.10
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.818
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        2.47      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        0.47      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.94      SUBAREA RUNOFF(CFS) =    1.11
  EFFECTIVE AREA(ACRES) =     16.77   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       16.8       PEAK FLOW RATE(CFS) =       6.30
```

```
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   7206.00 TO NODE   7206.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        6.30   39.10    0.818  0.43( 0.43) 1.00      16.8    7220.00
  LONGEST FLOWPATH FROM NODE   7220.00 TO NODE   7206.00 =    3282.00 FEET.

  ** MEMORY BANK #  3 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        9.70   41.12    0.789  0.44( 0.44) 1.00      24.1    7200.00
  LONGEST FLOWPATH FROM NODE   7200.00 TO NODE   7206.00 =    4435.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       16.00   39.10    0.818  0.44( 0.44) 1.00      39.7    7220.00
      2       15.54   41.12    0.789  0.44( 0.44) 1.00      40.9    7200.00
    TOTAL AREA(ACRES) =        40.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       16.00  Tc(MIN.) =   39.104
  EFFECTIVE AREA(ACRES) =     39.69  AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       40.9
  LONGEST FLOWPATH FROM NODE   7200.00 TO NODE   7206.00 =    4435.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7206.00 TO NODE   7206.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   7206.00 TO NODE   7006.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3045.40  DOWNSTREAM(FEET) =   3012.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1102.00   CHANNEL SLOPE =  0.0300
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0300 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
  CHANNEL FLOW THRU SUBAREA(CFS) =      16.00
  FLOW VELOCITY(FEET/SEC) =   2.44 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.52   Tc(MIN.) =   46.62
  LONGEST FLOWPATH FROM NODE   7200.00 TO NODE   7006.00 =    5537.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7006.00 TO NODE   7006.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   46.62
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.723
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        0.36      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        7.43      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.19
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    7.79      SUBAREA RUNOFF(CFS) =    3.72
  EFFECTIVE AREA(ACRES) =     47.48   AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       48.7       PEAK FLOW RATE(CFS) =      16.00
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   7006.00 TO NODE   7006.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       16.00   46.62    0.723  0.40( 0.40) 1.00      47.5    7220.00
      2       15.54   48.71    0.701  0.40( 0.40) 1.00      48.7    7200.00
  LONGEST FLOWPATH FROM NODE   7200.00 TO NODE   7006.00 =    5537.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       12.39   56.20    0.634  0.44( 0.44) 1.00      53.0    7000.00
  LONGEST FLOWPATH FROM NODE   7000.00 TO NODE   7006.00 =    6505.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       28.38   46.62    0.723  0.42( 0.42) 1.00      91.4    7220.00
      2       27.92   48.71    0.701  0.42( 0.42) 1.00      94.6    7200.00
```

```
      3       24.51   56.20    0.634  0.42( 0.42) 1.00     101.7    7000.00
    TOTAL AREA(ACRES) =       101.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       28.38  Tc(MIN.) =   46.622
  EFFECTIVE AREA(ACRES) =     91.44  AREA-AVERAGED Fm(INCH/HR) =  0.42
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      101.7
  LONGEST FLOWPATH FROM NODE   7000.00 TO NODE   7006.00 =    6505.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7006.00 TO NODE   7006.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   7006.00 TO NODE   7006.50 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3012.30  DOWNSTREAM(FEET) =   2953.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1966.00   CHANNEL SLOPE =  0.0298
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0298 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      28.38
  FLOW VELOCITY(FEET/SEC) =   2.94 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  11.13   Tc(MIN.) =   57.75
  LONGEST FLOWPATH FROM NODE   7000.00 TO NODE   7006.50 =    8471.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7006.50 TO NODE   7006.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   57.75
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.622
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        5.51      0.44     1.000     -
  COMMERCIAL                 D        3.06      0.47     0.100    75
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        8.68      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.840
  SUBAREA AREA(ACRES) =   17.25      SUBAREA RUNOFF(CFS) =    5.94
  EFFECTIVE AREA(ACRES) =    108.69   AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.97
```

```
  TOTAL AREA(ACRES) =      118.9       PEAK FLOW RATE(CFS) =      28.38
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   7006.50 TO NODE   7006.50 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   7240.00 TO NODE   7241.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   785.00
  ELEVATION DATA: UPSTREAM(FEET) =   3016.90  DOWNSTREAM(FEET) =   2990.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.908
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.606
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        3.06      0.18     1.000    91   14.91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      3.93
  TOTAL AREA(ACRES) =      3.06   PEAK FLOW RATE(CFS) =      3.93

****************************************************************************
  FLOW PROCESS FROM NODE   7241.00 TO NODE   7006.50 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2990.70  DOWNSTREAM(FEET) =   2953.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1167.00   CHANNEL SLOPE =  0.0316
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0316 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.93
  FLOW VELOCITY(FEET/SEC) =   1.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  12.39   Tc(MIN.) =   27.29
  LONGEST FLOWPATH FROM NODE   7240.00 TO NODE   7006.50 =    1952.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7006.50 TO NODE   7006.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==========================================================================
  MAINLINE Tc(MIN.) =   27.29
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.052
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        3.51      0.47     0.100    75
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        6.42      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.682
  SUBAREA AREA(ACRES) =    9.93      SUBAREA RUNOFF(CFS) =    8.21
  EFFECTIVE AREA(ACRES) =     12.99   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.19  AREA-AVERAGED Ap =  0.76
  TOTAL AREA(ACRES) =       13.0       PEAK FLOW RATE(CFS) =      10.61

**************************************************************************
  FLOW PROCESS FROM NODE   7006.50 TO NODE   7006.50 IS CODE =  11
--------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
==========================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       10.61   27.29    1.052  0.19( 0.14) 0.76      13.0    7240.00
  LONGEST FLOWPATH FROM NODE   7240.00 TO NODE   7006.50 =    1952.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       28.38   57.75    0.622  0.40( 0.39) 0.97     108.7    7220.00
      2       27.92   59.90    0.607  0.40( 0.39) 0.98     111.8    7200.00
      3       24.51   67.89    0.556  0.40( 0.39) 0.98     118.9    7000.00
  LONGEST FLOWPATH FROM NODE   7000.00 TO NODE   7006.50 =    8471.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       39.00   27.29    1.052  0.36( 0.34) 0.93      64.4    7240.00
      2       33.98   57.75    0.622  0.38( 0.36) 0.95     121.7    7220.00
      3       33.33   59.90    0.607  0.38( 0.36) 0.95     124.8    7200.00
      4       29.33   67.89    0.556  0.38( 0.37) 0.96     131.9    7000.00
    TOTAL AREA(ACRES) =       131.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       39.00  Tc(MIN.) =   27.293
  EFFECTIVE AREA(ACRES) =     64.35  AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  0.93
  TOTAL AREA(ACRES) =      131.9
```

```
 LONGEST FLOWPATH FROM NODE   7000.00 TO NODE   7006.50 =    8471.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7006.50 TO NODE   7006.50 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE   7006.50 TO NODE   7007.00 IS CODE =  37
----------------------------------------------------------------------------
 >>>>>COMPUTE CULVERT TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED CULVERT SIZE<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  2953.80  DOWNSTREAM(FEET) =  2948.60
 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) =   2.50
 NUMBER OF BARREL(S) =   1
 CULVERT-FLOW VELOCITY(FEET/SEC.) =   7.94
 CULVERT-FLOW(CFS) =      39.00
 CULVERT-FLOW TRAVEL TIME(MIN.) =   0.52    Tc(MIN.) =   27.82
 LONGEST FLOWPATH FROM NODE   7000.00 TO NODE   7007.00 =    8721.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7007.00 TO NODE   6011.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   2948.60  DOWNSTREAM(FEET) =   2922.60
 CHANNEL LENGTH THRU SUBAREA(FEET) =   789.00   CHANNEL SLOPE =  0.0330
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0330 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =      39.00
 FLOW VELOCITY(FEET/SEC) =   3.44 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   3.82   Tc(MIN.) =   31.64
 LONGEST FLOWPATH FROM NODE   7000.00 TO NODE   6011.00 =    9510.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   6011.00 TO NODE   6011.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   31.64
```

```
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.949
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.02      0.98     0.100    32
 COMMERCIAL                 D        2.72      0.47     0.100    75
 NATURAL DESERT COVER
 "DESERT BRUSH"   (30.0%)   D        5.51      0.18     1.000    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.19
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.701
 SUBAREA AREA(ACRES) =    8.25      SUBAREA RUNOFF(CFS) =    6.03
 EFFECTIVE AREA(ACRES) =     72.60   AREA-AVERAGED Fm(INCH/HR) =  0.32
 AREA-AVERAGED Fp(INCH/HR) =  0.35  AREA-AVERAGED Ap =  0.90
 TOTAL AREA(ACRES) =      140.1       PEAK FLOW RATE(CFS) =      41.38

****************************************************************************
 FLOW PROCESS FROM NODE   6011.00 TO NODE   6011.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       41.38   31.64    0.949  0.35( 0.32) 0.90      72.6    7240.00
     2       33.98   62.24    0.591  0.37( 0.35) 0.94     129.9    7220.00
     3       33.33   64.43    0.577  0.37( 0.35) 0.94     133.1    7200.00
     4       29.33   72.53    0.531  0.38( 0.35) 0.94     140.1    7000.00
 LONGEST FLOWPATH FROM NODE   7000.00 TO NODE   6011.00 =    9510.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       35.04   46.34    0.726  0.34( 0.31) 0.93      94.0    6300.00
     2       27.01   60.58    0.602  0.35( 0.33) 0.94     109.6    6200.00
     3       26.34   61.76    0.594  0.35( 0.33) 0.94     110.5    6000.00
 LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6011.00 =    9765.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       76.41   31.64    0.949  0.34( 0.31) 0.92     136.8    7240.00
     2       72.86   46.34    0.726  0.35( 0.32) 0.92     194.1    6300.00
     3       61.39   60.58    0.602  0.36( 0.34) 0.94     236.4    6200.00
     4       60.43   61.76    0.594  0.36( 0.34) 0.94     239.6    6000.00
     5       60.00   62.24    0.591  0.36( 0.34) 0.94     240.5    7220.00
     6       57.95   64.43    0.577  0.36( 0.34) 0.94     243.6    7200.00
     7       49.38   72.53    0.531  0.36( 0.34) 0.94     250.7    7000.00
   TOTAL AREA(ACRES) =       250.7
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       76.41  Tc(MIN.) =   31.637
  EFFECTIVE AREA(ACRES) =    136.76  AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  0.92
  TOTAL AREA(ACRES) =      250.7
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6011.00 =    9765.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6011.00 TO NODE   6011.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   6011.00 TO NODE   6011.50 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2922.60  DOWNSTREAM(FEET) =   2902.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1029.00   CHANNEL SLOPE =  0.0192
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0192 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      76.41
  FLOW VELOCITY(FEET/SEC) =   3.29 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.21   Tc(MIN.) =   36.85
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6011.50 =   10794.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6011.50 TO NODE   6011.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   36.85
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.852
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.42      0.98     0.100    32
  USER-DEFINED               -        5.88      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        5.27      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.32
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.967
  SUBAREA AREA(ACRES) =   11.57      SUBAREA RUNOFF(CFS) =    5.66
  EFFECTIVE AREA(ACRES) =    148.33   AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  0.92
  TOTAL AREA(ACRES) =      262.2       PEAK FLOW RATE(CFS) =      76.41
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   6011.50 TO NODE   6012.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2902.80  DOWNSTREAM(FEET) =  2897.90
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.82
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      76.41
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   36.93
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6012.00 =   10894.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6012.00 TO NODE   1025.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2897.90  DOWNSTREAM(FEET) =   2894.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   269.00   CHANNEL SLOPE =  0.0138
  CHANNEL FLOW THRU SUBAREA(CFS) =      76.41
  FLOW VELOCITY(FEET/SEC) =   5.14 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.87   Tc(MIN.) =   37.80
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   1025.00 =   11163.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1025.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   37.80
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.837
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.23      0.98     0.100    32
  USER-DEFINED               -        0.83      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.805
  SUBAREA AREA(ACRES) =    1.06      SUBAREA RUNOFF(CFS) =    0.45
  EFFECTIVE AREA(ACRES) =    149.39   AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  0.92
  TOTAL AREA(ACRES) =      263.3       PEAK FLOW RATE(CFS) =      76.41
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      263.3  TC(MIN.) =     37.80
```

```
  EFFECTIVE AREA(ACRES) =    149.39  AREA-AVERAGED Fm(INCH/HR)=  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap = 0.919
  PEAK FLOW RATE(CFS)   =      76.41

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       76.41   37.80    0.837  0.34( 0.31) 0.92     149.4    7240.00
      2       72.86   52.60    0.664  0.35( 0.32) 0.93     206.7    6300.00
      3       61.39   67.20    0.560  0.36( 0.34) 0.94     249.1    6200.00
      4       60.43   68.42    0.553  0.36( 0.34) 0.94     252.2    6000.00
      5       60.00   68.91    0.550  0.36( 0.34) 0.94     253.1    7220.00
      6       57.95   71.17    0.538  0.36( 0.34) 0.94     256.2    7200.00
      7       49.38   79.64    0.497  0.36( 0.34) 0.94     263.3    7000.00
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```



```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        (c) Copyright 1983-2015 Advanced Engineering Software (aes)
            Ver. 22.0  Release Date: 07/01/2015  License ID 1673

                          Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* APPLE VALLEY 143 ACRES - EXISTING CONDITION                           *
* 10-YR RATIONAL METHOD - WATERSHED A                                   *
* Q3 08/26/2022                                                         *
 ************************************************************************

  FILE NAME: API_10E.DAT
  TIME/DATE OF STUDY: 18:21 08/26/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.7000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.6060

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 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.*
```

```
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE   1000.00 TO NODE   1001.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   601.00
  ELEVATION DATA: UPSTREAM(FEET) =   3740.10  DOWNSTREAM(FEET) =   3640.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.730
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.165
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        7.58      0.18     1.000    91    9.73
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     13.54
  TOTAL AREA(ACRES) =      7.58   PEAK FLOW RATE(CFS) =     13.54

****************************************************************************
  FLOW PROCESS FROM NODE   1001.00 TO NODE   1002.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3640.80  DOWNSTREAM(FEET) =   3581.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1030.00   CHANNEL SLOPE =  0.0574
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0574 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      13.54
  FLOW VELOCITY(FEET/SEC) =   3.19 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.37   Tc(MIN.) =   15.10
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1002.00 =    1631.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1002.00 TO NODE   1002.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.10
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.592
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
```

```
  "DESERT BRUSH"   (30.0%)   D        5.55      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.55      SUBAREA RUNOFF(CFS) =    7.05
  EFFECTIVE AREA(ACRES) =     13.13   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       13.1       PEAK FLOW RATE(CFS) =      16.68

****************************************************************************
  FLOW PROCESS FROM NODE   1002.00 TO NODE   1002.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.10
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.592
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        5.31      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.31      SUBAREA RUNOFF(CFS) =    6.75
  EFFECTIVE AREA(ACRES) =     18.44   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       18.4       PEAK FLOW RATE(CFS) =      23.43

****************************************************************************
  FLOW PROCESS FROM NODE   1002.00 TO NODE   1003.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3581.70  DOWNSTREAM(FEET) =   3541.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   815.00   CHANNEL SLOPE =  0.0494
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0494 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      23.43
  FLOW VELOCITY(FEET/SEC) =   3.56 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.82   Tc(MIN.) =   18.92
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1003.00 =    2446.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1003.00 TO NODE   1003.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.92
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.359
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        9.25      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    9.25      SUBAREA RUNOFF(CFS) =    9.82
  EFFECTIVE AREA(ACRES) =     27.69   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       27.7       PEAK FLOW RATE(CFS) =      29.39

****************************************************************************
  FLOW PROCESS FROM NODE   1003.00 TO NODE   1004.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3541.40  DOWNSTREAM(FEET) =   3501.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   940.00   CHANNEL SLOPE =  0.0422
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0422 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      29.39
  FLOW VELOCITY(FEET/SEC) =   3.55 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.42   Tc(MIN.) =   23.34
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1004.00 =    3386.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1004.00 TO NODE   1004.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   23.34
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.174
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        9.06      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    9.06      SUBAREA RUNOFF(CFS) =    8.10
  EFFECTIVE AREA(ACRES) =     36.75   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       36.8       PEAK FLOW RATE(CFS) =      32.87

****************************************************************************
  FLOW PROCESS FROM NODE   1004.00 TO NODE   1005.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3501.70  DOWNSTREAM(FEET) =   3462.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   907.00   CHANNEL SLOPE =  0.0436
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0436 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      32.87
  FLOW VELOCITY(FEET/SEC) =   3.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.04   Tc(MIN.) =   27.38
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1005.00 =    4293.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1005.00 TO NODE   1005.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.38
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.050
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       13.74      0.18     1.000    91
  USER-DEFINED               -        2.03      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   15.77      SUBAREA RUNOFF(CFS) =   11.87
  EFFECTIVE AREA(ACRES) =     52.52   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.19  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       52.5       PEAK FLOW RATE(CFS) =      40.63

****************************************************************************
  FLOW PROCESS FROM NODE   1005.00 TO NODE   1006.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3462.20  DOWNSTREAM(FEET) =   3384.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1877.00   CHANNEL SLOPE =  0.0417
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0417 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      40.63
  FLOW VELOCITY(FEET/SEC) =   3.92 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.97   Tc(MIN.) =   35.35
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1006.00 =    6170.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1006.00 TO NODE   1006.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
  MAINLINE Tc(MIN.) =   35.35
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.878
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        5.17      0.18     1.000    91
  USER-DEFINED                -       18.98      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.38
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   24.15      SUBAREA RUNOFF(CFS) =   10.72
  EFFECTIVE AREA(ACRES) =     76.67   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       76.7       PEAK FLOW RATE(CFS) =      43.22

****************************************************************************
  FLOW PROCESS FROM NODE   1006.00 TO NODE   1007.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3384.00  DOWNSTREAM(FEET) =   3346.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1010.00   CHANNEL SLOPE =  0.0368
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0368 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      43.22
  FLOW VELOCITY(FEET/SEC) =   3.77 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.47   Tc(MIN.) =   39.82
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1007.00 =    7180.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1007.00 TO NODE   1007.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   39.82
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.807
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        6.62      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    6.62      SUBAREA RUNOFF(CFS) =    2.19
  EFFECTIVE AREA(ACRES) =     83.29   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       83.3       PEAK FLOW RATE(CFS) =      43.22
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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

```
  FLOW PROCESS FROM NODE   1007.00 TO NODE   1008.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3346.80  DOWNSTREAM(FEET) =   3224.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  3042.00   CHANNEL SLOPE =  0.0404
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0404 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      43.22
  FLOW VELOCITY(FEET/SEC) =   3.94 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  12.86   Tc(MIN.) =   52.67
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1008.00 =   10222.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1008.00 TO NODE   1008.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   52.67
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.664
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       20.17      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B       27.64      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.38
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   47.81      SUBAREA RUNOFF(CFS) =   12.02
  EFFECTIVE AREA(ACRES) =    131.10   AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.31  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      131.1       PEAK FLOW RATE(CFS) =      43.22
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1008.00 TO NODE   1009.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3224.00  DOWNSTREAM(FEET) =   3143.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2349.00   CHANNEL SLOPE =  0.0344
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0344 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      43.22
  FLOW VELOCITY(FEET/SEC) =   3.64 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  10.75   Tc(MIN.) =   63.43
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1009.00 =   12571.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1009.00 TO NODE   1009.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   63.43
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.583
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       29.88      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   29.88      SUBAREA RUNOFF(CFS) =    3.84
  EFFECTIVE AREA(ACRES) =    160.98   AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.33  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      161.0       PEAK FLOW RATE(CFS) =      43.22
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1009.00 TO NODE   1010.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3143.20  DOWNSTREAM(FEET) =   3093.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1460.00   CHANNEL SLOPE =  0.0338
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0338 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      43.22
  FLOW VELOCITY(FEET/SEC) =   3.61 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.74   Tc(MIN.) =   70.17
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1010.00 =   14031.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1010.00 TO NODE   1010.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   70.17
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.543
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       20.56      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   20.56      SUBAREA RUNOFF(CFS) =    1.91
  EFFECTIVE AREA(ACRES) =    181.54   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.35  AREA-AVERAGED Ap =  1.00
```

```
  TOTAL AREA(ACRES) =      181.5       PEAK FLOW RATE(CFS) =      43.22
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1010.00 TO NODE   1011.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3093.80  DOWNSTREAM(FEET) =   3059.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   945.00   CHANNEL SLOPE =  0.0360
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0360 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      43.22
  FLOW VELOCITY(FEET/SEC) =   3.72 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.23   Tc(MIN.) =   74.40
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1011.00 =   14976.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1011.00 TO NODE   1011.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   74.40
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.521
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       15.78      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   15.78      SUBAREA RUNOFF(CFS) =    1.15
  EFFECTIVE AREA(ACRES) =    197.32   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.35  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      197.3       PEAK FLOW RATE(CFS) =      43.22
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1011.00 TO NODE   1011.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1200.00 TO NODE   1200.50 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   579.00
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   3502.00  DOWNSTREAM(FEET) =   3481.90

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.096
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.759
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  USER-DEFINED               -        1.71      0.44     1.000     -   13.10
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        0.82      0.18     1.000    91   13.10
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.36
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      3.19
  TOTAL AREA(ACRES) =      2.53   PEAK FLOW RATE(CFS) =      3.19

****************************************************************************
  FLOW PROCESS FROM NODE   1200.50 TO NODE   1201.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3481.90  DOWNSTREAM(FEET) =   3461.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   579.00   CHANNEL SLOPE =  0.0347
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0347 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.19
  FLOW VELOCITY(FEET/SEC) =   1.54 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.28   Tc(MIN.) =   19.38
  LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1201.00 =    1158.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1201.00 TO NODE   1201.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.38
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.337
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        0.82      0.18     1.000    91
  USER-DEFINED               -        1.71      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.36
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.53      SUBAREA RUNOFF(CFS) =    2.23
  EFFECTIVE AREA(ACRES) =      5.06   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        5.1       PEAK FLOW RATE(CFS) =       4.47
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1201.00 TO NODE   1201.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.38
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.337
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        2.01      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        3.12      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.13      SUBAREA RUNOFF(CFS) =    4.87
  EFFECTIVE AREA(ACRES) =     10.19   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.32  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       10.2       PEAK FLOW RATE(CFS) =       9.34

****************************************************************************
  FLOW PROCESS FROM NODE   1201.00 TO NODE   1202.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3461.80  DOWNSTREAM(FEET) =   3398.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1417.00   CHANNEL SLOPE =  0.0450
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0450 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       9.34
  FLOW VELOCITY(FEET/SEC) =   2.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   9.45   Tc(MIN.) =   28.83
  LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1202.00 =    2575.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1202.00 TO NODE   1202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   28.83
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.012
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       15.53      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.01      0.34     1.000    82
  NATURAL DESERT COVER
```

```
  "DESERT BRUSH"   (30.0%)   D        3.04      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   18.58      SUBAREA RUNOFF(CFS) =   10.28
  EFFECTIVE AREA(ACRES) =     28.77   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       28.8       PEAK FLOW RATE(CFS) =      16.64

****************************************************************************
  FLOW PROCESS FROM NODE   1202.00 TO NODE   1203.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3398.10  DOWNSTREAM(FEET) =   3338.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1400.00   CHANNEL SLOPE =  0.0429
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0429 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      16.64
  FLOW VELOCITY(FEET/SEC) =   2.96 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.88   Tc(MIN.) =   36.72
  LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1203.00 =    3975.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1203.00 TO NODE   1203.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   36.72
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.855
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       12.43      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        7.71      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   20.14      SUBAREA RUNOFF(CFS) =    8.18
  EFFECTIVE AREA(ACRES) =     48.91   AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       48.9       PEAK FLOW RATE(CFS) =      20.74

****************************************************************************
  FLOW PROCESS FROM NODE   1203.00 TO NODE   1204.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3338.00  DOWNSTREAM(FEET) =   3300.90
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   871.00   CHANNEL SLOPE =  0.0426
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0426 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      20.74
  FLOW VELOCITY(FEET/SEC) =   3.17 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.58   Tc(MIN.) =   41.29
  LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1204.00 =    4846.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1204.00 TO NODE   1204.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   41.29
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.787
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        8.76      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        6.27      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   15.03      SUBAREA RUNOFF(CFS) =    5.24
  EFFECTIVE AREA(ACRES) =     63.94   AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.39  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       63.9       PEAK FLOW RATE(CFS) =      23.01

****************************************************************************
  FLOW PROCESS FROM NODE   1204.00 TO NODE   1205.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3300.90  DOWNSTREAM(FEET) =   3261.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1210.00   CHANNEL SLOPE =  0.0322
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0322 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      23.01
  FLOW VELOCITY(FEET/SEC) =   2.86 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.06   Tc(MIN.) =   48.35
  LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1205.00 =    6056.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1205.00 TO NODE   1205.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   48.35
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.705
```

```
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        9.86      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        2.36      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   12.22      SUBAREA RUNOFF(CFS) =    3.12
  EFFECTIVE AREA(ACRES) =     76.16   AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.39  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       76.2       PEAK FLOW RATE(CFS) =      23.01
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1205.00 TO NODE   1206.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3261.90  DOWNSTREAM(FEET) =   3220.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1019.00   CHANNEL SLOPE =  0.0411
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0411 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      23.01
  FLOW VELOCITY(FEET/SEC) =   3.23 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.26   Tc(MIN.) =   53.61
  LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1206.00 =    7075.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1206.00 TO NODE   1206.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   53.61
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.656
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       13.25      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   13.25      SUBAREA RUNOFF(CFS) =    2.57
  EFFECTIVE AREA(ACRES) =     89.41   AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       89.4       PEAK FLOW RATE(CFS) =      23.01
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1206.00 TO NODE   1207.00 IS CODE =  53
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3220.00  DOWNSTREAM(FEET) =   3180.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   832.00   CHANNEL SLOPE =  0.0472
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0472 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      23.01
  FLOW VELOCITY(FEET/SEC) =   3.46 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.01   Tc(MIN.) =   57.62
  LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1207.00 =    7907.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1207.00 TO NODE   1207.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   57.62
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.623
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       14.84      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   14.84      SUBAREA RUNOFF(CFS) =    2.45
  EFFECTIVE AREA(ACRES) =    104.25   AREA-AVERAGED Fm(INCH/HR) =  0.41
  AREA-AVERAGED Fp(INCH/HR) =  0.41  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      104.2       PEAK FLOW RATE(CFS) =      23.01
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1207.00 TO NODE   1208.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3180.70  DOWNSTREAM(FEET) =   3126.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1559.00   CHANNEL SLOPE =  0.0350
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0350 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      23.01
  FLOW VELOCITY(FEET/SEC) =   2.98 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   8.73   Tc(MIN.) =   66.35
  LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1208.00 =    9466.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1208.00 TO NODE   1208.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   66.35
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.565
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       16.67      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   16.67      SUBAREA RUNOFF(CFS) =    1.87
  EFFECTIVE AREA(ACRES) =    120.92   AREA-AVERAGED Fm(INCH/HR) =  0.41
  AREA-AVERAGED Fp(INCH/HR) =  0.41  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      120.9       PEAK FLOW RATE(CFS) =      23.01
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

********************************************************************************
  FLOW PROCESS FROM NODE   1208.00 TO NODE   1209.00 IS CODE =  53
--------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3126.10  DOWNSTREAM(FEET) =   3091.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1009.00   CHANNEL SLOPE =  0.0344
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0344 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      23.01
  FLOW VELOCITY(FEET/SEC) =   2.95 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.70   Tc(MIN.) =   72.05
  LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1209.00 =   10475.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE   1209.00 TO NODE   1209.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   72.05
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.533
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        6.45      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    6.45      SUBAREA RUNOFF(CFS) =    0.54
  EFFECTIVE AREA(ACRES) =    127.37   AREA-AVERAGED Fm(INCH/HR) =  0.41
  AREA-AVERAGED Fp(INCH/HR) =  0.41  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      127.4       PEAK FLOW RATE(CFS) =      23.01
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1209.00 TO NODE   1210.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3091.40  DOWNSTREAM(FEET) =   3059.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   894.00   CHANNEL SLOPE =  0.0353
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0353 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      23.01
  FLOW VELOCITY(FEET/SEC) =   2.99 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.98   Tc(MIN.) =   77.03
  LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1210.00 =   11369.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1210.00 TO NODE   1210.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   77.03
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.509
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.39      0.98     0.100    32
  USER-DEFINED               -        3.65      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.46
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.752
  SUBAREA AREA(ACRES) =    5.04      SUBAREA RUNOFF(CFS) =    0.74
  EFFECTIVE AREA(ACRES) =    132.41   AREA-AVERAGED Fm(INCH/HR) =  0.41
  AREA-AVERAGED Fp(INCH/HR) =  0.41  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =      132.4       PEAK FLOW RATE(CFS) =      23.01
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1210.00 TO NODE   1210.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       23.01   77.03    0.509  0.41( 0.41) 0.99     132.4    1200.00
  LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1210.00 =   11369.00 FEET.

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

```
      1       43.22   74.40    0.521  0.35( 0.35) 1.00     197.3    1000.00
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1210.00 =   14976.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       66.23   74.40    0.521  0.38( 0.38) 1.00     325.2    1000.00
      2       63.01   77.03    0.509  0.38( 0.38) 1.00     329.7    1200.00
    TOTAL AREA(ACRES) =       329.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       66.23  Tc(MIN.) =   74.399
  EFFECTIVE AREA(ACRES) =    325.21  AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      329.7
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1210.00 =   14976.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1210.00 TO NODE   1210.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1210.00 TO NODE   1011.50 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3059.80  DOWNSTREAM(FEET) =   3052.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   500.00   CHANNEL SLOPE =  0.0156
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0156 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      66.23
  FLOW VELOCITY(FEET/SEC) =   2.83 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.95   Tc(MIN.) =   77.35
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1011.50 =   15476.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1011.50 TO NODE   1011.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   77.35
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.507
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        3.92      0.98     0.100    32
  USER-DEFINED               -        2.61      0.44     1.000     -
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.51
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.460
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  SUBAREA AREA(ACRES) =    6.53      SUBAREA RUNOFF(CFS) =    1.61
  EFFECTIVE AREA(ACRES) =    331.74   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =      336.3       PEAK FLOW RATE(CFS) =      66.23
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1011.50 TO NODE   1012.00 IS CODE =  37
----------------------------------------------------------------------------
  >>>>>COMPUTE CULVERT TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED CULVERT SIZE<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3052.00  DOWNSTREAM(FEET) =  3049.90
  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) =   3.00
  NUMBER OF BARREL(S) =   1
  CULVERT-FLOW VELOCITY(FEET/SEC.) =   9.37
  CULVERT-FLOW(CFS) =      66.23
  CULVERT-FLOW TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =   77.79
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1012.00 =   15726.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1012.00 TO NODE   1013.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3049.90  DOWNSTREAM(FEET) =   3027.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   516.00   CHANNEL SLOPE =  0.0426
  CHANNEL FLOW THRU SUBAREA(CFS) =      66.23
  FLOW VELOCITY(FEET/SEC) =   8.67 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.99   Tc(MIN.) =   78.78
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1013.00 =   16242.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1013.00 TO NODE   1013.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   78.78
```

```
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.501
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.17      0.98     0.100    32
  COMMERCIAL                 B        0.73      0.75     0.100    56
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.68      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.487
  SUBAREA AREA(ACRES) =    1.58      SUBAREA RUNOFF(CFS) =    0.44
  EFFECTIVE AREA(ACRES) =    333.32   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      337.8       PEAK FLOW RATE(CFS) =      66.23
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1013.00 TO NODE   1013.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1300.00 TO NODE   1301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   324.00
  ELEVATION DATA: UPSTREAM(FEET) =   3055.40  DOWNSTREAM(FEET) =   3040.90

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.714
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.143
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.15      0.98     0.100    32    5.71
  COMMERCIAL                 B        0.20      0.75     0.100    56    5.71
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.04      0.34     1.000    82    9.87
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.58
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.192
  SUBAREA RUNOFF(CFS) =      1.06
  TOTAL AREA(ACRES) =      0.39   PEAK FLOW RATE(CFS) =      1.06

****************************************************************************
  FLOW PROCESS FROM NODE   1301.00 TO NODE   1013.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
```

```
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3040.90  DOWNSTREAM(FEET) =   3027.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   387.00   CHANNEL SLOPE =  0.0336
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.06
  FLOW VELOCITY(FEET/SEC) =   2.78 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.32   Tc(MIN.) =    8.03
  LONGEST FLOWPATH FROM NODE   1300.00 TO NODE   1013.00 =     711.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1013.00 TO NODE   1013.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.03
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.476
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.76      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.76      SUBAREA RUNOFF(CFS) =    1.46
  EFFECTIVE AREA(ACRES) =      1.15   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.73
  TOTAL AREA(ACRES) =        1.1       PEAK FLOW RATE(CFS) =       2.29

****************************************************************************
  FLOW PROCESS FROM NODE   1013.00 TO NODE   1013.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        2.29    8.03    2.476  0.37( 0.27) 0.73       1.1    1300.00
  LONGEST FLOWPATH FROM NODE   1300.00 TO NODE   1013.00 =     711.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       66.23   78.78    0.501  0.38( 0.37) 0.98     333.3    1000.00
      2       63.01   81.50    0.489  0.38( 0.37) 0.98     337.8    1200.00
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1013.00 =   16242.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
```

```
      1       68.52    8.03    2.476  0.38( 0.37) 0.97      35.1    1300.00
      2       66.47   78.78    0.501  0.38( 0.37) 0.98     334.5    1000.00
      3       63.24   81.50    0.489  0.38( 0.37) 0.98     339.0    1200.00
    TOTAL AREA(ACRES) =       339.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       68.52  Tc(MIN.) =    8.033
  EFFECTIVE AREA(ACRES) =     35.13  AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =      339.0
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1013.00 =   16242.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1013.00 TO NODE   1014.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3027.90  DOWNSTREAM(FEET) =   2997.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1227.00   CHANNEL SLOPE =  0.0249
  CHANNEL FLOW THRU SUBAREA(CFS) =      68.52
  FLOW VELOCITY(FEET/SEC) =   6.70 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.05   Tc(MIN.) =   11.09
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1014.00 =   17469.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1014.00 TO NODE   1014.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.09
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.976
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        3.93      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.93      SUBAREA RUNOFF(CFS) =    5.77
  EFFECTIVE AREA(ACRES) =     39.06   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      342.9       PEAK FLOW RATE(CFS) =      68.52
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1014.00 TO NODE   1014.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1014.00 TO NODE   1014.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1310.00 TO NODE   1311.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   557.00
  ELEVATION DATA: UPSTREAM(FEET) =   3063.00  DOWNSTREAM(FEET) =   3040.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.250
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.660
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.94      0.98     0.100    32    7.25
  COMMERCIAL                 B        0.06      0.75     0.100    56    7.25
  USER-DEFINED               -        0.18      0.44     1.000     -   12.52
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.27      0.34     1.000    82   12.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.49
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.379
  SUBAREA RUNOFF(CFS) =      3.23
  TOTAL AREA(ACRES) =      1.45   PEAK FLOW RATE(CFS) =      3.23

****************************************************************************
  FLOW PROCESS FROM NODE   1311.00 TO NODE   1312.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3040.60  DOWNSTREAM(FEET) =   3022.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   683.00   CHANNEL SLOPE =  0.0261
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.23
  FLOW VELOCITY(FEET/SEC) =   3.08 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.69   Tc(MIN.) =   10.94
  LONGEST FLOWPATH FROM NODE   1310.00 TO NODE   1312.00 =    1240.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1312.00 TO NODE   1312.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
  MAINLINE Tc(MIN.) =   10.94
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.994
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.33      0.98     0.100    32
  COMMERCIAL                 B        0.26      0.75     0.100    56
  USER-DEFINED               -        0.33      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        3.41      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.36
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.877
  SUBAREA AREA(ACRES) =    4.33      SUBAREA RUNOFF(CFS) =    6.54
  EFFECTIVE AREA(ACRES) =      5.78   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  0.75
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =       8.90

****************************************************************************
  FLOW PROCESS FROM NODE   1312.00 TO NODE   1014.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3022.80  DOWNSTREAM(FEET) =   2997.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   965.00   CHANNEL SLOPE =  0.0264
  CHANNEL FLOW THRU SUBAREA(CFS) =       8.90
  FLOW VELOCITY(FEET/SEC) =   3.95 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.08   Tc(MIN.) =   15.02
  LONGEST FLOWPATH FROM NODE   1310.00 TO NODE   1014.00 =    2205.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1014.00 TO NODE   1014.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.02
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.598
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        2.21      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.21      SUBAREA RUNOFF(CFS) =    2.49
  EFFECTIVE AREA(ACRES) =      7.99   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.82
  TOTAL AREA(ACRES) =        8.0       PEAK FLOW RATE(CFS) =       9.33

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

```
  FLOW PROCESS FROM NODE   1014.00 TO NODE   1014.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        9.33   15.02    1.598  0.37( 0.30) 0.82       8.0    1310.00
  LONGEST FLOWPATH FROM NODE   1310.00 TO NODE   1014.00 =    2205.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       68.52   11.09    1.976  0.37( 0.37) 0.98      39.1    1300.00
      2       66.47   81.86    0.488  0.38( 0.37) 0.98     338.4    1000.00
      3       63.24   84.63    0.476  0.38( 0.37) 0.98     342.9    1200.00
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1014.00 =   17469.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       77.41   11.09    1.976  0.37( 0.36) 0.96      45.0    1300.00
      2       77.73   15.02    1.598  0.37( 0.36) 0.96      63.7    1310.00
      3       67.82   81.86    0.488  0.38( 0.37) 0.98     346.4    1000.00
      4       64.50   84.63    0.476  0.38( 0.37) 0.98     350.9    1200.00
    TOTAL AREA(ACRES) =       350.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       77.73  Tc(MIN.) =   15.021
  EFFECTIVE AREA(ACRES) =     63.70  AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.96
  TOTAL AREA(ACRES) =      350.9
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1014.00 =   17469.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1014.00 TO NODE   1014.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1014.00 TO NODE   1015.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2997.30  DOWNSTREAM(FEET) =   2984.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   549.00   CHANNEL SLOPE =  0.0240
  CHANNEL FLOW THRU SUBAREA(CFS) =      77.73
```

```
  FLOW VELOCITY(FEET/SEC) =   6.83 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.34   Tc(MIN.) =   16.36
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1015.00 =   18018.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1015.00 TO NODE   1015.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.36
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.505
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        3.13      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.13      SUBAREA RUNOFF(CFS) =    3.27
  EFFECTIVE AREA(ACRES) =     66.83   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.96
  TOTAL AREA(ACRES) =      354.0       PEAK FLOW RATE(CFS) =      77.73
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1015.00 TO NODE   1015.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1320.00 TO NODE   1321.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   459.00
  ELEVATION DATA: UPSTREAM(FEET) =   3044.40  DOWNSTREAM(FEET) =   3029.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.079
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.861
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.65      0.34     1.000    82   12.08
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.89
```

```
  TOTAL AREA(ACRES) =      0.65   PEAK FLOW RATE(CFS) =      0.89

****************************************************************************
  FLOW PROCESS FROM NODE   1321.00 TO NODE   1322.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3029.40  DOWNSTREAM(FEET) =   3018.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   399.00   CHANNEL SLOPE =  0.0278
  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.) =   2.66   Tc(MIN.) =   14.74
  LONGEST FLOWPATH FROM NODE   1320.00 TO NODE   1322.00 =     858.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1322.00 TO NODE   1322.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.74
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.619
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        1.31      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.31      SUBAREA RUNOFF(CFS) =    1.50
  EFFECTIVE AREA(ACRES) =      1.96   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        2.0       PEAK FLOW RATE(CFS) =       2.25

****************************************************************************
  FLOW PROCESS FROM NODE   1322.00 TO NODE   1323.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3018.30  DOWNSTREAM(FEET) =   2998.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   786.00   CHANNEL SLOPE =  0.0254
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.25
  FLOW VELOCITY(FEET/SEC) =   2.81 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.66   Tc(MIN.) =   19.39
  LONGEST FLOWPATH FROM NODE   1320.00 TO NODE   1323.00 =    1644.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1323.00 TO NODE   1323.00 IS CODE =  81
```

```
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   19.39
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.336
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        3.17      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.17      SUBAREA RUNOFF(CFS) =    2.83
  EFFECTIVE AREA(ACRES) =      5.13   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        5.1       PEAK FLOW RATE(CFS) =       4.58

************************************************************************
  FLOW PROCESS FROM NODE   1323.00 TO NODE   1015.00 IS CODE =  52
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2998.30  DOWNSTREAM(FEET) =   2984.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   596.00   CHANNEL SLOPE =  0.0238
  CHANNEL FLOW THRU SUBAREA(CFS) =       4.58
  FLOW VELOCITY(FEET/SEC) =   3.19 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.11   Tc(MIN.) =   22.51
  LONGEST FLOWPATH FROM NODE   1320.00 TO NODE   1015.00 =    2240.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE   1015.00 TO NODE   1015.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   22.51
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.204
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        3.16      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.16      SUBAREA RUNOFF(CFS) =    2.45
  EFFECTIVE AREA(ACRES) =      8.29   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        8.3       PEAK FLOW RATE(CFS) =       6.42

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

```
  FLOW PROCESS FROM NODE   1015.00 TO NODE   1015.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        6.42   22.51    1.204  0.34( 0.34) 1.00       8.3    1320.00
  LONGEST FLOWPATH FROM NODE   1320.00 TO NODE   1015.00 =    2240.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       77.41   12.43    1.824  0.37( 0.36) 0.96      48.1    1300.00
      2       77.73   16.36    1.505  0.37( 0.36) 0.96      66.8    1310.00
      3       67.82   83.26    0.482  0.38( 0.37) 0.98     349.5    1000.00
      4       64.50   86.04    0.471  0.38( 0.37) 0.98     354.0    1200.00
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1015.00 =   18018.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       83.51   12.43    1.824  0.37( 0.36) 0.96      52.7    1300.00
      2       84.03   16.36    1.505  0.37( 0.36) 0.96      72.9    1310.00
      3       83.24   22.51    1.204  0.37( 0.36) 0.96     101.1    1320.00
      4       68.85   83.26    0.482  0.38( 0.37) 0.98     357.8    1000.00
      5       65.45   86.04    0.471  0.38( 0.37) 0.98     362.3    1200.00
    TOTAL AREA(ACRES) =       362.3

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       84.03  Tc(MIN.) =   16.361
  EFFECTIVE AREA(ACRES) =     72.86  AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.96
  TOTAL AREA(ACRES) =      362.3
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1015.00 =   18018.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1015.00 TO NODE   1015.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1015.00 TO NODE   1016.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2984.10  DOWNSTREAM(FEET) =   2947.30
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1806.00   CHANNEL SLOPE =  0.0204
  CHANNEL FLOW THRU SUBAREA(CFS) =      84.03
  FLOW VELOCITY(FEET/SEC) =   6.43 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.68   Tc(MIN.) =   21.04
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1016.00 =   19824.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1016.00 TO NODE   1016.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.04
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.262
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B       12.04      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   12.04      SUBAREA RUNOFF(CFS) =    9.95
  EFFECTIVE AREA(ACRES) =     84.90   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =      374.4       PEAK FLOW RATE(CFS) =      84.03
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1016.00 TO NODE   1016.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1330.00 TO NODE   1331.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   962.00
  ELEVATION DATA: UPSTREAM(FEET) =   3005.30  DOWNSTREAM(FEET) =   2978.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   16.791
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.478
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        2.43      0.34     1.000    82   16.79
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.48
  TOTAL AREA(ACRES) =      2.43   PEAK FLOW RATE(CFS) =      2.48

****************************************************************************
  FLOW PROCESS FROM NODE   1331.00 TO NODE   1016.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2978.70  DOWNSTREAM(FEET) =   2947.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1538.00   CHANNEL SLOPE =  0.0204
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.48
  FLOW VELOCITY(FEET/SEC) =   2.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   9.96   Tc(MIN.) =   26.75
  LONGEST FLOWPATH FROM NODE   1330.00 TO NODE   1016.00 =    2500.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1016.00 TO NODE   1016.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   26.75
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.067
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        7.23      0.34     1.000    82
  USER-DEFINED               -        0.01      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    7.24      SUBAREA RUNOFF(CFS) =    4.71
  EFFECTIVE AREA(ACRES) =      9.67   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        9.7       PEAK FLOW RATE(CFS) =       6.29

****************************************************************************
  FLOW PROCESS FROM NODE   1016.00 TO NODE   1016.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        6.29   26.75    1.067  0.34( 0.34) 1.00       9.7    1330.00
  LONGEST FLOWPATH FROM NODE   1330.00 TO NODE   1016.00 =    2500.00 FEET.

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

```
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1       83.51   17.11    1.458  0.36( 0.35) 0.97      64.7    1300.00
    2       84.03   21.04    1.262  0.37( 0.35) 0.97      84.9    1310.00
    3       83.24   27.20    1.054  0.37( 0.36) 0.97     113.1    1320.00
    4       68.85   88.22    0.463  0.38( 0.37) 0.98     369.8    1000.00
    5       65.45   91.08    0.452  0.38( 0.37) 0.98     374.4    1200.00
LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1016.00 =   19824.00 FEET.

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1       89.71   17.11    1.458  0.36( 0.35) 0.97      70.9    1300.00
    2       90.31   21.04    1.262  0.36( 0.35) 0.97      92.5    1310.00
    3       89.59   26.75    1.067  0.37( 0.35) 0.97     120.7    1330.00
    4       89.42   27.20    1.054  0.37( 0.35) 0.97     122.8    1320.00
    5       69.88   88.22    0.463  0.37( 0.37) 0.98     379.5    1000.00
    6       66.39   91.08    0.452  0.37( 0.37) 0.98     384.0    1200.00
  TOTAL AREA(ACRES) =       384.0

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =       90.31  Tc(MIN.) =   21.040
EFFECTIVE AREA(ACRES) =     92.50  AREA-AVERAGED Fm(INCH/HR) =  0.35
AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.97
TOTAL AREA(ACRES) =      384.0
LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1016.00 =   19824.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1016.00 TO NODE   1016.00 IS CODE =  12
----------------------------------------------------------------------------
>>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
FLOW PROCESS FROM NODE   1016.00 TO NODE   1017.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   2947.30  DOWNSTREAM(FEET) =   2929.40
CHANNEL LENGTH THRU SUBAREA(FEET) =   749.00   CHANNEL SLOPE =  0.0239
CHANNEL FLOW THRU SUBAREA(CFS) =      90.31
FLOW VELOCITY(FEET/SEC) =   7.12 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.75   Tc(MIN.) =   22.79
LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1017.00 =   20573.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1017.00 TO NODE   1017.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
================================================================================
  MAINLINE Tc(MIN.) =   22.79
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.193
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        3.04      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.62      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.66      SUBAREA RUNOFF(CFS) =    2.53
  EFFECTIVE AREA(ACRES) =     96.16   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =      387.7       PEAK FLOW RATE(CFS) =      90.31
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1017.00 TO NODE   1017.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1340.00 TO NODE   1341.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   913.00
  ELEVATION DATA: UPSTREAM(FEET) =   3006.40  DOWNSTREAM(FEET) =   2981.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   16.437
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.500
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        2.45      0.34     1.000    82   16.44
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.55
  TOTAL AREA(ACRES) =      2.45   PEAK FLOW RATE(CFS) =      2.55

****************************************************************************
  FLOW PROCESS FROM NODE   1341.00 TO NODE   1342.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2981.10  DOWNSTREAM(FEET) =   2963.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   817.00   CHANNEL SLOPE =  0.0213
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.55
  FLOW VELOCITY(FEET/SEC) =   2.64 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.15   Tc(MIN.) =   21.59
  LONGEST FLOWPATH FROM NODE   1340.00 TO NODE   1342.00 =    1730.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1342.00 TO NODE   1342.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   21.59
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.240
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        3.81      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.81      SUBAREA RUNOFF(CFS) =    3.07
  EFFECTIVE AREA(ACRES) =      6.26   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        6.3       PEAK FLOW RATE(CFS) =       5.05

****************************************************************************
  FLOW PROCESS FROM NODE   1342.00 TO NODE   1017.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2963.70  DOWNSTREAM(FEET) =   2929.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1663.00   CHANNEL SLOPE =  0.0206
  CHANNEL FLOW THRU SUBAREA(CFS) =       5.05
  FLOW VELOCITY(FEET/SEC) =   3.04 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   9.13   Tc(MIN.) =   30.71
  LONGEST FLOWPATH FROM NODE   1340.00 TO NODE   1017.00 =    3393.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1017.00 TO NODE   1017.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   30.71
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.968
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  USER-DEFINED                -        2.65      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B       13.62      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.36
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   16.27      SUBAREA RUNOFF(CFS) =    8.91
  EFFECTIVE AREA(ACRES) =     22.53   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       22.5       PEAK FLOW RATE(CFS) =      12.43

****************************************************************************
  FLOW PROCESS FROM NODE   1017.00 TO NODE   1017.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       12.43   30.71    0.968  0.36( 0.36) 1.00      22.5    1340.00
  LONGEST FLOWPATH FROM NODE   1340.00 TO NODE   1017.00 =    3393.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       89.71   18.87    1.362  0.37( 0.36) 0.97      74.6    1300.00
      2       90.31   22.79    1.193  0.37( 0.36) 0.97      96.2    1310.00
      3       89.59   28.51    1.020  0.37( 0.36) 0.97     124.4    1330.00
      4       89.42   28.96    1.009  0.37( 0.36) 0.97     126.5    1320.00
      5       69.88   90.12    0.456  0.37( 0.37) 0.98     383.2    1000.00
      6       66.39   93.00    0.446  0.38( 0.37) 0.98     387.7    1200.00
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1017.00 =   20573.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      102.15   18.87    1.362  0.36( 0.36) 0.98      88.4    1300.00
      2      102.74   22.79    1.193  0.36( 0.36) 0.98     112.9    1310.00
      3      102.02   28.51    1.020  0.37( 0.36) 0.98     145.3    1330.00
      4      101.85   28.96    1.009  0.37( 0.36) 0.98     147.7    1320.00
      5      101.29   30.71    0.968  0.37( 0.36) 0.98     156.4    1340.00
      6       71.92   90.12    0.456  0.37( 0.37) 0.98     405.7    1000.00
      7       68.23   93.00    0.446  0.37( 0.37) 0.98     410.2    1200.00
    TOTAL AREA(ACRES) =       410.2

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      102.74  Tc(MIN.) =   22.794
  EFFECTIVE AREA(ACRES) =    112.88  AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      410.2
```

```
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1017.00 =   20573.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1017.00 TO NODE   1017.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1017.00 TO NODE   1018.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2929.40  DOWNSTREAM(FEET) =   2922.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   702.00   CHANNEL SLOPE =  0.0100
  CHANNEL FLOW THRU SUBAREA(CFS) =     102.74
  FLOW VELOCITY(FEET/SEC) =   4.78 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.45   Tc(MIN.) =   25.24
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1018.00 =   21275.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1018.00 TO NODE   1018.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   25.24
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.111
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.20      0.98     0.100    32
  USER-DEFINED               -        0.91      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        2.39      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.37
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.949
  SUBAREA AREA(ACRES) =    3.50      SUBAREA RUNOFF(CFS) =    2.38
  EFFECTIVE AREA(ACRES) =    116.38   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      413.7       PEAK FLOW RATE(CFS) =     102.74
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1018.00 TO NODE   1018.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

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

```
  FLOW PROCESS FROM NODE   1350.00 TO NODE   1351.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   705.00
  ELEVATION DATA: UPSTREAM(FEET) =   2976.70  DOWNSTREAM(FEET) =   2955.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.609
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.629
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        2.49      0.34     1.000    82   14.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.88
  TOTAL AREA(ACRES) =      2.49   PEAK FLOW RATE(CFS) =      2.88

****************************************************************************
  FLOW PROCESS FROM NODE   1351.00 TO NODE   1352.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2955.70  DOWNSTREAM(FEET) =   2943.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   630.00   CHANNEL SLOPE =  0.0189
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.88
  FLOW VELOCITY(FEET/SEC) =   2.56 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.11   Tc(MIN.) =   18.71
  LONGEST FLOWPATH FROM NODE   1350.00 TO NODE   1352.00 =    1335.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1352.00 TO NODE   1352.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.71
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.370
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        4.25      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.25      SUBAREA RUNOFF(CFS) =    3.92
  EFFECTIVE AREA(ACRES) =      6.74   AREA-AVERAGED Fm(INCH/HR) =  0.34
```

```
 AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        6.7       PEAK FLOW RATE(CFS) =       6.22

****************************************************************************
 FLOW PROCESS FROM NODE   1352.00 TO NODE   1018.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   2943.80  DOWNSTREAM(FEET) =   2922.40
 CHANNEL LENGTH THRU SUBAREA(FEET) =   832.00   CHANNEL SLOPE =  0.0257
 CHANNEL FLOW THRU SUBAREA(CFS) =       6.22
 FLOW VELOCITY(FEET/SEC) =   3.56 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   3.89   Tc(MIN.) =   22.61
 LONGEST FLOWPATH FROM NODE   1350.00 TO NODE   1018.00 =    2167.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1018.00 TO NODE   1018.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   22.61
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.200
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.02      0.98     0.100    32
 USER-DEFINED               -        0.29      0.44     1.000     -
 NATURAL DESERT COVER
 "DESERT BRUSH"   (30.0%)   B        4.14      0.34     1.000    82
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.35
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.996
 SUBAREA AREA(ACRES) =    4.45      SUBAREA RUNOFF(CFS) =    3.41
 EFFECTIVE AREA(ACRES) =     11.19   AREA-AVERAGED Fm(INCH/HR) =  0.35
 AREA-AVERAGED Fp(INCH/HR) =  0.35  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       11.2       PEAK FLOW RATE(CFS) =       8.60

****************************************************************************
 FLOW PROCESS FROM NODE   1018.00 TO NODE   1018.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        8.60   22.61    1.200  0.35( 0.35) 1.00      11.2    1350.00
 LONGEST FLOWPATH FROM NODE   1350.00 TO NODE   1018.00 =    2167.00 FEET.

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

```
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1      102.15   21.32    1.250  0.36( 0.36) 0.98      91.9    1300.00
    2      102.74   25.24    1.111  0.36( 0.36) 0.98     116.4    1310.00
    3      102.02   30.96    0.963  0.37( 0.36) 0.98     148.8    1330.00
    4      101.85   31.41    0.953  0.37( 0.36) 0.98     151.2    1320.00
    5      101.29   33.17    0.918  0.37( 0.36) 0.98     159.9    1340.00
    6       71.92   92.84    0.446  0.37( 0.37) 0.98     409.2    1000.00
    7       68.23   95.77    0.437  0.37( 0.37) 0.98     413.7    1200.00
LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1018.00 =   21275.00 FEET.

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1      110.74   21.32    1.250  0.36( 0.35) 0.98     102.5    1300.00
    2      110.94   22.61    1.200  0.36( 0.35) 0.98     111.1    1350.00
    3      110.45   25.24    1.111  0.36( 0.36) 0.98     127.6    1310.00
    4      108.23   30.96    0.963  0.36( 0.36) 0.98     160.0    1330.00
    5      107.97   31.41    0.953  0.36( 0.36) 0.98     162.4    1320.00
    6      107.05   33.17    0.918  0.36( 0.36) 0.98     171.0    1340.00
    7       72.93   92.84    0.446  0.37( 0.37) 0.98     420.4    1000.00
    8       69.14   95.77    0.437  0.37( 0.37) 0.98     424.9    1200.00
  TOTAL AREA(ACRES) =       424.9

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      110.94  Tc(MIN.) =   22.605
EFFECTIVE AREA(ACRES) =    111.09  AREA-AVERAGED Fm(INCH/HR) =  0.35
AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  0.98
TOTAL AREA(ACRES) =      424.9
LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1018.00 =   21275.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   1018.00 TO NODE   1018.00 IS CODE =  12
----------------------------------------------------------------------------
>>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
FLOW PROCESS FROM NODE   1018.00 TO NODE   1019.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   2922.40  DOWNSTREAM(FEET) =   2919.40
CHANNEL LENGTH THRU SUBAREA(FEET) =   500.00   CHANNEL SLOPE =  0.0060
CHANNEL FLOW THRU SUBAREA(CFS) =     110.94
FLOW VELOCITY(FEET/SEC) =   3.79 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.20   Tc(MIN.) =   24.80
LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1019.00 =   21775.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1019.00 TO NODE   1019.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   24.80
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.125
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.30      0.98     0.100    32
  USER-DEFINED               -        1.44      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.49      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.879
  SUBAREA AREA(ACRES) =    2.23      SUBAREA RUNOFF(CFS) =    1.51
  EFFECTIVE AREA(ACRES) =    113.32   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      427.1       PEAK FLOW RATE(CFS) =     110.94
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1019.00 TO NODE   1020.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2919.40  DOWNSTREAM(FEET) =   2918.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   120.00   CHANNEL SLOPE =  0.0042
  CHANNEL FLOW THRU SUBAREA(CFS) =     110.94
  FLOW VELOCITY(FEET/SEC) =   3.16 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.63   Tc(MIN.) =   25.43
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1020.00 =   21895.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1020.00 TO NODE   1020.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   2000.00 TO NODE   2000.50 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   856.00
  ELEVATION DATA: UPSTREAM(FEET) =   3080.00  DOWNSTREAM(FEET) =   3043.30
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.500
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.380
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        1.77      0.98     0.100    32    8.50
  COMMERCIAL                 B        0.35      0.75     0.100    56    8.50
  USER-DEFINED               -        2.56      0.44     1.000     -   14.68
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.48
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.592
  SUBAREA RUNOFF(CFS) =      8.83
  TOTAL AREA(ACRES) =      4.68   PEAK FLOW RATE(CFS) =      8.83

****************************************************************************
  FLOW PROCESS FROM NODE   2000.50 TO NODE   2001.00 IS CODE =  37
----------------------------------------------------------------------------
  >>>>>COMPUTE CULVERT TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED CULVERT SIZE<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3043.30  DOWNSTREAM(FEET) =  3041.20
  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) =   1.25
  NUMBER OF BARREL(S) =   1
  CULVERT-FLOW VELOCITY(FEET/SEC.) =   7.20
  CULVERT-FLOW(CFS) =       8.83
  CULVERT-FLOW TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =    9.08
  LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   2001.00 =    1106.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2001.00 TO NODE   2002.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3041.20  DOWNSTREAM(FEET) =   3002.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1270.00   CHANNEL SLOPE =  0.0306
  CHANNEL FLOW THRU SUBAREA(CFS) =       8.83
  FLOW VELOCITY(FEET/SEC) =   4.23 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.00   Tc(MIN.) =   14.08
  LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   2002.00 =    2376.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2002.00 TO NODE   2002.00 IS CODE =  81
```

```
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.08
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.672
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        1.30      0.75     0.100    56
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        7.34      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.35
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.865
  SUBAREA AREA(ACRES) =    8.64      SUBAREA RUNOFF(CFS) =   10.64
  EFFECTIVE AREA(ACRES) =     13.32   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.39  AREA-AVERAGED Ap =  0.77
  TOTAL AREA(ACRES) =       13.3       PEAK FLOW RATE(CFS) =      16.49

****************************************************************************
  FLOW PROCESS FROM NODE   2002.00 TO NODE   2003.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3002.40  DOWNSTREAM(FEET) =   2980.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   913.00   CHANNEL SLOPE =  0.0245
  CHANNEL FLOW THRU SUBAREA(CFS) =      16.49
  FLOW VELOCITY(FEET/SEC) =   4.46 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.41   Tc(MIN.) =   17.49
  LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   2003.00 =    3289.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2003.00 TO NODE   2003.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.49
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.436
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B       10.74      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   10.74      SUBAREA RUNOFF(CFS) =   10.56
  EFFECTIVE AREA(ACRES) =     24.06   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  0.87
  TOTAL AREA(ACRES) =       24.1       PEAK FLOW RATE(CFS) =      24.22
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   2003.00 TO NODE   2004.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2980.00  DOWNSTREAM(FEET) =   2958.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1004.00   CHANNEL SLOPE =  0.0219
  CHANNEL FLOW THRU SUBAREA(CFS) =      24.22
  FLOW VELOCITY(FEET/SEC) =   4.67 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.58   Tc(MIN.) =   21.07
  LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   2004.00 =    4293.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2004.00 TO NODE   2004.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.07
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.261
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B       12.87      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   12.87      SUBAREA RUNOFF(CFS) =   10.62
  EFFECTIVE AREA(ACRES) =     36.93   AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  0.92
  TOTAL AREA(ACRES) =       36.9       PEAK FLOW RATE(CFS) =      31.03

****************************************************************************
  FLOW PROCESS FROM NODE   2004.00 TO NODE   1020.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2958.00  DOWNSTREAM(FEET) =   2919.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2059.00   CHANNEL SLOPE =  0.0185
  CHANNEL FLOW THRU SUBAREA(CFS) =      31.03
  FLOW VELOCITY(FEET/SEC) =   4.60 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.46   Tc(MIN.) =   28.54
  LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   1020.00 =    6352.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1020.00 TO NODE   1020.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
 MAINLINE Tc(MIN.) =   28.54
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.020
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.10      0.98     0.100    32
 USER-DEFINED               -        0.37      0.44     1.000     -
 NATURAL DESERT COVER
 "DESERT BRUSH"   (30.0%)   B        9.39      0.34     1.000    82
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.35
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.991
 SUBAREA AREA(ACRES) =    9.86      SUBAREA RUNOFF(CFS) =    5.98
 EFFECTIVE AREA(ACRES) =     46.79   AREA-AVERAGED Fm(INCH/HR) =  0.33
 AREA-AVERAGED Fp(INCH/HR) =  0.35  AREA-AVERAGED Ap =  0.93
 TOTAL AREA(ACRES) =       46.8       PEAK FLOW RATE(CFS) =      31.03
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE   1020.00 TO NODE   1020.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       31.03   28.54    1.020  0.35( 0.33) 0.93      46.8    2000.00
 LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   1020.00 =    6352.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      110.74   24.16    1.146  0.36( 0.36) 0.98     104.7    1300.00
     2      110.94   25.43    1.105  0.36( 0.36) 0.98     113.3    1350.00
     3      110.45   28.08    1.031  0.36( 0.36) 0.98     129.8    1310.00
     4      108.23   33.81    0.905  0.36( 0.36) 0.98     162.2    1330.00
     5      107.97   34.26    0.897  0.36( 0.36) 0.98     164.6    1320.00
     6      107.05   36.03    0.866  0.37( 0.36) 0.98     173.3    1340.00
     7       72.93   96.04    0.436  0.37( 0.37) 0.98     422.6    1000.00
     8       69.14   99.03    0.427  0.37( 0.37) 0.98     427.1    1200.00
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1020.00 =   21895.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      141.77   24.16    1.146  0.36( 0.35) 0.96     144.3    1300.00
     2      141.98   25.43    1.105  0.36( 0.35) 0.96     155.0    1350.00
     3      141.48   28.08    1.031  0.36( 0.35) 0.96     175.8    1310.00
     4      141.30   28.54    1.020  0.36( 0.35) 0.96     179.2    2000.00
     5      134.12   33.81    0.905  0.36( 0.35) 0.97     209.0    1330.00
```

```
      6      133.48   34.26    0.897  0.36( 0.35) 0.97     211.4    1320.00
      7      131.16   36.03    0.866  0.36( 0.35) 0.97     220.1    1340.00
      8       77.67   96.04    0.436  0.37( 0.36) 0.98     469.4    1000.00
      9       73.47   99.03    0.427  0.37( 0.36) 0.98     473.9    1200.00
    TOTAL AREA(ACRES) =       473.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      141.98  Tc(MIN.) =   25.435
  EFFECTIVE AREA(ACRES) =    155.02  AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  0.96
  TOTAL AREA(ACRES) =      473.9
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1020.00 =   21895.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1020.00 TO NODE   1020.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1020.00 TO NODE   1021.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2919.90  DOWNSTREAM(FEET) =   2918.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   269.00   CHANNEL SLOPE =  0.0041
  CHANNEL FLOW THRU SUBAREA(CFS) =     141.98
  FLOW VELOCITY(FEET/SEC) =   3.37 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.33   Tc(MIN.) =   26.76
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1021.00 =   22164.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1021.00 TO NODE   1021.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3300.00 TO NODE   3301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   590.00
  ELEVATION DATA: UPSTREAM(FEET) =   2983.60  DOWNSTREAM(FEET) =   2965.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.555
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.717
```

```
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        1.47      0.34     1.000    82   13.55
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.82
  TOTAL AREA(ACRES) =      1.47   PEAK FLOW RATE(CFS) =      1.82

****************************************************************************
  FLOW PROCESS FROM NODE   3301.00 TO NODE   3302.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2965.70  DOWNSTREAM(FEET) =    249.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   678.00   CHANNEL SLOPE =  4.0059
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.82
  FLOW VELOCITY(FEET/SEC) =   5.33 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.12   Tc(MIN.) =   15.67
  LONGEST FLOWPATH FROM NODE   3300.00 TO NODE   3302.00 =    1268.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3302.00 TO NODE   3302.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.67
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.551
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        3.83      0.34     1.000    82
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.01      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.84      SUBAREA RUNOFF(CFS) =    4.17
  EFFECTIVE AREA(ACRES) =      5.31   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        5.3       PEAK FLOW RATE(CFS) =       5.77

****************************************************************************
  FLOW PROCESS FROM NODE   3302.00 TO NODE   3303.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2949.70  DOWNSTREAM(FEET) =   2930.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   885.00   CHANNEL SLOPE =  0.0218
  CHANNEL FLOW THRU SUBAREA(CFS) =       5.77
  FLOW VELOCITY(FEET/SEC) =   3.22 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.58   Tc(MIN.) =   20.25
  LONGEST FLOWPATH FROM NODE   3300.00 TO NODE   3303.00 =    2153.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3303.00 TO NODE   3303.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.25
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.296
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        5.14      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.14      SUBAREA RUNOFF(CFS) =    4.41
  EFFECTIVE AREA(ACRES) =     10.45   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       10.4       PEAK FLOW RATE(CFS) =       8.96

****************************************************************************
  FLOW PROCESS FROM NODE   3303.00 TO NODE   1021.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2930.40  DOWNSTREAM(FEET) =   2918.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   666.00   CHANNEL SLOPE =  0.0174
  CHANNEL FLOW THRU SUBAREA(CFS) =       8.96
  FLOW VELOCITY(FEET/SEC) =   3.21 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.46   Tc(MIN.) =   23.71
  LONGEST FLOWPATH FROM NODE   3300.00 TO NODE   1021.00 =    2819.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1021.00 TO NODE   1021.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   23.71
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.161
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  COMMERCIAL                  A        0.46      0.98     0.100    32
  USER-DEFINED                -        2.69      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        6.51      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.38
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.957
  SUBAREA AREA(ACRES) =    9.66      SUBAREA RUNOFF(CFS) =    6.97
  EFFECTIVE AREA(ACRES) =     20.11   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =       20.1       PEAK FLOW RATE(CFS) =      14.65

****************************************************************************
  FLOW PROCESS FROM NODE   1021.00 TO NODE   1021.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       14.65   23.71    1.161  0.36( 0.35) 0.98      20.1    3300.00
  LONGEST FLOWPATH FROM NODE   3300.00 TO NODE   1021.00 =    2819.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      141.77   25.49    1.104  0.36( 0.35) 0.96     144.3    1300.00
      2      141.98   26.76    1.066  0.36( 0.35) 0.96     155.0    1350.00
      3      141.48   29.41    0.998  0.36( 0.35) 0.96     175.8    1310.00
      4      141.30   29.87    0.988  0.36( 0.35) 0.96     179.2    2000.00
      5      134.12   35.16    0.881  0.36( 0.35) 0.97     209.0    1330.00
      6      133.48   35.62    0.873  0.36( 0.35) 0.97     211.4    1320.00
      7      131.16   37.39    0.844  0.36( 0.35) 0.97     220.1    1340.00
      8       77.67   97.64    0.431  0.37( 0.36) 0.98     469.4    1000.00
      9       73.47  100.64    0.422  0.37( 0.36) 0.98     473.9    1200.00
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1021.00 =   22164.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      156.42   23.71    1.161  0.36( 0.35) 0.97     154.4    3300.00
      2      155.39   25.49    1.104  0.36( 0.35) 0.97     164.4    1300.00
      3      154.92   26.76    1.066  0.36( 0.35) 0.97     175.1    1350.00
      4      153.19   29.41    0.998  0.36( 0.35) 0.97     195.9    1310.00
      5      152.82   29.87    0.988  0.36( 0.35) 0.97     199.3    2000.00
      6      143.71   35.16    0.881  0.36( 0.35) 0.97     229.1    1330.00
      7      142.92   35.62    0.873  0.36( 0.35) 0.97     231.5    1320.00
      8      140.07   37.39    0.844  0.36( 0.35) 0.97     240.2    1340.00
      9       79.12   97.64    0.431  0.37( 0.36) 0.98     489.5    1000.00
     10       74.75  100.64    0.422  0.37( 0.36) 0.98     494.0    1200.00
```

```
    TOTAL AREA(ACRES) =       494.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      156.42  Tc(MIN.) =   23.710
  EFFECTIVE AREA(ACRES) =    154.35  AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =      494.0
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1021.00 =   22164.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1021.00 TO NODE   1021.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1021.00 TO NODE   1022.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2918.80  DOWNSTREAM(FEET) =   2916.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   113.00   CHANNEL SLOPE =  0.0248
  CHANNEL FLOW THRU SUBAREA(CFS) =     156.42
  FLOW VELOCITY(FEET/SEC) =   8.56 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.22   Tc(MIN.) =   23.93
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1022.00 =   22277.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1022.00 TO NODE   1022.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1500.00 TO NODE   1501.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   586.00
  ELEVATION DATA: UPSTREAM(FEET) =   2925.30  DOWNSTREAM(FEET) =   2918.90

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.602
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.185
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.47      0.98     0.100    32    9.60
```

```
  USER-DEFINED                -        1.39      0.44     1.000     -   16.58
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.46
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.773
  SUBAREA RUNOFF(CFS) =      3.07
  TOTAL AREA(ACRES) =      1.86   PEAK FLOW RATE(CFS) =      3.07

****************************************************************************
  FLOW PROCESS FROM NODE   1501.00 TO NODE   1502.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2918.90  DOWNSTREAM(FEET) =   2916.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   429.00   CHANNEL SLOPE =  0.0068
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.07
  FLOW VELOCITY(FEET/SEC) =   1.55 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.61   Tc(MIN.) =   14.21
  LONGEST FLOWPATH FROM NODE   1500.00 TO NODE   1502.00 =    1015.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1502.00 TO NODE   1502.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.21
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.661
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.34      0.98     0.100    32
  USER-DEFINED               -        2.68      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.899
  SUBAREA AREA(ACRES) =    3.02      SUBAREA RUNOFF(CFS) =    3.42
  EFFECTIVE AREA(ACRES) =      4.88   AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        4.9       PEAK FLOW RATE(CFS) =       5.61

****************************************************************************
  FLOW PROCESS FROM NODE   1502.00 TO NODE   1502.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        5.61   14.21    1.661  0.45( 0.38) 0.85       4.9    1500.00
  LONGEST FLOWPATH FROM NODE   1500.00 TO NODE   1502.00 =    1015.00 FEET.
```

```
 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      156.42   23.93    1.153  0.36( 0.35) 0.97     154.4    3300.00
     2      155.39   25.71    1.097  0.36( 0.35) 0.97     164.4    1300.00
     3      154.92   26.98    1.060  0.36( 0.35) 0.97     175.1    1350.00
     4      153.19   29.63    0.993  0.36( 0.35) 0.97     195.9    1310.00
     5      152.82   30.09    0.982  0.36( 0.35) 0.97     199.3    2000.00
     6      143.71   35.39    0.877  0.36( 0.35) 0.97     229.1    1330.00
     7      142.92   35.84    0.869  0.36( 0.35) 0.97     231.5    1320.00
     8      140.07   37.62    0.840  0.36( 0.35) 0.97     240.2    1340.00
     9       79.12   97.91    0.430  0.37( 0.36) 0.98     489.5    1000.00
    10       74.75  100.92    0.421  0.37( 0.36) 0.98     494.0    1200.00
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1502.00 =   22277.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      157.12   14.21    1.661  0.36( 0.35) 0.96      96.5    1500.00
     2      159.80   23.93    1.153  0.36( 0.35) 0.96     159.2    3300.00
     3      158.52   25.71    1.097  0.36( 0.35) 0.96     169.3    1300.00
     4      157.89   26.98    1.060  0.36( 0.35) 0.96     180.0    1350.00
     5      155.87   29.63    0.993  0.36( 0.35) 0.96     200.8    1310.00
     6      155.45   30.09    0.982  0.36( 0.35) 0.96     204.2    2000.00
     7      145.87   35.39    0.877  0.36( 0.35) 0.96     234.0    1330.00
     8      145.06   35.84    0.869  0.36( 0.35) 0.96     236.4    1320.00
     9      142.08   37.62    0.840  0.36( 0.35) 0.97     245.1    1340.00
    10       79.40   97.91    0.430  0.37( 0.36) 0.98     494.4    1000.00
    11       75.03  100.92    0.421  0.37( 0.36) 0.98     498.9    1200.00
   TOTAL AREA(ACRES) =       498.9

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      159.80  Tc(MIN.) =   23.930
 EFFECTIVE AREA(ACRES) =    159.23  AREA-AVERAGED Fm(INCH/HR) =  0.35
 AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  0.96
 TOTAL AREA(ACRES) =      498.9
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1502.00 =   22277.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1502.00 TO NODE   1502.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE   1022.00 TO NODE   1023.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   2916.00  DOWNSTREAM(FEET) =   2906.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   907.00   CHANNEL SLOPE =  0.0108
  CHANNEL FLOW THRU SUBAREA(CFS) =     159.80
  FLOW VELOCITY(FEET/SEC) =   5.69 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.66   Tc(MIN.) =   26.59
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1023.00 =   23184.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1023.00 TO NODE   1023.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   26.59
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.071
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.44      0.98     0.100    32
  USER-DEFINED               -        8.33      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.955
  SUBAREA AREA(ACRES) =    8.77      SUBAREA RUNOFF(CFS) =    5.12
  EFFECTIVE AREA(ACRES) =    168.00   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.96
  TOTAL AREA(ACRES) =      507.7       PEAK FLOW RATE(CFS) =     159.80
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1023.00 TO NODE   1024.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2906.20  DOWNSTREAM(FEET) =   2896.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1100.00   CHANNEL SLOPE =  0.0089
  CHANNEL FLOW THRU SUBAREA(CFS) =     159.80
  FLOW VELOCITY(FEET/SEC) =   5.17 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.55   Tc(MIN.) =   30.14
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1024.00 =   24284.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1024.00 TO NODE   1024.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   30.14
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.981
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  COMMERCIAL                  A        0.98      0.98     0.100    32
  USER-DEFINED                -        8.08      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.903
  SUBAREA AREA(ACRES) =    9.06      SUBAREA RUNOFF(CFS) =    4.72
  EFFECTIVE AREA(ACRES) =    177.06   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.96
  TOTAL AREA(ACRES) =      516.8       PEAK FLOW RATE(CFS) =     159.80
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1024.00 TO NODE   1024.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5100.00 TO NODE   1024.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   25.06   RAINFALL INTENSITY(INCH/HR) =  1.12
  EFFECTIVE AREA(ACRES) =   411.62
  TOTAL AREA(ACRES) =  1169.60        PEAK FLOW RATE(CFS) =    503.45
  AREA-AVERAGED Fm(INCH/HR) =   0.28  AREA-AVERAGED Fp(INCH/HR) =   0.29
  AREA-AVERAGED Ap =  0.97
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE   1024.00 TO NODE   1024.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      503.45   25.06    1.117  0.29( 0.28) 0.97     411.6    1000.00
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1024.00 =   24284.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      157.12   20.45    1.287  0.38( 0.36) 0.96     114.4    1500.00
      2      159.80   30.14    0.981  0.37( 0.36) 0.96     177.1    3300.00
      3      158.52   31.93    0.942  0.37( 0.36) 0.96     187.1    1300.00
      4      157.89   33.21    0.917  0.37( 0.36) 0.96     197.8    1350.00
      5      155.87   35.88    0.868  0.37( 0.36) 0.96     218.7    1310.00
```

```
     6      155.45   36.35    0.861  0.37( 0.36) 0.96     222.0    2000.00
     7      145.87   41.77    0.781  0.37( 0.36) 0.96     251.8    1330.00
     8      145.06   42.24    0.775  0.37( 0.36) 0.96     254.2    1320.00
     9      142.08   44.06    0.752  0.37( 0.36) 0.96     262.9    1340.00
    10       79.40  105.57    0.408  0.37( 0.36) 0.97     512.2    1000.00
    11       75.03  108.71    0.400  0.37( 0.36) 0.97     516.8    1200.00
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1024.00 =   24284.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      652.00   20.45    1.287  0.31( 0.30) 0.97     450.3    1500.00
     2      661.85   25.06    1.117  0.31( 0.30) 0.97     555.8    1000.00
     3      581.67   30.14    0.981  0.31( 0.30) 0.97     588.7    3300.00
     4      556.95   31.93    0.942  0.31( 0.30) 0.97     598.7    1300.00
     5      540.83   33.21    0.917  0.32( 0.31) 0.97     609.5    1350.00
     6      509.69   35.88    0.868  0.32( 0.31) 0.97     630.3    1310.00
     7      504.56   36.35    0.861  0.32( 0.31) 0.97     633.6    2000.00
     8      446.81   41.77    0.781  0.32( 0.31) 0.97     663.5    1330.00
     9      442.36   42.24    0.775  0.32( 0.31) 0.97     665.8    1320.00
    10      425.80   44.06    0.752  0.32( 0.31) 0.97     674.5    1340.00
    11      155.49  105.57    0.408  0.34( 0.33) 0.97     923.9    1000.00
    12      146.11  108.71    0.400  0.34( 0.33) 0.97     928.4    1200.00
    TOTAL AREA(ACRES) =      1686.4

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      661.85  Tc(MIN.) =   25.060
  EFFECTIVE AREA(ACRES) =    555.83  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.31  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =     1686.4
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1024.00 =   24284.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1024.00 TO NODE   1024.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1024.00 TO NODE   1025.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2896.40  DOWNSTREAM(FEET) =   2894.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   563.00   CHANNEL SLOPE =  0.0039
  CHANNEL FLOW THRU SUBAREA(CFS) =     661.85
  FLOW VELOCITY(FEET/SEC) =   5.36 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.75   Tc(MIN.) =   26.81
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1025.00 =   24847.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1025.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   26.81
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.065
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.14      0.98     0.100    32
  USER-DEFINED               -        1.25      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.909
  SUBAREA AREA(ACRES) =    1.39      SUBAREA RUNOFF(CFS) =    0.82
  EFFECTIVE AREA(ACRES) =    557.22   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.31  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =     1687.8       PEAK FLOW RATE(CFS) =     661.85
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1025.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   7240.00 TO NODE   1025.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   37.80   RAINFALL INTENSITY(INCH/HR) =  0.84
  EFFECTIVE AREA(ACRES) =   149.39
  TOTAL AREA(ACRES) =   263.30        PEAK FLOW RATE(CFS) =     76.41
  AREA-AVERAGED Fm(INCH/HR) =   0.31  AREA-AVERAGED Fp(INCH/HR) =   0.34
  AREA-AVERAGED Ap =  0.92
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1025.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

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

```
    1       76.41   37.80    0.837  0.34( 0.31) 0.92     149.4    1000.00
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1025.00 =   24847.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      652.00   22.21    1.215  0.31( 0.30) 0.97     451.7    1500.00
     2      661.85   26.81    1.065  0.31( 0.30) 0.97     557.2    1000.00
     3      581.67   31.96    0.942  0.31( 0.30) 0.97     590.1    3300.00
     4      556.95   33.78    0.906  0.32( 0.31) 0.97     600.1    1300.00
     5      540.83   35.08    0.882  0.32( 0.31) 0.97     610.9    1350.00
     6      509.69   37.79    0.838  0.32( 0.31) 0.97     631.7    1310.00
     7      504.56   38.26    0.830  0.32( 0.31) 0.97     635.0    2000.00
     8      446.81   43.76    0.756  0.32( 0.31) 0.97     664.9    1330.00
     9      442.36   44.23    0.750  0.32( 0.31) 0.97     667.2    1320.00
    10      425.80   46.07    0.729  0.32( 0.31) 0.97     675.9    1340.00
    11      155.49  108.34    0.401  0.34( 0.33) 0.97     925.2    1000.00
    12      146.11  111.53    0.393  0.34( 0.33) 0.97     929.8    1200.00
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1025.00 =   24847.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      728.41   22.21    1.215  0.32( 0.30) 0.96     539.4    1500.00
     2      738.26   26.81    1.065  0.32( 0.30) 0.96     663.2    1000.00
     3      658.08   31.96    0.942  0.32( 0.31) 0.96     716.4    3300.00
     4      633.36   33.78    0.906  0.32( 0.31) 0.96     733.6    1300.00
     5      617.24   35.08    0.882  0.32( 0.31) 0.96     749.5    1350.00
     6      586.10   37.79    0.838  0.32( 0.31) 0.96     781.0    1310.00
     7      585.96   37.80    0.837  0.32( 0.31) 0.96     781.2    1000.00
     8      579.94   38.26    0.830  0.32( 0.31) 0.96     784.4    2000.00
     9      511.34   43.76    0.756  0.32( 0.31) 0.96     814.2    1330.00
    10      506.07   44.23    0.750  0.32( 0.31) 0.96     816.6    1320.00
    11      486.44   46.07    0.729  0.32( 0.31) 0.96     825.3    1340.00
    12      168.33  108.34    0.401  0.34( 0.33) 0.97    1074.6    1000.00
    13      157.79  111.53    0.393  0.34( 0.33) 0.97    1079.2    1200.00
   TOTAL AREA(ACRES) =      1951.1

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      738.26  Tc(MIN.) =   26.811
 EFFECTIVE AREA(ACRES) =    663.18  AREA-AVERAGED Fm(INCH/HR) =  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.32  AREA-AVERAGED Ap =  0.96
 TOTAL AREA(ACRES) =     1951.1
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1025.00 =   24847.00 FEET.
================================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =     1951.1  TC(MIN.) =     26.81
 EFFECTIVE AREA(ACRES) =    663.18  AREA-AVERAGED Fm(INCH/HR)=  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.32  AREA-AVERAGED Ap = 0.960
 PEAK FLOW RATE(CFS)   =     738.26
```

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	728.41	22.21	1.215	0.32(0.30)	0.96	539.4	1500.00
2	738.26	26.81	1.065	0.32(0.30)	0.96	663.2	1000.00
3	658.08	31.96	0.942	0.32(0.31)	0.96	716.4	3300.00
4	633.36	33.78	0.906	0.32(0.31)	0.96	733.6	1300.00
5	617.24	35.08	0.882	0.32(0.31)	0.96	749.5	1350.00
6	586.10	37.79	0.838	0.32(0.31)	0.96	781.0	1310.00
7	585.96	37.80	0.837	0.32(0.31)	0.96	781.2	1000.00
8	579.94	38.26	0.830	0.32(0.31)	0.96	784.4	2000.00
9	511.34	43.76	0.756	0.32(0.31)	0.96	814.2	1330.00
10	506.07	44.23	0.750	0.32(0.31)	0.96	816.6	1320.00
11	486.44	46.07	0.729	0.32(0.31)	0.96	825.3	1340.00
12	168.33	108.34	0.401	0.34(0.33)	0.97	1074.6	1000.00
13	157.79	111.53	0.393	0.34(0.33)	0.97	1079.2	1200.00

END OF RATIONAL METHOD ANALYSIS

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        (c) Copyright 1983-2015 Advanced Engineering Software (aes)
            Ver. 22.0  Release Date: 07/01/2015  License ID 1673

                          Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* APPLE VALLEY 143 ACRES - EXISTING CONDITION                           *
* 100-YR RATIONAL METHOD - WATERSHEDS D & E                             *
* Q3 08/26/2022                                                         *
 ************************************************************************

  FILE NAME: APC_00E.DAT
  TIME/DATE OF STUDY: 17:59 08/26/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.7000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.0800

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 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.*
```

```
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE   3000.00 TO NODE   3001.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   732.00
  ELEVATION DATA: UPSTREAM(FEET) =   3162.40  DOWNSTREAM(FEET) =   3134.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.097
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.977
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  USER-DEFINED               -        2.10      0.44     1.000     -   14.10
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      4.79
  TOTAL AREA(ACRES) =      2.10   PEAK FLOW RATE(CFS) =      4.79

****************************************************************************
  FLOW PROCESS FROM NODE   3001.00 TO NODE   3002.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3134.30  DOWNSTREAM(FEET) =   3112.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   619.00   CHANNEL SLOPE =  0.0352
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0352 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       4.79
  FLOW VELOCITY(FEET/SEC) =   1.77 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.82   Tc(MIN.) =   19.92
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3002.00 =    1351.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3002.00 TO NODE   3002.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.92
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.337
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        1.33      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.33      SUBAREA RUNOFF(CFS) =    2.27
  EFFECTIVE AREA(ACRES) =      3.43   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.4       PEAK FLOW RATE(CFS) =       5.85

****************************************************************************
  FLOW PROCESS FROM NODE   3002.00 TO NODE   3003.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3112.50  DOWNSTREAM(FEET) =   3087.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   636.00   CHANNEL SLOPE =  0.0393
  CHANNEL FLOW THRU SUBAREA(CFS) =       5.85
  FLOW VELOCITY(FEET/SEC) =   4.34 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.44   Tc(MIN.) =   22.36
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3003.00 =    1987.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3003.00 TO NODE   3003.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   22.36
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.155
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        4.92      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.92      SUBAREA RUNOFF(CFS) =    7.59
  EFFECTIVE AREA(ACRES) =      8.35   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        8.4       PEAK FLOW RATE(CFS) =      12.89

****************************************************************************
  FLOW PROCESS FROM NODE   3003.00 TO NODE   3004.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3087.50  DOWNSTREAM(FEET) =   3051.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1242.00   CHANNEL SLOPE =  0.0293
  CHANNEL FLOW THRU SUBAREA(CFS) =      12.89
  FLOW VELOCITY(FEET/SEC) =   4.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.53   Tc(MIN.) =   26.90
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3004.00 =    3229.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   3004.00 TO NODE   3004.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   26.90
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.894
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        6.74      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    6.74      SUBAREA RUNOFF(CFS) =    8.82
  EFFECTIVE AREA(ACRES) =     15.09   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       15.1       PEAK FLOW RATE(CFS) =      19.74

****************************************************************************
  FLOW PROCESS FROM NODE   3004.00 TO NODE   3004.50 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3051.10  DOWNSTREAM(FEET) =   3028.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   734.00   CHANNEL SLOPE =  0.0308
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0308 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      19.74
  FLOW VELOCITY(FEET/SEC) =   2.65 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.61   Tc(MIN.) =   31.51
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3004.50 =    3963.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3004.50 TO NODE   3004.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   31.51
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.695
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        3.50      0.44     1.000     -
  COMMERCIAL                 B        0.42      0.75     0.100    56
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.09      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.906
  SUBAREA AREA(ACRES) =    4.01      SUBAREA RUNOFF(CFS) =    4.68
```

```
  EFFECTIVE AREA(ACRES) =     19.10   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =       19.1       PEAK FLOW RATE(CFS) =      21.72

****************************************************************************
  FLOW PROCESS FROM NODE   3004.50 TO NODE   3004.50 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3200.00 TO NODE   3201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   797.00
  ELEVATION DATA: UPSTREAM(FEET) =   3114.30  DOWNSTREAM(FEET) =   3086.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.825
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.874
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  USER-DEFINED               -        2.57      0.44     1.000     -   14.82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      5.63
  TOTAL AREA(ACRES) =      2.57   PEAK FLOW RATE(CFS) =      5.63

****************************************************************************
  FLOW PROCESS FROM NODE   3201.00 TO NODE   3202.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3086.10  DOWNSTREAM(FEET) =   3068.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   536.00   CHANNEL SLOPE =  0.0330
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0330 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       5.63
  FLOW VELOCITY(FEET/SEC) =   1.81 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.94   Tc(MIN.) =   19.76
  LONGEST FLOWPATH FROM NODE   3200.00 TO NODE   3202.00 =    1333.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3202.00 TO NODE   3202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==========================================================================
  MAINLINE Tc(MIN.) =   19.76
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.350
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        2.70      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.70      SUBAREA RUNOFF(CFS) =    4.64
  EFFECTIVE AREA(ACRES) =      5.27   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        5.3       PEAK FLOW RATE(CFS) =       9.06

**************************************************************************
  FLOW PROCESS FROM NODE   3202.00 TO NODE   3004.50 IS CODE =  53
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3068.40  DOWNSTREAM(FEET) =   3028.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1518.00   CHANNEL SLOPE =  0.0263
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0263 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       9.06
  FLOW VELOCITY(FEET/SEC) =   1.89 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  13.38   Tc(MIN.) =   33.14
  LONGEST FLOWPATH FROM NODE   3200.00 TO NODE   3004.50 =    2851.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE   3004.50 TO NODE   3004.50 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   33.14
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.636
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.64      0.98     0.100    32
  USER-DEFINED               -        4.52      0.44     1.000     -
  COMMERCIAL                 B        4.18      0.75     0.100    56
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.13      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.47
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.542
  SUBAREA AREA(ACRES) =    9.47      SUBAREA RUNOFF(CFS) =   11.78
  EFFECTIVE AREA(ACRES) =     14.74   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.71
  TOTAL AREA(ACRES) =       14.7       PEAK FLOW RATE(CFS) =      17.45
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   3004.50 TO NODE   3004.50 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       17.45   33.14    1.636  0.45( 0.32) 0.71      14.7    3200.00
  LONGEST FLOWPATH FROM NODE   3200.00 TO NODE   3004.50 =    2851.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       21.72   31.51    1.695  0.44( 0.43) 0.98      19.1    3000.00
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3004.50 =    3963.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       39.06   31.51    1.695  0.45( 0.38) 0.86      33.1    3000.00
      2       38.16   33.14    1.636  0.45( 0.38) 0.86      33.8    3200.00
    TOTAL AREA(ACRES) =        33.8

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       39.06  Tc(MIN.) =   31.507
  EFFECTIVE AREA(ACRES) =     33.11  AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =       33.8
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3004.50 =    3963.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3004.50 TO NODE   3004.50 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3004.50 TO NODE   3005.00 IS CODE =  37
----------------------------------------------------------------------------
  >>>>>COMPUTE CULVERT TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED CULVERT SIZE<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3028.50  DOWNSTREAM(FEET) =  3024.30
  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,
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       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) =   2.50
  NUMBER OF BARREL(S) =   1
  CULVERT-FLOW VELOCITY(FEET/SEC.) =   7.96
  CULVERT-FLOW(CFS) =      39.06
  CULVERT-FLOW TRAVEL TIME(MIN.) =   0.52    Tc(MIN.) =   32.03
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3005.00 =    4213.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3005.00 TO NODE   3006.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3024.30  DOWNSTREAM(FEET) =   2975.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1729.00   CHANNEL SLOPE =  0.0284
  CHANNEL FLOW THRU SUBAREA(CFS) =      39.06
  FLOW VELOCITY(FEET/SEC) =   6.08 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.74   Tc(MIN.) =   36.77
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3006.00 =    5942.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3006.00 TO NODE   3006.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   36.77
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.521
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        3.97      0.75     0.100    56
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B       15.00      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.35
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.812
  SUBAREA AREA(ACRES) =   18.97      SUBAREA RUNOFF(CFS) =   21.07
  EFFECTIVE AREA(ACRES) =     52.08   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.41  AREA-AVERAGED Ap =  0.84
  TOTAL AREA(ACRES) =       52.8       PEAK FLOW RATE(CFS) =      54.94

****************************************************************************
  FLOW PROCESS FROM NODE   3006.00 TO NODE   3006.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

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

```
  FLOW PROCESS FROM NODE   4000.00 TO NODE   4001.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   956.00
  ELEVATION DATA: UPSTREAM(FEET) =   3068.10  DOWNSTREAM(FEET) =   3035.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   16.023
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.722
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  USER-DEFINED               -        5.14      0.44     1.000     -   16.02
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     10.55
  TOTAL AREA(ACRES) =      5.14   PEAK FLOW RATE(CFS) =     10.55

****************************************************************************
  FLOW PROCESS FROM NODE   4001.00 TO NODE   4001.50 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3035.10  DOWNSTREAM(FEET) =   3016.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   657.00   CHANNEL SLOPE =  0.0277
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0277 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      10.55
  FLOW VELOCITY(FEET/SEC) =   2.04 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.36   Tc(MIN.) =   21.38
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4001.50 =    1613.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4001.50 TO NODE   4001.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.38
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.224
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        0.69      0.44     1.000     -
  COMMERCIAL                 B        3.10      0.75     0.100    56
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        1.97      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.41
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.516
  SUBAREA AREA(ACRES) =    5.76      SUBAREA RUNOFF(CFS) =   10.44
  EFFECTIVE AREA(ACRES) =     10.90   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  0.74
  TOTAL AREA(ACRES) =       10.9       PEAK FLOW RATE(CFS) =      18.69

****************************************************************************
  FLOW PROCESS FROM NODE   4001.50 TO NODE   4002.00 IS CODE =  37
----------------------------------------------------------------------------
  >>>>>COMPUTE CULVERT TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED CULVERT SIZE<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3016.90  DOWNSTREAM(FEET) =  3012.20
  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) =   1.75
  NUMBER OF BARREL(S) =   1
  CULVERT-FLOW VELOCITY(FEET/SEC.) =   7.77
  CULVERT-FLOW(CFS) =      18.69
  CULVERT-FLOW TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =   21.92
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4002.00 =    1863.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4002.00 TO NODE   3006.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3012.20  DOWNSTREAM(FEET) =   2975.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1303.00   CHANNEL SLOPE =  0.0284
  CHANNEL FLOW THRU SUBAREA(CFS) =      18.69
  FLOW VELOCITY(FEET/SEC) =   4.96 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.38   Tc(MIN.) =   26.30
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   3006.00 =    3166.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3006.00 TO NODE   3006.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   26.30
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.924
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  COMMERCIAL                  B        2.06      0.75     0.100    56
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        4.42      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.36
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.714
  SUBAREA AREA(ACRES) =    6.48      SUBAREA RUNOFF(CFS) =    9.71
  EFFECTIVE AREA(ACRES) =     17.38   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.73
  TOTAL AREA(ACRES) =       17.4       PEAK FLOW RATE(CFS) =      25.46

****************************************************************************
  FLOW PROCESS FROM NODE   3006.00 TO NODE   3006.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       25.46   26.30    1.924  0.40( 0.30) 0.73      17.4    4000.00
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   3006.00 =    3166.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       54.94   36.77    1.521  0.41( 0.35) 0.84      52.1    3000.00
      2       53.51   38.45    1.475  0.41( 0.35) 0.84      52.8    3200.00
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3006.00 =    5942.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       78.24   26.30    1.924  0.41( 0.33) 0.81      54.6    4000.00
      2       74.11   36.77    1.521  0.41( 0.34) 0.82      69.5    3000.00
      3       71.94   38.45    1.475  0.41( 0.34) 0.82      70.2    3200.00
    TOTAL AREA(ACRES) =        70.2

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       78.24  Tc(MIN.) =   26.299
  EFFECTIVE AREA(ACRES) =     54.63  AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.41  AREA-AVERAGED Ap =  0.81
  TOTAL AREA(ACRES) =       70.2
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3006.00 =    5942.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3006.00 TO NODE   3006.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   3006.00 TO NODE   3007.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2975.20  DOWNSTREAM(FEET) =   2938.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1685.00   CHANNEL SLOPE =  0.0220
  CHANNEL FLOW THRU SUBAREA(CFS) =      78.24
  FLOW VELOCITY(FEET/SEC) =   6.55 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.29   Tc(MIN.) =   30.59
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3007.00 =    7627.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3007.00 TO NODE   3007.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   30.59
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.731
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B       17.33      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   17.33      SUBAREA RUNOFF(CFS) =   21.63
  EFFECTIVE AREA(ACRES) =     71.96   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.39  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =       87.5       PEAK FLOW RATE(CFS) =      90.38

****************************************************************************
  FLOW PROCESS FROM NODE   3007.00 TO NODE   3008.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2938.10  DOWNSTREAM(FEET) =   2910.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1770.00   CHANNEL SLOPE =  0.0157
  CHANNEL FLOW THRU SUBAREA(CFS) =      90.38
  FLOW VELOCITY(FEET/SEC) =   5.77 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.11   Tc(MIN.) =   35.70
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3008.00 =    9397.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3008.00 TO NODE   3008.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
  MAINLINE Tc(MIN.) =   35.70
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.553
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.82      0.98     0.100    32
  USER-DEFINED               -        3.42      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        7.32      0.34     1.000    82
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        0.08      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.38
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.937
  SUBAREA AREA(ACRES) =   11.64      SUBAREA RUNOFF(CFS) =   12.57
  EFFECTIVE AREA(ACRES) =     83.60   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.39  AREA-AVERAGED Ap =  0.87
  TOTAL AREA(ACRES) =       99.2       PEAK FLOW RATE(CFS) =      91.45

****************************************************************************
  FLOW PROCESS FROM NODE   3008.00 TO NODE   3008.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5000.00 TO NODE   5001.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   881.00
  ELEVATION DATA: UPSTREAM(FEET) =   3981.30  DOWNSTREAM(FEET) =   3901.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.783
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.188
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       12.54      0.18     1.000    91   12.78
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     33.95
  TOTAL AREA(ACRES) =     12.54   PEAK FLOW RATE(CFS) =     33.95

****************************************************************************
  FLOW PROCESS FROM NODE   5001.00 TO NODE   5002.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
```

```
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3901.40  DOWNSTREAM(FEET) =   3874.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   710.00   CHANNEL SLOPE =  0.0379
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0379 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      33.95
  FLOW VELOCITY(FEET/SEC) =   3.53 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.36   Tc(MIN.) =   16.14
  LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5002.00 =    1591.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5002.00 TO NODE   5002.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.14
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.708
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        6.39      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    6.39      SUBAREA RUNOFF(CFS) =   14.54
  EFFECTIVE AREA(ACRES) =     18.93   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       18.9       PEAK FLOW RATE(CFS) =      43.06

****************************************************************************
  FLOW PROCESS FROM NODE   5002.00 TO NODE   5002.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5100.00 TO NODE   5101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1024.00
  ELEVATION DATA: UPSTREAM(FEET) =   4046.20  DOWNSTREAM(FEET) =   3936.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.124
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.130
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
```

```
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       10.29      0.18     1.000    91   13.12
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     27.32
  TOTAL AREA(ACRES) =     10.29   PEAK FLOW RATE(CFS) =     27.32

****************************************************************************
  FLOW PROCESS FROM NODE   5101.00 TO NODE   5002.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3936.20  DOWNSTREAM(FEET) =   3874.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   642.00   CHANNEL SLOPE =  0.0961
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0961 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      27.32
  FLOW VELOCITY(FEET/SEC) =   5.22 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.05   Tc(MIN.) =   15.17
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5002.00 =    1666.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5002.00 TO NODE   5002.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.17
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.827
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        4.12      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.12      SUBAREA RUNOFF(CFS) =    9.82
  EFFECTIVE AREA(ACRES) =     14.41   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       14.4       PEAK FLOW RATE(CFS) =      34.33

****************************************************************************
  FLOW PROCESS FROM NODE   5002.00 TO NODE   5002.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

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

```
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1       34.33   15.17    2.827  0.18( 0.18) 1.00      14.4    5100.00
LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5002.00 =    1666.00 FEET.

** MEMORY BANK #  2 CONFLUENCE DATA **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1       43.06   16.14    2.708  0.18( 0.18) 1.00      18.9    5000.00
LONGEST FLOWPATH FROM NODE   5000.00 TO NODE   5002.00 =    1591.00 FEET.

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1       76.73   15.17    2.827  0.18( 0.18) 1.00      32.2    5100.00
    2       75.85   16.14    2.708  0.18( 0.18) 1.00      33.3    5000.00
  TOTAL AREA(ACRES) =        33.3

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =       76.73  Tc(MIN.) =   15.173
EFFECTIVE AREA(ACRES) =     32.21  AREA-AVERAGED Fm(INCH/HR) =  0.18
AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =       33.3
LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5002.00 =    1666.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   5002.00 TO NODE   5002.00 IS CODE =  12
----------------------------------------------------------------------------
>>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
FLOW PROCESS FROM NODE   5002.00 TO NODE   5003.00 IS CODE =  53
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   3874.50  DOWNSTREAM(FEET) =   3860.20
CHANNEL LENGTH THRU SUBAREA(FEET) =   201.00   CHANNEL SLOPE =  0.0711
SLOPE ADJUSTMENT CURVE USED:
EFFECTIVE SLOPE = .0711 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
CHANNEL FLOW THRU SUBAREA(CFS) =      76.73
FLOW VELOCITY(FEET/SEC) =   6.34 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   0.53   Tc(MIN.) =   15.70
LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5003.00 =    1867.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   5003.00 TO NODE   5003.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
  MAINLINE Tc(MIN.) =   15.70
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.760
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        7.28      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    7.28      SUBAREA RUNOFF(CFS) =   16.91
  EFFECTIVE AREA(ACRES) =     39.49   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       40.6       PEAK FLOW RATE(CFS) =      91.70

****************************************************************************
  FLOW PROCESS FROM NODE   5003.00 TO NODE   5003.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5200.00 TO NODE   5201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1032.00
  ELEVATION DATA: UPSTREAM(FEET) =   4207.30  DOWNSTREAM(FEET) =   3894.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.697
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.611
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        5.75      0.18     1.000    91   10.70
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     17.76
  TOTAL AREA(ACRES) =      5.75   PEAK FLOW RATE(CFS) =     17.76

****************************************************************************
  FLOW PROCESS FROM NODE   5201.00 TO NODE   5201.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.70
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.611
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        6.08      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    6.08      SUBAREA RUNOFF(CFS) =   18.78
  EFFECTIVE AREA(ACRES) =     11.83   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       11.8       PEAK FLOW RATE(CFS) =      36.53

****************************************************************************
  FLOW PROCESS FROM NODE   5201.00 TO NODE   5003.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3894.30  DOWNSTREAM(FEET) =   3860.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   271.00   CHANNEL SLOPE =  0.1258
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1189 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      36.53
  FLOW VELOCITY(FEET/SEC) =   6.40 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.71   Tc(MIN.) =   11.40
  LONGEST FLOWPATH FROM NODE   5200.00 TO NODE   5003.00 =    1303.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5003.00 TO NODE   5003.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.40
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.453
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        1.71      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.71      SUBAREA RUNOFF(CFS) =    5.04
  EFFECTIVE AREA(ACRES) =     13.54   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       13.5       PEAK FLOW RATE(CFS) =      39.89

****************************************************************************
  FLOW PROCESS FROM NODE   5003.00 TO NODE   5003.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================
```

```
 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       39.89   11.40    3.453  0.18( 0.18) 1.00      13.5    5200.00
 LONGEST FLOWPATH FROM NODE   5200.00 TO NODE   5003.00 =    1303.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       91.70   15.70    2.760  0.18( 0.18) 1.00      39.5    5100.00
     2       90.19   16.67    2.647  0.18( 0.18) 1.00      40.6    5000.00
 LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5003.00 =    1867.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      124.36   11.40    3.453  0.18( 0.18) 1.00      42.2    5200.00
     2      123.15   15.70    2.760  0.18( 0.18) 1.00      53.0    5100.00
     3      120.26   16.67    2.647  0.18( 0.18) 1.00      54.2    5000.00
   TOTAL AREA(ACRES) =        54.2

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      124.36  Tc(MIN.) =   11.403
 EFFECTIVE AREA(ACRES) =     42.22  AREA-AVERAGED Fm(INCH/HR) =  0.18
 AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       54.2
 LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5003.00 =    1867.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5003.00 TO NODE   5003.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE   5003.00 TO NODE   5004.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   3860.20  DOWNSTREAM(FEET) =   3840.80
 CHANNEL LENGTH THRU SUBAREA(FEET) =   567.00   CHANNEL SLOPE =  0.0342
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0342 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =     124.36
 FLOW VELOCITY(FEET/SEC) =   5.16 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.83   Tc(MIN.) =   13.23
 LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5004.00 =    2434.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   5004.00 TO NODE   5004.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.23
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.111
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        7.28      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    7.28      SUBAREA RUNOFF(CFS) =   19.21
  EFFECTIVE AREA(ACRES) =     49.50   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       61.4       PEAK FLOW RATE(CFS) =     130.58

****************************************************************************
  FLOW PROCESS FROM NODE   5004.00 TO NODE   5004.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5230.00 TO NODE   5231.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   887.00
  ELEVATION DATA: UPSTREAM(FEET) =   4040.50  DOWNSTREAM(FEET) =   3880.90

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.177
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.502
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        6.35      0.18     1.000    91   11.18
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     18.99
  TOTAL AREA(ACRES) =      6.35   PEAK FLOW RATE(CFS) =     18.99

****************************************************************************
  FLOW PROCESS FROM NODE   5231.00 TO NODE   5004.00 IS CODE =  53
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3880.90  DOWNSTREAM(FEET) =   3840.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   757.00   CHANNEL SLOPE =  0.0530
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0530 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      18.99
  FLOW VELOCITY(FEET/SEC) =   3.43 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.67   Tc(MIN.) =   14.85
  LONGEST FLOWPATH FROM NODE   5230.00 TO NODE   5004.00 =    1644.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5004.00 TO NODE   5004.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.85
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.870
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        5.73      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.73      SUBAREA RUNOFF(CFS) =   13.87
  EFFECTIVE AREA(ACRES) =     12.08   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       12.1       PEAK FLOW RATE(CFS) =      29.25

****************************************************************************
  FLOW PROCESS FROM NODE   5004.00 TO NODE   5004.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       29.25   14.85    2.870  0.18( 0.18) 1.00      12.1    5230.00
  LONGEST FLOWPATH FROM NODE   5230.00 TO NODE   5004.00 =    1644.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      130.58   13.23    3.111  0.18( 0.18) 1.00      49.5    5200.00
      2      128.89   17.54    2.555  0.18( 0.18) 1.00      60.3    5100.00
      3      126.02   18.52    2.459  0.18( 0.18) 1.00      61.4    5000.00
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5004.00 =    2434.00 FEET.
```

```
  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      158.99   13.23    3.111  0.18( 0.18) 1.00      60.3    5200.00
      2      159.20   14.85    2.870  0.18( 0.18) 1.00      65.6    5230.00
      3      154.71   17.54    2.555  0.18( 0.18) 1.00      72.4    5100.00
      4      150.79   18.52    2.459  0.18( 0.18) 1.00      73.5    5000.00
    TOTAL AREA(ACRES) =        73.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      159.20  Tc(MIN.) =   14.850
  EFFECTIVE AREA(ACRES) =     65.63  AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       73.5
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5004.00 =    2434.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5004.00 TO NODE   5004.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5004.00 TO NODE   5004.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5240.00 TO NODE   5241.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   948.00
  ELEVATION DATA: UPSTREAM(FEET) =   4077.00  DOWNSTREAM(FEET) =   3886.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.225
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.491
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        7.21      0.18     1.000    91   11.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     21.49
  TOTAL AREA(ACRES) =      7.21   PEAK FLOW RATE(CFS) =     21.49
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   5241.00 TO NODE   5004.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3886.30  DOWNSTREAM(FEET) =   3840.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   772.00   CHANNEL SLOPE =  0.0589
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0589 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      21.49
  FLOW VELOCITY(FEET/SEC) =   3.78 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.41   Tc(MIN.) =   14.63
  LONGEST FLOWPATH FROM NODE   5240.00 TO NODE   5004.00 =    1720.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5004.00 TO NODE   5004.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.63
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.900
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        3.05      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.05      SUBAREA RUNOFF(CFS) =    7.47
  EFFECTIVE AREA(ACRES) =     10.26   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       10.3       PEAK FLOW RATE(CFS) =      25.12

****************************************************************************
  FLOW PROCESS FROM NODE   5004.00 TO NODE   5004.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       25.12   14.63    2.900  0.18( 0.18) 1.00      10.3    5240.00
  LONGEST FLOWPATH FROM NODE   5240.00 TO NODE   5004.00 =    1720.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
```

```
     1      158.99   13.23    3.111  0.18( 0.18) 1.00      60.3    5200.00
     2      159.20   14.85    2.870  0.18( 0.18) 1.00      65.6    5230.00
     3      154.71   17.54    2.555  0.18( 0.18) 1.00      72.4    5100.00
     4      150.79   18.52    2.459  0.18( 0.18) 1.00      73.5    5000.00
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5004.00 =    2434.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      183.47   13.23    3.111  0.18( 0.18) 1.00      69.5    5200.00
     2      184.29   14.63    2.900  0.18( 0.18) 1.00      75.2    5240.00
     3      184.04   14.85    2.870  0.18( 0.18) 1.00      75.9    5230.00
     4      176.64   17.54    2.555  0.18( 0.18) 1.00      82.6    5100.00
     5      171.84   18.52    2.459  0.18( 0.18) 1.00      83.8    5000.00
    TOTAL AREA(ACRES) =        83.8

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      184.29  Tc(MIN.) =   14.632
  EFFECTIVE AREA(ACRES) =     75.17  AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       83.8
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5004.00 =    2434.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5004.00 TO NODE   5005.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3840.80  DOWNSTREAM(FEET) =   3764.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1426.00   CHANNEL SLOPE =  0.0536
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0536 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     184.29
  FLOW VELOCITY(FEET/SEC) =   7.37 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.23   Tc(MIN.) =   17.86
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5005.00 =    3860.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5005.00 TO NODE   5005.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.86
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.523
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       58.12      0.18     1.000    91
```

```
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   58.12      SUBAREA RUNOFF(CFS) =  122.54
 EFFECTIVE AREA(ACRES) =    133.29   AREA-AVERAGED Fm(INCH/HR) =  0.18
 AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      141.9       PEAK FLOW RATE(CFS) =     281.03

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      286.12   16.46    2.670  0.18( 0.18) 1.00     127.7    5200.00
     2      281.03   17.86    2.523  0.18( 0.18) 1.00     133.3    5240.00
     3      279.97   18.08    2.501  0.18( 0.18) 1.00     134.0    5230.00
     4      264.33   20.81    2.266  0.18( 0.18) 1.00     140.8    5100.00
     5      256.98   21.82    2.192  0.18( 0.18) 1.00     141.9    5000.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =     286.12  Tc(MIN.) =   16.46
 AREA-AVERAGED Fm(INCH/HR) =  0.18  AREA-AVERAGED Fp(INCH/HR) =  0.18
 AREA-AVERAGED Ap =  1.00  EFFECTIVE AREA(ACRES) =     127.66

****************************************************************************
 FLOW PROCESS FROM NODE   5005.00 TO NODE   5006.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   3764.30  DOWNSTREAM(FEET) =   3700.10
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1322.00   CHANNEL SLOPE =  0.0486
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0486 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =     286.12
 FLOW VELOCITY(FEET/SEC) =   8.12 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.71   Tc(MIN.) =   19.18
 LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5006.00 =    5182.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5006.00 TO NODE   5006.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.18
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.400
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL DESERT COVER
 "DESERT BRUSH"   (30.0%)   D       28.61      0.18     1.000    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   28.61      SUBAREA RUNOFF(CFS) =   57.16
```

```
  EFFECTIVE AREA(ACRES) =    156.27   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      170.5       PEAK FLOW RATE(CFS) =     312.19

****************************************************************************
  FLOW PROCESS FROM NODE   5006.00 TO NODE   5007.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3700.10  DOWNSTREAM(FEET) =   3655.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   937.00   CHANNEL SLOPE =  0.0478
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0478 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     312.19
  FLOW VELOCITY(FEET/SEC) =   8.29 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.88   Tc(MIN.) =   21.06
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5007.00 =    6119.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5007.00 TO NODE   5007.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.06
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.247
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        4.80      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.80      SUBAREA RUNOFF(CFS) =    8.93
  EFFECTIVE AREA(ACRES) =    161.07   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      175.3       PEAK FLOW RATE(CFS) =     312.19
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5007.00 TO NODE   5007.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5340.00 TO NODE   5341.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
```

```
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1215.00
  ELEVATION DATA: UPSTREAM(FEET) =   3872.40  DOWNSTREAM(FEET) =   3746.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.152
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.969
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        9.44      0.18     1.000    91   14.15
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     23.69
  TOTAL AREA(ACRES) =      9.44   PEAK FLOW RATE(CFS) =     23.69

**************************************************************************
  FLOW PROCESS FROM NODE   5341.00 TO NODE   5342.00 IS CODE =  53
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3746.40  DOWNSTREAM(FEET) =   3686.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1270.00   CHANNEL SLOPE =  0.0474
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0474 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      23.69
  FLOW VELOCITY(FEET/SEC) =   3.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.05   Tc(MIN.) =   20.20
  LONGEST FLOWPATH FROM NODE   5340.00 TO NODE   5342.00 =    2485.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE   5342.00 TO NODE   5342.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   20.20
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.314
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       28.36      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   28.36      SUBAREA RUNOFF(CFS) =   54.46
  EFFECTIVE AREA(ACRES) =     37.80   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       37.8       PEAK FLOW RATE(CFS) =      72.59
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   5342.00 TO NODE   5342.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.20
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.314
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       11.29      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   11.29      SUBAREA RUNOFF(CFS) =   21.68
  EFFECTIVE AREA(ACRES) =     49.09   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       49.1       PEAK FLOW RATE(CFS) =      94.27

****************************************************************************
  FLOW PROCESS FROM NODE   5342.00 TO NODE   5007.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3686.20  DOWNSTREAM(FEET) =   3655.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   635.00   CHANNEL SLOPE =  0.0487
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0487 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      94.27
  FLOW VELOCITY(FEET/SEC) =   5.61 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.89   Tc(MIN.) =   22.09
  LONGEST FLOWPATH FROM NODE   5340.00 TO NODE   5007.00 =    3120.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5007.00 TO NODE   5007.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   22.09
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.174
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        5.76      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.76      SUBAREA RUNOFF(CFS) =   10.34
```

```
  EFFECTIVE AREA(ACRES) =     54.85   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       54.8       PEAK FLOW RATE(CFS) =      98.42

****************************************************************************
  FLOW PROCESS FROM NODE   5007.00 TO NODE   5007.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       98.42   22.09    2.174  0.18( 0.18) 1.00      54.8    5340.00
  LONGEST FLOWPATH FROM NODE   5340.00 TO NODE   5007.00 =    3120.00 FEET.

  ** MEMORY BANK #  3 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      312.19   21.06    2.247  0.18( 0.18) 1.00     161.1    5200.00
      2      306.50   22.48    2.147  0.18( 0.18) 1.00     166.7    5240.00
      3      305.36   22.71    2.132  0.18( 0.18) 1.00     167.4    5230.00
      4      288.96   25.53    1.964  0.18( 0.18) 1.00     174.2    5100.00
      5      281.42   26.59    1.909  0.18( 0.18) 1.00     175.3    5000.00
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5007.00 =    6119.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      409.50   21.06    2.247  0.18( 0.18) 1.00     213.4    5200.00
      2      406.50   22.09    2.174  0.18( 0.18) 1.00     220.0    5340.00
      3      403.59   22.48    2.147  0.18( 0.18) 1.00     221.6    5240.00
      4      401.73   22.71    2.132  0.18( 0.18) 1.00     222.3    5230.00
      5      377.04   25.53    1.964  0.18( 0.18) 1.00     229.0    5100.00
      6      366.78   26.59    1.909  0.18( 0.18) 1.00     230.2    5000.00
    TOTAL AREA(ACRES) =       230.2

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      409.50  Tc(MIN.) =   21.062
  EFFECTIVE AREA(ACRES) =    213.37  AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      230.2
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5007.00 =    6119.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5007.00 TO NODE   5007.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   5007.00 TO NODE   5007.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5007.00 TO NODE   5008.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3655.30  DOWNSTREAM(FEET) =   3610.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   932.00   CHANNEL SLOPE =  0.0486
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0486 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     409.50
  FLOW VELOCITY(FEET/SEC) =   9.15 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.70   Tc(MIN.) =   22.76
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5008.00 =    7051.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5008.00 TO NODE   5008.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   22.76
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.129
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        6.41      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    6.41      SUBAREA RUNOFF(CFS) =   11.24
  EFFECTIVE AREA(ACRES) =    219.78   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      236.6       PEAK FLOW RATE(CFS) =     409.50
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5008.00 TO NODE   5009.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3610.00  DOWNSTREAM(FEET) =   3540.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1439.00   CHANNEL SLOPE =  0.0483
  SLOPE ADJUSTMENT CURVE USED:
```

```
  EFFECTIVE SLOPE = .0483 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     409.50
  FLOW VELOCITY(FEET/SEC) =   9.12 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.63   Tc(MIN.) =   25.39
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5009.00 =    8490.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5009.00 TO NODE   5009.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   25.39
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.972
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        9.10      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    9.10      SUBAREA RUNOFF(CFS) =   14.68
  EFFECTIVE AREA(ACRES) =    228.88   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      245.7       PEAK FLOW RATE(CFS) =     409.50
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5009.00 TO NODE   5009.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5360.00 TO NODE   5361.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   868.00
  ELEVATION DATA: UPSTREAM(FEET) =   3687.40  DOWNSTREAM(FEET) =   3638.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.965
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.996
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        4.43      0.18     1.000    91   13.97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     11.23
  TOTAL AREA(ACRES) =      4.43   PEAK FLOW RATE(CFS) =     11.23

****************************************************************************
  FLOW PROCESS FROM NODE   5361.00 TO NODE   5362.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3638.30  DOWNSTREAM(FEET) =   3565.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1354.00   CHANNEL SLOPE =  0.0535
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0535 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      11.23
  FLOW VELOCITY(FEET/SEC) =   2.90 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.78   Tc(MIN.) =   21.75
  LONGEST FLOWPATH FROM NODE   5360.00 TO NODE   5362.00 =    2222.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5362.00 TO NODE   5362.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.75
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.197
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        9.66      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    9.66      SUBAREA RUNOFF(CFS) =   17.54
  EFFECTIVE AREA(ACRES) =     14.09   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       14.1       PEAK FLOW RATE(CFS) =      25.58

****************************************************************************
  FLOW PROCESS FROM NODE   5362.00 TO NODE   5009.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3565.80  DOWNSTREAM(FEET) =   3540.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   628.00   CHANNEL SLOPE =  0.0403
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0403 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      25.58
  FLOW VELOCITY(FEET/SEC) =   3.31 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
  TRAVEL TIME(MIN.) =   3.16   Tc(MIN.) =   24.91
  LONGEST FLOWPATH FROM NODE   5360.00 TO NODE   5009.00 =    2850.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5009.00 TO NODE   5009.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   24.91
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.998
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        4.35      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.35      SUBAREA RUNOFF(CFS) =    7.12
  EFFECTIVE AREA(ACRES) =     18.44   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       18.4       PEAK FLOW RATE(CFS) =      30.17

****************************************************************************
  FLOW PROCESS FROM NODE   5009.00 TO NODE   5009.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       30.17   24.91    1.998  0.18( 0.18) 1.00      18.4    5360.00
  LONGEST FLOWPATH FROM NODE   5360.00 TO NODE   5009.00 =    2850.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      409.50   25.39    1.972  0.18( 0.18) 1.00     228.9    5200.00
      2      406.50   26.43    1.917  0.18( 0.18) 1.00     235.5    5340.00
      3      403.59   26.83    1.897  0.18( 0.18) 1.00     237.1    5240.00
      4      401.73   27.06    1.886  0.18( 0.18) 1.00     237.8    5230.00
      5      377.04   29.98    1.755  0.18( 0.18) 1.00     244.5    5100.00
      6      366.78   31.08    1.712  0.18( 0.18) 1.00     245.7    5000.00
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5009.00 =    8490.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      437.89   24.91    1.998  0.18( 0.18) 1.00     243.0    5360.00
      2      439.24   25.39    1.972  0.18( 0.18) 1.00     247.3    5200.00
```

```
      3      435.33   26.43    1.917  0.18( 0.18) 1.00     253.9    5340.00
      4      432.09   26.83    1.897  0.18( 0.18) 1.00     255.5    5240.00
      5      430.03   27.06    1.886  0.18( 0.18) 1.00     256.2    5230.00
      6      403.18   29.98    1.755  0.18( 0.18) 1.00     263.0    5100.00
      7      392.20   31.08    1.712  0.18( 0.18) 1.00     264.1    5000.00
    TOTAL AREA(ACRES) =       264.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      439.24  Tc(MIN.) =   25.389
  EFFECTIVE AREA(ACRES) =    247.32  AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      264.1
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5009.00 =    8490.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5009.00 TO NODE   5010.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3540.50  DOWNSTREAM(FEET) =   3480.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1063.00   CHANNEL SLOPE =  0.0568
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0568 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     439.24
  FLOW VELOCITY(FEET/SEC) =  10.13 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.75   Tc(MIN.) =   27.14
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5010.00 =    9553.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5010.00 TO NODE   5010.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5010.00 TO NODE   5010.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.14
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.882
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       10.80      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   10.80      SUBAREA RUNOFF(CFS) =   16.54
```

```
  EFFECTIVE AREA(ACRES) =    258.12   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      274.9       PEAK FLOW RATE(CFS) =     439.24
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5010.00 TO NODE   5010.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5370.00 TO NODE   5371.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   879.00
  ELEVATION DATA: UPSTREAM(FEET) =   3601.50  DOWNSTREAM(FEET) =   3541.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.518
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.065
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        6.19      0.18     1.000    91   13.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     16.07
  TOTAL AREA(ACRES) =      6.19   PEAK FLOW RATE(CFS) =     16.07

****************************************************************************
  FLOW PROCESS FROM NODE   5371.00 TO NODE   5010.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3541.50  DOWNSTREAM(FEET) =   3480.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   911.00   CHANNEL SLOPE =  0.0674
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0674 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      16.07
  FLOW VELOCITY(FEET/SEC) =   3.67 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.14   Tc(MIN.) =   17.66
  LONGEST FLOWPATH FROM NODE   5370.00 TO NODE   5010.00 =    1790.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5010.00 TO NODE   5010.00 IS CODE =  81
```

```
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.66
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.542
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       10.37      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   10.37      SUBAREA RUNOFF(CFS) =   22.05
  EFFECTIVE AREA(ACRES) =     16.56   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       16.6       PEAK FLOW RATE(CFS) =      35.21

****************************************************************************
  FLOW PROCESS FROM NODE   5010.00 TO NODE   5010.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       35.21   17.66    2.542  0.18( 0.18) 1.00      16.6    5370.00
  LONGEST FLOWPATH FROM NODE   5370.00 TO NODE   5010.00 =    1790.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      437.89   26.66    1.905  0.18( 0.18) 1.00     253.8    5360.00
      2      439.24   27.14    1.882  0.18( 0.18) 1.00     258.1    5200.00
      3      435.33   28.18    1.833  0.18( 0.18) 1.00     264.7    5340.00
      4      432.09   28.59    1.815  0.18( 0.18) 1.00     266.3    5240.00
      5      430.03   28.83    1.804  0.18( 0.18) 1.00     267.0    5230.00
      6      403.18   31.78    1.685  0.18( 0.18) 1.00     273.8    5100.00
      7      392.20   32.89    1.645  0.18( 0.18) 1.00     274.9    5000.00
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5010.00 =    9553.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      432.31   17.66    2.542  0.18( 0.18) 1.00     184.7    5370.00
      2      463.61   26.66    1.905  0.18( 0.18) 1.00     270.4    5360.00
      3      464.61   27.14    1.882  0.18( 0.18) 1.00     274.7    5200.00
      4      459.97   28.18    1.833  0.18( 0.18) 1.00     281.3    5340.00
      5      456.45   28.59    1.815  0.18( 0.18) 1.00     282.9    5240.00
      6      454.24   28.83    1.804  0.18( 0.18) 1.00     283.6    5230.00
```

```
      7      425.62   31.78    1.685  0.18( 0.18) 1.00     290.3    5100.00
      8      414.04   32.89    1.645  0.18( 0.18) 1.00     291.5    5000.00
    TOTAL AREA(ACRES) =       291.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      464.61  Tc(MIN.) =   27.139
  EFFECTIVE AREA(ACRES) =    274.68  AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      291.5
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5010.00 =    9553.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5010.00 TO NODE   5010.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5010.00 TO NODE   5010.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.14
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.882
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       15.18      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   15.18      SUBAREA RUNOFF(CFS) =   23.25
  EFFECTIVE AREA(ACRES) =    289.86   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      306.6       PEAK FLOW RATE(CFS) =     464.61
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5010.00 TO NODE   5011.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3480.10  DOWNSTREAM(FEET) =   3397.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1630.00   CHANNEL SLOPE =  0.0507
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0507 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     464.61
  FLOW VELOCITY(FEET/SEC) =   9.75 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.79   Tc(MIN.) =   29.93
```

```
 LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5011.00 =   11183.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5011.00 TO NODE   5011.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   29.93
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.758
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL DESERT COVER
 "DESERT BRUSH"   (30.0%)   D       39.04      0.18     1.000    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   39.04      SUBAREA RUNOFF(CFS) =   55.43
 EFFECTIVE AREA(ACRES) =    328.90   AREA-AVERAGED Fm(INCH/HR) =  0.18
 AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      345.7       PEAK FLOW RATE(CFS) =     466.97

****************************************************************************
 FLOW PROCESS FROM NODE   5011.00 TO NODE   5012.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   3397.40  DOWNSTREAM(FEET) =   3341.30
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1974.00   CHANNEL SLOPE =  0.0284
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0284 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =     466.97
 FLOW VELOCITY(FEET/SEC) =   7.31 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   4.50   Tc(MIN.) =   34.43
 LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5012.00 =   13157.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5012.00 TO NODE   5012.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   34.43
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.593
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED              -       18.59      0.44     1.000     -
 NATURAL DESERT COVER
 "DESERT BRUSH"   (30.0%)   B       12.22      0.34     1.000    82
 NATURAL DESERT COVER
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```
  "DESERT BRUSH"   (30.0%)   D       33.09      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   63.90      SUBAREA RUNOFF(CFS) =   75.13
  EFFECTIVE AREA(ACRES) =    392.80   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      409.6       PEAK FLOW RATE(CFS) =     493.49

****************************************************************************
  FLOW PROCESS FROM NODE   5012.00 TO NODE   5013.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3341.30  DOWNSTREAM(FEET) =   3261.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2368.00   CHANNEL SLOPE =  0.0337
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0337 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     493.49
  FLOW VELOCITY(FEET/SEC) =   8.11 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.87   Tc(MIN.) =   39.29
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5013.00 =   15525.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5013.00 TO NODE   5013.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   39.29
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.453
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       11.90      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B       44.78      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.36
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   56.68      SUBAREA RUNOFF(CFS) =   55.52
  EFFECTIVE AREA(ACRES) =    449.48   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      466.3       PEAK FLOW RATE(CFS) =     499.22

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      494.55   29.95    1.757  0.23( 0.23) 1.00     359.5    5370.00
      2      499.24   38.82    1.465  0.22( 0.22) 1.00     445.2    5360.00
      3      499.22   39.29    1.453  0.22( 0.22) 1.00     449.5    5200.00
      4      495.65   40.37    1.425  0.22( 0.22) 1.00     456.1    5340.00
```

```
      5      493.01   40.80    1.415  0.22( 0.22) 1.00     457.7    5240.00
      6      491.32   41.05    1.409  0.22( 0.22) 1.00     458.4    5230.00
      7      468.84   44.22    1.337  0.22( 0.22) 1.00     465.1    5100.00
      8      459.51   45.44    1.312  0.22( 0.22) 1.00     466.3    5000.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =     499.24  Tc(MIN.) =   38.82
  AREA-AVERAGED Fm(INCH/HR) =  0.22  AREA-AVERAGED Fp(INCH/HR) =  0.22
  AREA-AVERAGED Ap =  1.00  EFFECTIVE AREA(ACRES) =     445.18

****************************************************************************
  FLOW PROCESS FROM NODE   5013.00 TO NODE   5013.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5500.00 TO NODE   5501.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   737.00
  ELEVATION DATA: UPSTREAM(FEET) =   3782.70  DOWNSTREAM(FEET) =   3681.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.944
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.554
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        9.15      0.18     1.000    91   10.94
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     27.78
  TOTAL AREA(ACRES) =      9.15   PEAK FLOW RATE(CFS) =     27.78

****************************************************************************
  FLOW PROCESS FROM NODE   5501.00 TO NODE   5502.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3681.00  DOWNSTREAM(FEET) =   3638.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   514.00   CHANNEL SLOPE =  0.0821
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0821 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      27.78
  FLOW VELOCITY(FEET/SEC) =   4.85 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.76   Tc(MIN.) =   12.71
```

```
 LONGEST FLOWPATH FROM NODE   5500.00 TO NODE   5502.00 =    1251.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5502.00 TO NODE   5502.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.71
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.201
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL DESERT COVER
 "DESERT BRUSH"   (30.0%)   D       11.74      0.18     1.000    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   11.74      SUBAREA RUNOFF(CFS) =   31.92
 EFFECTIVE AREA(ACRES) =     20.89   AREA-AVERAGED Fm(INCH/HR) =  0.18
 AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       20.9       PEAK FLOW RATE(CFS) =      56.79

****************************************************************************
 FLOW PROCESS FROM NODE   5502.00 TO NODE   5503.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   3638.80  DOWNSTREAM(FEET) =   3519.70
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1774.00   CHANNEL SLOPE =  0.0671
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0671 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =      56.79
 FLOW VELOCITY(FEET/SEC) =   5.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   5.31   Tc(MIN.) =   18.02
 LONGEST FLOWPATH FROM NODE   5500.00 TO NODE   5503.00 =    3025.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5503.00 TO NODE   5503.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.02
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.507
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL DESERT COVER
 "DESERT BRUSH"   (30.0%)   D       23.66      0.18     1.000    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
```

```
  SUBAREA AREA(ACRES) =   23.66      SUBAREA RUNOFF(CFS) =   49.55
  EFFECTIVE AREA(ACRES) =     44.55   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       44.5       PEAK FLOW RATE(CFS) =      93.30

****************************************************************************
  FLOW PROCESS FROM NODE   5503.00 TO NODE   5503.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5550.00 TO NODE   5551.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1533.00
  ELEVATION DATA: UPSTREAM(FEET) =   3940.20  DOWNSTREAM(FEET) =   3559.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.039
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.144
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       11.37      0.18     1.000    91   13.04
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     30.33
  TOTAL AREA(ACRES) =     11.37   PEAK FLOW RATE(CFS) =     30.33

****************************************************************************
  FLOW PROCESS FROM NODE   5551.00 TO NODE   5503.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3559.00  DOWNSTREAM(FEET) =   3519.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   712.00   CHANNEL SLOPE =  0.0552
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0552 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      30.33
  FLOW VELOCITY(FEET/SEC) =   4.10 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.90   Tc(MIN.) =   15.93
  LONGEST FLOWPATH FROM NODE   5550.00 TO NODE   5503.00 =    2245.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5503.00 TO NODE   5503.00 IS CODE =  81
```

```
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   15.93
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.732
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        4.00      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.00      SUBAREA RUNOFF(CFS) =    9.19
  EFFECTIVE AREA(ACRES) =     15.37   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       15.4       PEAK FLOW RATE(CFS) =      35.30

************************************************************************
  FLOW PROCESS FROM NODE   5503.00 TO NODE   5503.00 IS CODE =  11
------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
========================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       35.30   15.93    2.732  0.18( 0.18) 1.00      15.4    5550.00
  LONGEST FLOWPATH FROM NODE   5550.00 TO NODE   5503.00 =    2245.00 FEET.

  ** MEMORY BANK #  3 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       93.30   18.02    2.507  0.18( 0.18) 1.00      44.5    5500.00
  LONGEST FLOWPATH FROM NODE   5500.00 TO NODE   5503.00 =    3025.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      125.80   15.93    2.732  0.18( 0.18) 1.00      54.8    5550.00
      2      125.49   18.02    2.507  0.18( 0.18) 1.00      59.9    5500.00
    TOTAL AREA(ACRES) =        59.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      125.80  Tc(MIN.) =   15.935
  EFFECTIVE AREA(ACRES) =     54.77  AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       59.9
  LONGEST FLOWPATH FROM NODE   5500.00 TO NODE   5503.00 =    3025.00 FEET.

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

```
  FLOW PROCESS FROM NODE   5503.00 TO NODE   5503.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5503.00 TO NODE   5504.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3519.70  DOWNSTREAM(FEET) =   3482.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   605.00   CHANNEL SLOPE =  0.0608
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0608 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     125.80
  FLOW VELOCITY(FEET/SEC) =   6.91 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.46   Tc(MIN.) =   17.39
  LONGEST FLOWPATH FROM NODE   5500.00 TO NODE   5504.00 =    3630.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5504.00 TO NODE   5504.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.39
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.569
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       30.48      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   30.48      SUBAREA RUNOFF(CFS) =   65.55
  EFFECTIVE AREA(ACRES) =     85.25   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       90.4       PEAK FLOW RATE(CFS) =     183.34

****************************************************************************
  FLOW PROCESS FROM NODE   5504.00 TO NODE   5505.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3482.90  DOWNSTREAM(FEET) =   3406.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1762.00   CHANNEL SLOPE =  0.0432
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0432 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     183.34
```

```
  FLOW VELOCITY(FEET/SEC) =   6.60 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.45   Tc(MIN.) =   21.84
  LONGEST FLOWPATH FROM NODE   5500.00 TO NODE   5505.00 =    5392.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5505.00 TO NODE   5505.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.84
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.191
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        6.62      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        7.17      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   13.79      SUBAREA RUNOFF(CFS) =   23.41
  EFFECTIVE AREA(ACRES) =     99.04   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      104.2       PEAK FLOW RATE(CFS) =     183.34
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5505.00 TO NODE   5506.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3406.70  DOWNSTREAM(FEET) =   3402.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =    78.00   CHANNEL SLOPE =  0.0526
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0526 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     183.34
  FLOW VELOCITY(FEET/SEC) =   7.28 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.18   Tc(MIN.) =   22.02
  LONGEST FLOWPATH FROM NODE   5500.00 TO NODE   5506.00 =    5470.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5506.00 TO NODE   5506.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   22.02
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.179
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  USER-DEFINED                -        1.72      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.72      SUBAREA RUNOFF(CFS) =    2.69
  EFFECTIVE AREA(ACRES) =    100.76   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      105.9       PEAK FLOW RATE(CFS) =     183.34
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5506.00 TO NODE   5506.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   22.02
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.179
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.54      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       14.51      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.19
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   15.05      SUBAREA RUNOFF(CFS) =   26.94
  EFFECTIVE AREA(ACRES) =    115.81   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      121.0       PEAK FLOW RATE(CFS) =     206.23

****************************************************************************
  FLOW PROCESS FROM NODE   5506.00 TO NODE   5506.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   22.02
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.179
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        0.72      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       11.59      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   12.31      SUBAREA RUNOFF(CFS) =   21.97
  EFFECTIVE AREA(ACRES) =    128.12   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      133.3       PEAK FLOW RATE(CFS) =     228.20

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

```
  FLOW PROCESS FROM NODE   5506.00 TO NODE   5507.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3402.60  DOWNSTREAM(FEET) =   3366.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   973.00   CHANNEL SLOPE =  0.0376
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0376 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     228.20
  FLOW VELOCITY(FEET/SEC) =   6.63 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.45   Tc(MIN.) =   24.47
  LONGEST FLOWPATH FROM NODE   5500.00 TO NODE   5507.00 =    6443.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5507.00 TO NODE   5507.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   24.47
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.024
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       27.90      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.73      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   28.63      SUBAREA RUNOFF(CFS) =   40.86
  EFFECTIVE AREA(ACRES) =    156.75   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      161.9       PEAK FLOW RATE(CFS) =     251.20

****************************************************************************
  FLOW PROCESS FROM NODE   5507.00 TO NODE   5507.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5540.00 TO NODE   5541.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1255.00
  ELEVATION DATA: UPSTREAM(FEET) =   3873.90  DOWNSTREAM(FEET) =   3664.90

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
```

```
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.041
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.143
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        8.22      0.18     1.000    91   13.04
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     21.92
  TOTAL AREA(ACRES) =      8.22   PEAK FLOW RATE(CFS) =     21.92

****************************************************************************
  FLOW PROCESS FROM NODE   5541.00 TO NODE   5542.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3664.90  DOWNSTREAM(FEET) =   3596.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   791.00   CHANNEL SLOPE =  0.0871
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0871 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      21.92
  FLOW VELOCITY(FEET/SEC) =   4.62 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.85   Tc(MIN.) =   15.89
  LONGEST FLOWPATH FROM NODE   5540.00 TO NODE   5542.00 =    2046.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5542.00 TO NODE   5542.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.89
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.737
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       12.39      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   12.39      SUBAREA RUNOFF(CFS) =   28.51
  EFFECTIVE AREA(ACRES) =     20.61   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       20.6       PEAK FLOW RATE(CFS) =      47.43

****************************************************************************
  FLOW PROCESS FROM NODE   5542.00 TO NODE   5543.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
```

```
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3596.00  DOWNSTREAM(FEET) =   3482.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2024.00   CHANNEL SLOPE =  0.0562
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0562 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      47.43
  FLOW VELOCITY(FEET/SEC) =   4.80 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.03   Tc(MIN.) =   22.92
  LONGEST FLOWPATH FROM NODE   5540.00 TO NODE   5543.00 =    4070.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5543.00 TO NODE   5543.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   22.92
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.118
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       18.61      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   18.61      SUBAREA RUNOFF(CFS) =   32.46
  EFFECTIVE AREA(ACRES) =     39.22   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       39.2       PEAK FLOW RATE(CFS) =      68.41

****************************************************************************
  FLOW PROCESS FROM NODE   5543.00 TO NODE   5543.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   22.92
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.118
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       16.49      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   16.49      SUBAREA RUNOFF(CFS) =   28.76
  EFFECTIVE AREA(ACRES) =     55.71   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       55.7       PEAK FLOW RATE(CFS) =      97.17

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

```
  FLOW PROCESS FROM NODE   5543.00 TO NODE   5544.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3482.30  DOWNSTREAM(FEET) =   3471.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   431.00   CHANNEL SLOPE =  0.0241
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0241 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      97.17
  FLOW VELOCITY(FEET/SEC) =   3.99 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.80   Tc(MIN.) =   24.72
  LONGEST FLOWPATH FROM NODE   5540.00 TO NODE   5544.00 =    4501.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5544.00 TO NODE   5544.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   24.72
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.009
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        0.01      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        2.27      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.28      SUBAREA RUNOFF(CFS) =    3.75
  EFFECTIVE AREA(ACRES) =     57.99   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       58.0       PEAK FLOW RATE(CFS) =      97.17
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5544.00 TO NODE   5544.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   24.72
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.009
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        4.01      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       63.69      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
```

```
  SUBAREA AREA(ACRES) =   67.70      SUBAREA RUNOFF(CFS) =  110.50
  EFFECTIVE AREA(ACRES) =    125.69   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.19  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      125.7       PEAK FLOW RATE(CFS) =     205.94

****************************************************************************
  FLOW PROCESS FROM NODE   5544.00 TO NODE   5507.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3471.90  DOWNSTREAM(FEET) =   3366.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2321.00   CHANNEL SLOPE =  0.0456
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0456 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     205.94
  FLOW VELOCITY(FEET/SEC) =   7.05 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.49   Tc(MIN.) =   30.21
  LONGEST FLOWPATH FROM NODE   5540.00 TO NODE   5507.00 =    6822.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5507.00 TO NODE   5507.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   30.21
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.746
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       18.84      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        8.14      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.36
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   26.98      SUBAREA RUNOFF(CFS) =   33.61
  EFFECTIVE AREA(ACRES) =    152.67   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      152.7       PEAK FLOW RATE(CFS) =     209.81

****************************************************************************
  FLOW PROCESS FROM NODE   5507.00 TO NODE   5507.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      209.81   30.21    1.746  0.22( 0.22) 1.00     152.7    5540.00
```

```
  LONGEST FLOWPATH FROM NODE   5540.00 TO NODE   5507.00 =    6822.00 FEET.

  ** MEMORY BANK #  3 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      251.20   24.47    2.024  0.24( 0.24) 1.00     156.8    5550.00
      2      242.86   26.62    1.908  0.24( 0.24) 1.00     161.9    5500.00
  LONGEST FLOWPATH FROM NODE   5500.00 TO NODE   5507.00 =    6443.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      452.03   24.47    2.024  0.23( 0.23) 1.00     280.4    5550.00
      2      447.31   26.62    1.908  0.23( 0.23) 1.00     296.4    5500.00
      3      429.10   30.21    1.746  0.23( 0.23) 1.00     314.6    5540.00
    TOTAL AREA(ACRES) =       314.6

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      452.03  Tc(MIN.) =   24.467
  EFFECTIVE AREA(ACRES) =    280.40  AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      314.6
  LONGEST FLOWPATH FROM NODE   5540.00 TO NODE   5507.00 =    6822.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5507.00 TO NODE   5507.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5507.00 TO NODE   5508.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3366.00  DOWNSTREAM(FEET) =   3323.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1133.00   CHANNEL SLOPE =  0.0372
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0372 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     452.03
  FLOW VELOCITY(FEET/SEC) =   8.27 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.28   Tc(MIN.) =   26.75
  LONGEST FLOWPATH FROM NODE   5540.00 TO NODE   5508.00 =    7955.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5508.00 TO NODE   5508.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
  MAINLINE Tc(MIN.) =   26.75
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.901
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       27.90      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.73      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   28.63      SUBAREA RUNOFF(CFS) =   37.71
  EFFECTIVE AREA(ACRES) =    309.03   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      343.2       PEAK FLOW RATE(CFS) =     458.81

****************************************************************************
  FLOW PROCESS FROM NODE   5508.00 TO NODE   5013.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3323.90  DOWNSTREAM(FEET) =   3261.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1718.00   CHANNEL SLOPE =  0.0364
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0364 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     458.81
  FLOW VELOCITY(FEET/SEC) =   8.22 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.48   Tc(MIN.) =   30.23
  LONGEST FLOWPATH FROM NODE   5540.00 TO NODE   5013.00 =    9673.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5013.00 TO NODE   5013.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   30.23
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.745
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        2.95      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B       10.56      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.36
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   13.51      SUBAREA RUNOFF(CFS) =   16.78
  EFFECTIVE AREA(ACRES) =    322.54   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      356.7       PEAK FLOW RATE(CFS) =     458.81
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   5013.00 TO NODE   5013.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      458.81   30.23    1.745  0.26( 0.26) 1.00     322.5    5550.00
      2      453.84   32.41    1.662  0.25( 0.25) 1.00     338.6    5500.00
      3      435.55   36.08    1.542  0.25( 0.25) 1.00     356.7    5540.00
  LONGEST FLOWPATH FROM NODE   5540.00 TO NODE   5013.00 =    9673.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      494.55   29.95    1.757  0.23( 0.23) 1.00     359.5    5370.00
      2      499.24   38.82    1.465  0.22( 0.22) 1.00     445.2    5360.00
      3      499.22   39.29    1.453  0.22( 0.22) 1.00     449.5    5200.00
      4      495.65   40.37    1.425  0.22( 0.22) 1.00     456.1    5340.00
      5      493.01   40.80    1.415  0.22( 0.22) 1.00     457.7    5240.00
      6      491.32   41.05    1.409  0.22( 0.22) 1.00     458.4    5230.00
      7      468.84   44.22    1.337  0.22( 0.22) 1.00     465.1    5100.00
      8      459.51   45.44    1.312  0.22( 0.22) 1.00     466.3    5000.00
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5013.00 =   15525.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      952.57   29.95    1.757  0.24( 0.24) 1.00     678.9    5370.00
      2      953.51   30.23    1.745  0.24( 0.24) 1.00     684.8    5550.00
      3      949.68   32.41    1.662  0.24( 0.24) 1.00     721.8    5500.00
      4      933.34   36.08    1.542  0.24( 0.24) 1.00     775.4    5540.00
      5      908.76   38.82    1.465  0.23( 0.23) 1.00     801.9    5360.00
      6      904.58   39.29    1.453  0.23( 0.23) 1.00     806.2    5200.00
      7      891.82   40.37    1.425  0.23( 0.23) 1.00     812.8    5340.00
      8      885.59   40.80    1.415  0.23( 0.23) 1.00     814.4    5240.00
      9      881.86   41.05    1.409  0.23( 0.23) 1.00     815.1    5230.00
     10      835.23   44.22    1.337  0.23( 0.23) 1.00     821.8    5100.00
     11      817.44   45.44    1.312  0.23( 0.23) 1.00     823.0    5000.00
    TOTAL AREA(ACRES) =       823.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      953.51  Tc(MIN.) =   30.234
  EFFECTIVE AREA(ACRES) =    684.80  AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      823.0
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5013.00 =   15525.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   5013.00 TO NODE   5013.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5013.00 TO NODE   5014.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3261.40  DOWNSTREAM(FEET) =   3215.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1118.00   CHANNEL SLOPE =  0.0411
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0411 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     953.51
  FLOW VELOCITY(FEET/SEC) =  11.15 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.67   Tc(MIN.) =   31.90
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5014.00 =   16643.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5014.00 TO NODE   5014.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   31.90
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.680
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       26.88      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B       11.57      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.41
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   38.45      SUBAREA RUNOFF(CFS) =   43.92
  EFFECTIVE AREA(ACRES) =    723.25   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      861.4       PEAK FLOW RATE(CFS) =     953.51
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5014.00 TO NODE   5015.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3215.40  DOWNSTREAM(FEET) =   3137.80
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2017.00   CHANNEL SLOPE =  0.0385
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0385 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     953.51
  FLOW VELOCITY(FEET/SEC) =  10.79 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.12   Tc(MIN.) =   35.02
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5015.00 =   18660.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5015.00 TO NODE   5015.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   35.02
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.574
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       22.25      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   22.25      SUBAREA RUNOFF(CFS) =   22.71
  EFFECTIVE AREA(ACRES) =    745.50   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      883.7       PEAK FLOW RATE(CFS) =     953.51
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5015.00 TO NODE   5016.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3137.80  DOWNSTREAM(FEET) =   3082.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1618.00   CHANNEL SLOPE =  0.0344
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0344 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     953.51
  FLOW VELOCITY(FEET/SEC) =  10.20 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.64   Tc(MIN.) =   37.66
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5016.00 =   20278.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5016.00 TO NODE   5016.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   37.66
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.496
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       11.60      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   11.60      SUBAREA RUNOFF(CFS) =   11.03
  EFFECTIVE AREA(ACRES) =    757.10   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      895.3       PEAK FLOW RATE(CFS) =     953.51
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5016.00 TO NODE   5016.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5600.00 TO NODE   5601.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   456.00
  ELEVATION DATA: UPSTREAM(FEET) =   3620.20  DOWNSTREAM(FEET) =   3242.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.312
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.224
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        5.85      0.18     1.000    91    6.31
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     26.56
  TOTAL AREA(ACRES) =      5.85   PEAK FLOW RATE(CFS) =     26.56

****************************************************************************
  FLOW PROCESS FROM NODE   5601.00 TO NODE   5602.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3242.80  DOWNSTREAM(FEET) =   3211.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   701.00   CHANNEL SLOPE =  0.0444
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0444 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      26.56
```

```
  FLOW VELOCITY(FEET/SEC) =   3.52 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.32   Tc(MIN.) =    9.64
  LONGEST FLOWPATH FROM NODE   5600.00 TO NODE   5602.00 =    1157.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5602.00 TO NODE   5602.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.64
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.885
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        1.09      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.09      SUBAREA RUNOFF(CFS) =    3.38
  EFFECTIVE AREA(ACRES) =      6.94   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.22  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        6.9       PEAK FLOW RATE(CFS) =      26.56
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5602.00 TO NODE   5602.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.64
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.885
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        3.44      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.44      SUBAREA RUNOFF(CFS) =   10.67
  EFFECTIVE AREA(ACRES) =     10.38   AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       10.4       PEAK FLOW RATE(CFS) =      33.55

****************************************************************************
  FLOW PROCESS FROM NODE   5602.00 TO NODE   5603.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3211.70  DOWNSTREAM(FEET) =   3164.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1125.00   CHANNEL SLOPE =  0.0423
  SLOPE ADJUSTMENT CURVE USED:
```

```
  EFFECTIVE SLOPE = .0423 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      33.55
  FLOW VELOCITY(FEET/SEC) =   3.71 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.05   Tc(MIN.) =   14.69
  LONGEST FLOWPATH FROM NODE   5600.00 TO NODE   5603.00 =    2282.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5603.00 TO NODE   5603.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.892
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        7.86      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    7.86      SUBAREA RUNOFF(CFS) =   17.35
  EFFECTIVE AREA(ACRES) =     18.24   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       18.2       PEAK FLOW RATE(CFS) =      41.63

****************************************************************************
  FLOW PROCESS FROM NODE   5603.00 TO NODE   5604.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3164.10  DOWNSTREAM(FEET) =   3125.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1044.00   CHANNEL SLOPE =  0.0375
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0375 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      41.63
  FLOW VELOCITY(FEET/SEC) =   3.75 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.64   Tc(MIN.) =   19.33
  LONGEST FLOWPATH FROM NODE   5600.00 TO NODE   5604.00 =    3326.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5604.00 TO NODE   5604.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.33
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.387
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        5.09      0.44     1.000     -
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.09      SUBAREA RUNOFF(CFS) =    8.92
  EFFECTIVE AREA(ACRES) =     23.33   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       23.3       PEAK FLOW RATE(CFS) =      42.24

****************************************************************************
  FLOW PROCESS FROM NODE   5604.00 TO NODE   5605.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3125.00  DOWNSTREAM(FEET) =   3101.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   698.00   CHANNEL SLOPE =  0.0341
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0341 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      42.24
  FLOW VELOCITY(FEET/SEC) =   3.60 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.23   Tc(MIN.) =   22.56
  LONGEST FLOWPATH FROM NODE   5600.00 TO NODE   5605.00 =    4024.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5605.00 TO NODE   5605.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   22.56
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.142
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        2.58      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.58      SUBAREA RUNOFF(CFS) =    3.95
  EFFECTIVE AREA(ACRES) =     25.91   AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       25.9       PEAK FLOW RATE(CFS) =      42.24
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5605.00 TO NODE   5605.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   22.56
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.142
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -        6.01      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    6.01      SUBAREA RUNOFF(CFS) =    9.20
  EFFECTIVE AREA(ACRES) =     31.92   AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.39  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       31.9       PEAK FLOW RATE(CFS) =      50.26

****************************************************************************
  FLOW PROCESS FROM NODE   5605.00 TO NODE   5016.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3101.20  DOWNSTREAM(FEET) =   3082.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   599.00   CHANNEL SLOPE =  0.0319
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0319 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      50.26
  FLOW VELOCITY(FEET/SEC) =   3.69 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.71   Tc(MIN.) =   25.27
  LONGEST FLOWPATH FROM NODE   5600.00 TO NODE   5016.00 =    4623.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5016.00 TO NODE   5016.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   25.27
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.978
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -        2.30      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.30      SUBAREA RUNOFF(CFS) =    3.18
  EFFECTIVE AREA(ACRES) =     34.22   AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       34.2       PEAK FLOW RATE(CFS) =      50.26
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5016.00 TO NODE   5016.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
```

```
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1       50.26   25.27    1.978  0.40( 0.40) 1.00      34.2    5600.00
LONGEST FLOWPATH FROM NODE   5600.00 TO NODE   5016.00 =    4623.00 FEET.

** MEMORY BANK #  2 CONFLUENCE DATA **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1      952.57   37.38    1.504  0.26( 0.26) 1.00     751.2    5370.00
    2      953.51   37.66    1.496  0.26( 0.26) 1.00     757.1    5550.00
    3      949.68   39.84    1.438  0.26( 0.26) 1.00     794.1    5500.00
    4      933.34   43.56    1.351  0.25( 0.25) 1.00     847.7    5540.00
    5      908.76   46.37    1.294  0.25( 0.25) 1.00     874.2    5360.00
    6      904.58   46.85    1.284  0.25( 0.25) 1.00     878.5    5200.00
    7      891.82   47.96    1.263  0.25( 0.25) 1.00     885.1    5340.00
    8      885.59   48.42    1.255  0.25( 0.25) 1.00     886.7    5240.00
    9      881.86   48.68    1.250  0.25( 0.25) 1.00     887.4    5230.00
   10      835.23   51.99    1.194  0.25( 0.25) 1.00     894.1    5100.00
   11      817.44   53.26    1.174  0.25( 0.25) 1.00     895.3    5000.00
LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5016.00 =   20278.00 FEET.

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1      939.49   25.27    1.978  0.27( 0.27) 1.00     542.1    5600.00
    2      987.77   37.38    1.504  0.26( 0.26) 1.00     785.5    5370.00
    3      988.46   37.66    1.496  0.26( 0.26) 1.00     791.3    5550.00
    4      982.79   39.84    1.438  0.26( 0.26) 1.00     828.3    5500.00
    5      963.69   43.56    1.351  0.26( 0.26) 1.00     881.9    5540.00
    6      937.27   46.37    1.294  0.25( 0.25) 1.00     908.4    5360.00
    7      932.79   46.85    1.284  0.25( 0.25) 1.00     912.7    5200.00
    8      919.37   47.96    1.263  0.25( 0.25) 1.00     919.3    5340.00
    9      912.87   48.42    1.255  0.25( 0.25) 1.00     920.9    5240.00
   10      909.00   48.68    1.250  0.25( 0.25) 1.00     921.6    5230.00
   11      860.58   51.99    1.194  0.25( 0.25) 1.00     928.4    5100.00
   12      842.15   53.26    1.174  0.25( 0.25) 1.00     929.5    5000.00
  TOTAL AREA(ACRES) =       929.5

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      988.46  Tc(MIN.) =   37.664
 EFFECTIVE AREA(ACRES) =    791.32  AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      929.5
 LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5016.00 =   20278.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5016.00 TO NODE   5016.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   5016.00 TO NODE   5017.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3082.10  DOWNSTREAM(FEET) =   3040.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1260.00   CHANNEL SLOPE =  0.0329
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0329 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     988.46
  FLOW VELOCITY(FEET/SEC) =  10.10 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.08   Tc(MIN.) =   39.74
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5017.00 =   21538.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5017.00 TO NODE   5017.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   39.74
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.441
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       18.40      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   18.40      SUBAREA RUNOFF(CFS) =   16.57
  EFFECTIVE AREA(ACRES) =    809.72   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      947.9       PEAK FLOW RATE(CFS) =     988.46
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5017.00 TO NODE   5018.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3040.60  DOWNSTREAM(FEET) =   3012.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1072.00   CHANNEL SLOPE =  0.0266
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0266 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     988.46
  FLOW VELOCITY(FEET/SEC) =   9.07 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.97   Tc(MIN.) =   41.71
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5018.00 =   22610.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   5018.00 TO NODE   5018.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   41.71
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.393
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        4.04      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        2.92      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    6.96      SUBAREA RUNOFF(CFS) =    6.22
  EFFECTIVE AREA(ACRES) =    816.68   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      954.9       PEAK FLOW RATE(CFS) =     988.46
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5018.00 TO NODE   5018.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5700.00 TO NODE   5701.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   613.00
  ELEVATION DATA: UPSTREAM(FEET) =   3198.30  DOWNSTREAM(FEET) =   3169.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.620
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.217
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  USER-DEFINED               -        1.60      0.44     1.000     -   12.62
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      4.00
  TOTAL AREA(ACRES) =      1.60   PEAK FLOW RATE(CFS) =      4.00

****************************************************************************
  FLOW PROCESS FROM NODE   5701.00 TO NODE   5702.00 IS CODE =  53
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3169.60  DOWNSTREAM(FEET) =   3146.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   572.00   CHANNEL SLOPE =  0.0400
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0400 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       4.00
  FLOW VELOCITY(FEET/SEC) =   1.78 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.36   Tc(MIN.) =   17.98
  LONGEST FLOWPATH FROM NODE   5700.00 TO NODE   5702.00 =    1185.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5702.00 TO NODE   5702.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.98
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.510
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        2.19      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.19      SUBAREA RUNOFF(CFS) =    4.08
  EFFECTIVE AREA(ACRES) =      3.79   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.8       PEAK FLOW RATE(CFS) =       7.06

****************************************************************************
  FLOW PROCESS FROM NODE   5702.00 TO NODE   5702.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.98
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.510
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        3.46      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.46      SUBAREA RUNOFF(CFS) =    6.45
  EFFECTIVE AREA(ACRES) =      7.25   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        7.2       PEAK FLOW RATE(CFS) =      13.51

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

```
 FLOW PROCESS FROM NODE   5702.00 TO NODE   5703.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   3146.70  DOWNSTREAM(FEET) =   3116.90
 CHANNEL LENGTH THRU SUBAREA(FEET) =   781.00   CHANNEL SLOPE =  0.0382
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0382 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =      13.51
 FLOW VELOCITY(FEET/SEC) =   2.60 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   5.00   Tc(MIN.) =   22.98
 LONGEST FLOWPATH FROM NODE   5700.00 TO NODE   5703.00 =    1966.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5703.00 TO NODE   5703.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   22.98
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.114
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        7.75      0.44     1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    7.75      SUBAREA RUNOFF(CFS) =   11.68
 EFFECTIVE AREA(ACRES) =     15.00   AREA-AVERAGED Fm(INCH/HR) =  0.44
 AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       15.0       PEAK FLOW RATE(CFS) =      22.60

****************************************************************************
 FLOW PROCESS FROM NODE   5703.00 TO NODE   5704.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   3116.90  DOWNSTREAM(FEET) =   3071.10
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1259.00   CHANNEL SLOPE =  0.0364
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0364 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =      22.60
 FLOW VELOCITY(FEET/SEC) =   3.02 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   6.96   Tc(MIN.) =   29.94
 LONGEST FLOWPATH FROM NODE   5700.00 TO NODE   5704.00 =    3225.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5704.00 TO NODE   5704.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   29.94
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.757
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        6.04      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    6.04      SUBAREA RUNOFF(CFS) =    7.16
  EFFECTIVE AREA(ACRES) =     21.04   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       21.0       PEAK FLOW RATE(CFS) =      24.94

********************************************************************************
  FLOW PROCESS FROM NODE   5704.00 TO NODE   5018.00 IS CODE =  53
--------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3071.10  DOWNSTREAM(FEET) =   3012.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1836.00   CHANNEL SLOPE =  0.0321
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0321 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      24.94
  FLOW VELOCITY(FEET/SEC) =   2.93 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  10.44   Tc(MIN.) =   40.38
  LONGEST FLOWPATH FROM NODE   5700.00 TO NODE   5018.00 =    5061.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE   5018.00 TO NODE   5018.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   40.38
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.425
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       10.73      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        3.49      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   14.22      SUBAREA RUNOFF(CFS) =   12.90
  EFFECTIVE AREA(ACRES) =     35.26   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       35.3       PEAK FLOW RATE(CFS) =      31.55
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   5018.00 TO NODE   5018.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       31.55   40.38    1.425  0.43( 0.43) 1.00      35.3    5700.00
  LONGEST FLOWPATH FROM NODE   5700.00 TO NODE   5018.00 =    5061.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      939.49   29.39    1.780  0.27( 0.27) 1.00     567.5    5600.00
      2      987.77   41.43    1.400  0.27( 0.27) 1.00     810.8    5370.00
      3      988.46   41.71    1.393  0.27( 0.27) 1.00     816.7    5550.00
      4      982.79   43.90    1.344  0.27( 0.27) 1.00     853.7    5500.00
      5      963.69   47.64    1.269  0.26( 0.26) 1.00     907.3    5540.00
      6      937.27   50.49    1.219  0.26( 0.26) 1.00     933.8    5360.00
      7      932.79   50.98    1.210  0.26( 0.26) 1.00     938.1    5200.00
      8      919.37   52.11    1.192  0.26( 0.26) 1.00     944.7    5340.00
      9      912.87   52.57    1.185  0.26( 0.26) 1.00     946.3    5240.00
     10      909.00   52.84    1.180  0.26( 0.26) 1.00     947.0    5230.00
     11      860.58   56.23    1.130  0.26( 0.26) 1.00     953.7    5100.00
     12      842.15   57.53    1.112  0.26( 0.26) 1.00     954.9    5000.00
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5018.00 =   22610.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      970.65   29.39    1.780  0.28( 0.28) 1.00     593.1    5600.00
      2     1015.14   40.38    1.425  0.28( 0.28) 1.00     825.0    5700.00
      3     1018.52   41.43    1.400  0.28( 0.28) 1.00     846.1    5370.00
      4     1019.00   41.71    1.393  0.28( 0.28) 1.00     851.9    5550.00
      5     1011.78   43.90    1.344  0.27( 0.27) 1.00     888.9    5500.00
      6      990.30   47.64    1.269  0.27( 0.27) 1.00     942.5    5540.00
      7      962.28   50.49    1.219  0.27( 0.27) 1.00     969.0    5360.00
      8      957.54   50.98    1.210  0.27( 0.27) 1.00     973.3    5200.00
      9      943.53   52.11    1.192  0.26( 0.26) 1.00     979.9    5340.00
     10      936.80   52.57    1.185  0.26( 0.26) 1.00     981.5    5240.00
     11      932.80   52.84    1.180  0.26( 0.26) 1.00     982.2    5230.00
     12      882.78   56.23    1.130  0.26( 0.26) 1.00     989.0    5100.00
     13      863.79   57.53    1.112  0.26( 0.26) 1.00     990.1    5000.00
    TOTAL AREA(ACRES) =       990.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     1019.00  Tc(MIN.) =   41.712
  EFFECTIVE AREA(ACRES) =    851.94  AREA-AVERAGED Fm(INCH/HR) =  0.28
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      990.1
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5018.00 =   22610.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5018.00 TO NODE   5018.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5018.00 TO NODE   5018.50 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3012.10  DOWNSTREAM(FEET) =   3000.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   384.00   CHANNEL SLOPE =  0.0302
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0302 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    1019.00
  FLOW VELOCITY(FEET/SEC) =   9.77 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.65   Tc(MIN.) =   42.37
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5018.50 =   22994.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5018.50 TO NODE   5018.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   42.37
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.378
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        0.11      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        2.27      0.34     1.000    82
  COMMERCIAL                 B        4.47      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.41
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.413
  SUBAREA AREA(ACRES) =    6.85      SUBAREA RUNOFF(CFS) =    7.45
  EFFECTIVE AREA(ACRES) =    858.79   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      997.0       PEAK FLOW RATE(CFS) =    1019.00
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5018.50 TO NODE   5019.00 IS CODE =  37
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE CULVERT TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED CULVERT SIZE<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3000.50  DOWNSTREAM(FEET) =  2998.80
  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) =  10.50
  NUMBER OF BARREL(S) =   1
  CULVERT-FLOW VELOCITY(FEET/SEC.) =  11.77
  CULVERT-FLOW(CFS) =    1019.00
  CULVERT-FLOW TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   42.72
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5019.00 =   23244.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5019.00 TO NODE   5020.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2998.80  DOWNSTREAM(FEET) =   2954.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1589.00   CHANNEL SLOPE =  0.0281
  CHANNEL FLOW THRU SUBAREA(CFS) =    1019.00
  FLOW VELOCITY(FEET/SEC) =  16.54 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.60   Tc(MIN.) =   44.32
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5020.00 =   24833.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5020.00 TO NODE   5020.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   44.32
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.335
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        2.16      0.75     0.100    56
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        8.47      0.34     1.000    82
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        1.00      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.833
  SUBAREA AREA(ACRES) =   11.63      SUBAREA RUNOFF(CFS) =   11.04
  EFFECTIVE AREA(ACRES) =    870.42   AREA-AVERAGED Fm(INCH/HR) =  0.28
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =     1008.6       PEAK FLOW RATE(CFS) =    1019.00
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5020.00 TO NODE   5020.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5800.00 TO NODE   5801.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1000.00
  ELEVATION DATA: UPSTREAM(FEET) =   2999.30  DOWNSTREAM(FEET) =   2973.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.020
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.780
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.20      0.34     1.000    82   17.31
  COMMERCIAL                 B        0.62      0.75     0.100    56   10.02
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        0.66      0.18     1.000    91   17.31
  COMMERCIAL                 D        0.27      0.47     0.100    75   10.02
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.542
  SUBAREA RUNOFF(CFS) =      5.73
  TOTAL AREA(ACRES) =      1.75   PEAK FLOW RATE(CFS) =      5.73

****************************************************************************
  FLOW PROCESS FROM NODE   5801.00 TO NODE   5020.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2973.60  DOWNSTREAM(FEET) =   2954.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1323.00   CHANNEL SLOPE =  0.0147
  CHANNEL FLOW THRU SUBAREA(CFS) =       5.73
  FLOW VELOCITY(FEET/SEC) =   2.65 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   8.33   Tc(MIN.) =   18.36
  LONGEST FLOWPATH FROM NODE   5800.00 TO NODE   5020.00 =    2323.00 FEET.

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

```
  FLOW PROCESS FROM NODE   5020.00 TO NODE   5020.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.36
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.475
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        3.18      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.18      SUBAREA RUNOFF(CFS) =    6.57
  EFFECTIVE AREA(ACRES) =      4.93   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.84
  TOTAL AREA(ACRES) =        4.9       PEAK FLOW RATE(CFS) =      10.24

****************************************************************************
  FLOW PROCESS FROM NODE   5020.00 TO NODE   5020.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       10.24   18.36    2.475  0.20( 0.17) 0.84       4.9    5800.00
  LONGEST FLOWPATH FROM NODE   5800.00 TO NODE   5020.00 =    2323.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      970.65   32.02    1.676  0.28( 0.28) 0.99     611.6    5600.00
      2     1015.14   43.00    1.364  0.28( 0.28) 0.99     843.5    5700.00
      3     1018.52   44.04    1.341  0.28( 0.28) 0.99     864.6    5370.00
      4     1019.00   44.32    1.335  0.28( 0.28) 0.99     870.4    5550.00
      5     1011.78   46.52    1.291  0.27( 0.27) 0.99     907.4    5500.00
      6      990.30   50.28    1.222  0.27( 0.27) 0.99     961.0    5540.00
      7      962.28   53.13    1.176  0.27( 0.27) 0.99     987.5    5360.00
      8      957.54   53.62    1.168  0.27( 0.26) 0.99     991.8    5200.00
      9      943.53   54.77    1.151  0.27( 0.26) 0.99     998.4    5340.00
     10      936.80   55.24    1.144  0.27( 0.26) 0.99    1000.0    5240.00
     11      932.80   55.51    1.140  0.27( 0.26) 0.99    1000.7    5230.00
     12      882.78   58.93    1.094  0.27( 0.26) 0.99    1007.5    5100.00
     13      863.79   60.25    1.077  0.27( 0.26) 0.99    1008.6    5000.00
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5020.00 =   24833.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
```

```
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      884.87   18.36    2.475  0.28( 0.28) 0.99     355.6    5800.00
      2      977.35   32.02    1.676  0.28( 0.28) 0.99     616.5    5600.00
      3     1020.45   43.00    1.364  0.28( 0.28) 0.99     848.4    5700.00
      4     1023.73   44.04    1.341  0.28( 0.28) 0.99     869.5    5370.00
      5     1024.18   44.32    1.335  0.28( 0.27) 0.99     875.3    5550.00
      6     1016.77   46.52    1.291  0.27( 0.27) 0.99     912.3    5500.00
      7      994.98   50.28    1.222  0.27( 0.27) 0.99     965.9    5540.00
      8      966.76   53.13    1.176  0.27( 0.26) 0.99     992.4    5360.00
      9      961.98   53.62    1.168  0.27( 0.26) 0.99     996.7    5200.00
     10      947.90   54.77    1.151  0.27( 0.26) 0.99    1003.4    5340.00
     11      941.14   55.24    1.144  0.27( 0.26) 0.99    1004.9    5240.00
     12      937.12   55.51    1.140  0.27( 0.26) 0.99    1005.6    5230.00
     13      886.89   58.93    1.094  0.26( 0.26) 0.99    1012.4    5100.00
     14      867.83   60.25    1.077  0.26( 0.26) 0.99    1013.5    5000.00
    TOTAL AREA(ACRES) =      1013.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     1024.18  Tc(MIN.) =   44.322
  EFFECTIVE AREA(ACRES) =    875.35  AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =     1013.5
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5020.00 =   24833.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5020.00 TO NODE   5020.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5020.00 TO NODE   5021.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2954.10  DOWNSTREAM(FEET) =   2930.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1098.00   CHANNEL SLOPE =  0.0219
  CHANNEL FLOW THRU SUBAREA(CFS) =    1024.18
  FLOW VELOCITY(FEET/SEC) =  14.63 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.25   Tc(MIN.) =   45.57
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   5021.00 =   25931.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5021.00 TO NODE   5021.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   45.57
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.309
```

```
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        2.99      0.34     1.000    82
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        9.40      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   12.39      SUBAREA RUNOFF(CFS) =   12.15
  EFFECTIVE AREA(ACRES) =    887.74   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =     1025.9       PEAK FLOW RATE(CFS) =    1024.18
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5021.00 TO NODE   3008.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2930.00  DOWNSTREAM(FEET) =   2910.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1179.00   CHANNEL SLOPE =  0.0167
  CHANNEL FLOW THRU SUBAREA(CFS) =    1024.18
  FLOW VELOCITY(FEET/SEC) =  12.77 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.54   Tc(MIN.) =   47.11
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   3008.00 =   27110.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3008.00 TO NODE   3008.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   47.11
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.279
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                A        0.01      0.98     0.100    32
  USER-DEFINED              -        1.82      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.09      0.34     1.000    82
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        5.56      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.999
  SUBAREA AREA(ACRES) =    7.48      SUBAREA RUNOFF(CFS) =    6.96
  EFFECTIVE AREA(ACRES) =    895.22   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =     1033.4       PEAK FLOW RATE(CFS) =    1024.18
```

NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****
FLOW PROCESS FROM NODE 3008.00 TO NODE 3008.00 IS CODE = 11

>>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
==========

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	884.87	21.28	2.231	0.28(0.28)	0.99	375.4	5800.00
2	977.35	34.85	1.580	0.28(0.28)	0.99	636.4	5600.00
3	1020.45	45.79	1.305	0.28(0.27)	0.99	868.3	5700.00
4	1023.73	46.83	1.285	0.28(0.27)	0.99	889.4	5370.00
5	1024.18	47.11	1.279	0.28(0.27)	0.99	895.2	5550.00
6	1016.77	49.31	1.239	0.27(0.27)	0.99	932.2	5500.00
7	994.98	53.10	1.176	0.27(0.27)	0.99	985.8	5540.00
8	966.76	55.97	1.134	0.27(0.26)	0.99	1012.3	5360.00
9	961.98	56.47	1.127	0.27(0.26)	0.99	1016.6	5200.00
10	947.90	57.63	1.111	0.27(0.26)	0.99	1023.2	5340.00
11	941.14	58.11	1.104	0.26(0.26)	0.99	1024.8	5240.00
12	937.12	58.38	1.101	0.26(0.26)	0.99	1025.5	5230.00
13	886.89	61.85	1.057	0.26(0.26)	0.99	1032.3	5100.00
14	867.83	63.19	1.041	0.26(0.26)	0.99	1033.4	5000.00

LONGEST FLOWPATH FROM NODE 5100.00 TO NODE 3008.00 = 27110.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	91.45	35.70	1.553	0.39(0.34)	0.87	83.6	4000.00
2	84.52	46.36	1.294	0.39(0.34)	0.86	98.4	3000.00
3	82.18	48.13	1.260	0.39(0.34)	0.86	99.2	3200.00

LONGEST FLOWPATH FROM NODE 3000.00 TO NODE 3008.00 = 9397.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	969.79	21.28	2.231	0.29(0.28)	0.97	425.3	5800.00
2	1068.57	34.85	1.580	0.29(0.28)	0.98	718.0	5600.00
3	1072.16	35.70	1.553	0.29(0.28)	0.98	738.1	4000.00
4	1105.34	45.79	1.305	0.29(0.28)	0.98	965.9	5700.00
5	1106.78	46.36	1.294	0.29(0.28)	0.98	978.4	3000.00
6	1107.64	46.83	1.285	0.29(0.28)	0.98	988.0	5370.00
7	1107.71	47.11	1.279	0.29(0.28)	0.98	994.0	5550.00
8	1102.95	48.13	1.260	0.28(0.28)	0.98	1011.4	3200.00
9	1097.04	49.31	1.239	0.28(0.28)	0.98	1031.4	5500.00
10	1069.68	53.10	1.176	0.28(0.27)	0.98	1085.0	5540.00
11	1037.65	55.97	1.134	0.28(0.27)	0.98	1111.5	5360.00
12	1032.25	56.47	1.127	0.28(0.27)	0.98	1115.8	5200.00

```
     13     1016.75   57.63    1.111  0.28( 0.27) 0.98    1122.4    5340.00
     14     1009.42   58.11    1.104  0.27( 0.27) 0.98    1124.0    5240.00
     15     1005.07   58.38    1.101  0.27( 0.27) 0.98    1124.7    5230.00
     16      950.96   61.85    1.057  0.27( 0.27) 0.98    1131.4    5100.00
     17      930.48   63.19    1.041  0.27( 0.27) 0.98    1132.6    5000.00
    TOTAL AREA(ACRES) =      1132.6

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     1107.71  Tc(MIN.) =   47.111
  EFFECTIVE AREA(ACRES) =    993.96  AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =     1132.6
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   3008.00 =   27110.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3008.00 TO NODE   3008.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3008.00 TO NODE   3009.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2910.30  DOWNSTREAM(FEET) =   2906.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   230.00   CHANNEL SLOPE =  0.0187
  CHANNEL FLOW THRU SUBAREA(CFS) =    1107.71
  FLOW VELOCITY(FEET/SEC) =  13.86 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.28   Tc(MIN.) =   47.39
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   3009.00 =   27340.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3009.00 TO NODE   3009.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   47.39
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.274
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.20      0.98     0.100    32
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        3.18      0.18     1.000    91
  USER-DEFINED               -        0.25      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.950
  SUBAREA AREA(ACRES) =    3.63      SUBAREA RUNOFF(CFS) =    3.53
```

```
  EFFECTIVE AREA(ACRES) =    997.59   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =     1136.2       PEAK FLOW RATE(CFS) =    1107.71
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   3009.00 TO NODE   3009.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5900.00 TO NODE   5901.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   950.00
  ELEVATION DATA: UPSTREAM(FEET) =   2999.30  DOWNSTREAM(FEET) =   2973.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.717
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.862
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.20      0.34     1.000    82   16.78
  COMMERCIAL                 B        0.62      0.75     0.100    56    9.72
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        0.66      0.18     1.000    91   16.78
  COMMERCIAL                 D        0.27      0.47     0.100    75    9.72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.542
  SUBAREA RUNOFF(CFS) =      5.86
  TOTAL AREA(ACRES) =      1.75   PEAK FLOW RATE(CFS) =      5.86

****************************************************************************
  FLOW PROCESS FROM NODE   5901.00 TO NODE   5902.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2973.60  DOWNSTREAM(FEET) =   2955.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   836.00   CHANNEL SLOPE =  0.0219
  CHANNEL FLOW THRU SUBAREA(CFS) =       5.86
  FLOW VELOCITY(FEET/SEC) =   3.24 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.30   Tc(MIN.) =   14.02
  LONGEST FLOWPATH FROM NODE   5900.00 TO NODE   5902.00 =    1786.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   5902.00 TO NODE   5902.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.02
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.989
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        3.18      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.18      SUBAREA RUNOFF(CFS) =    8.04
  EFFECTIVE AREA(ACRES) =      4.93   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.84
  TOTAL AREA(ACRES) =        4.9       PEAK FLOW RATE(CFS) =      12.52

****************************************************************************
  FLOW PROCESS FROM NODE   5902.00 TO NODE   5903.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2955.30  DOWNSTREAM(FEET) =   2932.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   906.00   CHANNEL SLOPE =  0.0256
  CHANNEL FLOW THRU SUBAREA(CFS) =      12.52
  FLOW VELOCITY(FEET/SEC) =   4.24 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.56   Tc(MIN.) =   17.58
  LONGEST FLOWPATH FROM NODE   5900.00 TO NODE   5903.00 =    2692.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5903.00 TO NODE   5903.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.58
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.551
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        8.04      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    8.04      SUBAREA RUNOFF(CFS) =   17.15
  EFFECTIVE AREA(ACRES) =     12.97   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.19  AREA-AVERAGED Ap =  0.94
  TOTAL AREA(ACRES) =       13.0       PEAK FLOW RATE(CFS) =      27.73
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   5903.00 TO NODE   5903.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5910.00 TO NODE   5911.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   600.00
  ELEVATION DATA: UPSTREAM(FEET) =   2975.30  DOWNSTREAM(FEET) =   2948.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.621
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.216
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        1.31      0.18     1.000    91   12.62
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      3.58
  TOTAL AREA(ACRES) =      1.31   PEAK FLOW RATE(CFS) =      3.58

****************************************************************************
  FLOW PROCESS FROM NODE   5911.00 TO NODE   5912.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2948.40  DOWNSTREAM(FEET) =   2932.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   531.00   CHANNEL SLOPE =  0.0307
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.58
  FLOW VELOCITY(FEET/SEC) =   3.42 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.59   Tc(MIN.) =   15.21
  LONGEST FLOWPATH FROM NODE   5910.00 TO NODE   5912.00 =    1131.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5912.00 TO NODE   5912.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.21
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.823
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        2.59      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.59      SUBAREA RUNOFF(CFS) =    6.16
  EFFECTIVE AREA(ACRES) =      3.90   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.9       PEAK FLOW RATE(CFS) =       9.28

****************************************************************************
  FLOW PROCESS FROM NODE   5903.00 TO NODE   5903.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        9.28   15.21    2.823  0.18( 0.18) 1.00       3.9    5910.00
  LONGEST FLOWPATH FROM NODE   5910.00 TO NODE   5903.00 =    1131.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       27.73   17.58    2.551  0.19( 0.17) 0.94      13.0    5900.00
  LONGEST FLOWPATH FROM NODE   5900.00 TO NODE   5903.00 =    2692.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       36.02   15.21    2.823  0.18( 0.18) 0.95      15.1    5910.00
      2       36.05   17.58    2.551  0.18( 0.18) 0.95      16.9    5900.00
    TOTAL AREA(ACRES) =        16.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       36.05  Tc(MIN.) =   17.579
  EFFECTIVE AREA(ACRES) =     16.87  AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =       16.9
  LONGEST FLOWPATH FROM NODE   5900.00 TO NODE   5903.00 =    2692.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5903.00 TO NODE   3009.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2932.10  DOWNSTREAM(FEET) =   2906.00
```

```
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1139.00   CHANNEL SLOPE =  0.0229
 CHANNEL FLOW THRU SUBAREA(CFS) =      36.05
 FLOW VELOCITY(FEET/SEC) =   5.34 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   3.56   Tc(MIN.) =   21.14
 LONGEST FLOWPATH FROM NODE   5900.00 TO NODE   3009.00 =    3831.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   3009.00 TO NODE   3009.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   21.14
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.242
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -        1.88      0.44     1.000     -
 COMMERCIAL                 A        0.05      0.98     0.100    32
 NATURAL DESERT COVER
 "DESERT BRUSH"   (30.0%)   D        6.24      0.18     1.000    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.994
 SUBAREA AREA(ACRES) =    8.17      SUBAREA RUNOFF(CFS) =   14.72
 EFFECTIVE AREA(ACRES) =     25.04   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.97
 TOTAL AREA(ACRES) =       25.0       PEAK FLOW RATE(CFS) =      46.09

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       46.92   18.77    2.437  0.20( 0.20) 0.97      23.3    5910.00
     2       46.09   21.14    2.242  0.20( 0.20) 0.97      25.0    5900.00
 NEW PEAK FLOW DATA ARE:
 PEAK FLOW RATE(CFS) =      46.92  Tc(MIN.) =   18.77
 AREA-AVERAGED Fm(INCH/HR) =  0.20  AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.97  EFFECTIVE AREA(ACRES) =      23.29

****************************************************************************
 FLOW PROCESS FROM NODE   3009.00 TO NODE   3009.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       46.92   18.77    2.437  0.20( 0.20) 0.97      23.3    5910.00
     2       46.09   21.14    2.242  0.20( 0.20) 0.97      25.0    5900.00
 LONGEST FLOWPATH FROM NODE   5900.00 TO NODE   3009.00 =    3831.00 FEET.
```

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	969.79	21.57	2.210	0.29(0.28)	0.97	428.9	5800.00
2	1068.57	35.13	1.571	0.29(0.28)	0.98	721.6	5600.00
3	1072.16	35.98	1.545	0.29(0.28)	0.98	741.7	4000.00
4	1105.34	46.07	1.299	0.29(0.28)	0.98	969.6	5700.00
5	1106.78	46.64	1.288	0.29(0.28)	0.98	982.0	3000.00
6	1107.64	47.10	1.279	0.29(0.28)	0.98	991.6	5370.00
7	1107.71	47.39	1.274	0.29(0.28)	0.98	997.6	5550.00
8	1102.95	48.40	1.255	0.28(0.28)	0.98	1015.0	3200.00
9	1097.04	49.59	1.234	0.28(0.28)	0.98	1035.0	5500.00
10	1069.68	53.38	1.172	0.28(0.27)	0.98	1088.6	5540.00
11	1037.65	56.25	1.130	0.28(0.27)	0.98	1115.1	5360.00
12	1032.25	56.75	1.123	0.28(0.27)	0.98	1119.4	5200.00
13	1016.75	57.92	1.107	0.27(0.27)	0.98	1126.0	5340.00
14	1009.42	58.39	1.101	0.27(0.27)	0.98	1127.6	5240.00
15	1005.07	58.67	1.097	0.27(0.27)	0.98	1128.3	5230.00
16	950.96	62.14	1.054	0.27(0.27)	0.98	1135.1	5100.00
17	930.48	63.49	1.038	0.27(0.27)	0.98	1136.2	5000.00

LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   3009.00 =   27340.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	989.68	18.77	2.437	0.29(0.28)	0.97	396.4	5910.00
2	1011.99	21.14	2.242	0.29(0.28)	0.97	445.3	5900.00
3	1015.17	21.57	2.210	0.29(0.28)	0.97	453.9	5800.00
4	1099.54	35.13	1.571	0.29(0.28)	0.97	746.7	5600.00
5	1102.54	35.98	1.545	0.29(0.28)	0.98	766.7	4000.00
6	1130.19	46.07	1.299	0.28(0.28)	0.98	994.6	5700.00
7	1131.38	46.64	1.288	0.28(0.28)	0.98	1007.1	3000.00
8	1132.04	47.10	1.279	0.28(0.28)	0.98	1016.7	5370.00
9	1131.99	47.39	1.274	0.28(0.28)	0.98	1022.6	5550.00
10	1126.80	48.40	1.255	0.28(0.28)	0.98	1040.1	3200.00
11	1120.42	49.59	1.234	0.28(0.28)	0.98	1060.0	5500.00
12	1091.66	53.38	1.172	0.28(0.27)	0.98	1113.7	5540.00
13	1058.68	56.25	1.130	0.27(0.27)	0.98	1140.1	5360.00
14	1053.12	56.75	1.123	0.27(0.27)	0.98	1144.4	5200.00
15	1037.27	57.92	1.107	0.27(0.27)	0.98	1151.1	5340.00
16	1029.79	58.39	1.101	0.27(0.27)	0.98	1152.6	5240.00
17	1025.36	58.67	1.097	0.27(0.27)	0.98	1153.3	5230.00
18	970.27	62.14	1.054	0.27(0.27)	0.98	1160.1	5100.00
19	949.45	63.49	1.038	0.27(0.27)	0.98	1161.2	5000.00

  TOTAL AREA(ACRES) =   1161.2

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =   1132.04 Tc(MIN.) =   47.104
EFFECTIVE AREA(ACRES) =   1016.66 AREA-AVERAGED Fm(INCH/HR) = 0.28
AREA-AVERAGED Fp(INCH/HR) = 0.28 AREA-AVERAGED Ap = 0.98

```
  TOTAL AREA(ACRES) =     1161.2
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   3009.00 =   27340.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3009.00 TO NODE   3009.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3009.00 TO NODE   3009.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3009.00 TO NODE   3010.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2906.00  DOWNSTREAM(FEET) =   2901.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   434.00   CHANNEL SLOPE =  0.0099
  CHANNEL FLOW THRU SUBAREA(CFS) =    1132.04
  FLOW VELOCITY(FEET/SEC) =  10.16 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.71   Tc(MIN.) =   47.82
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   3010.00 =   27774.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3010.00 TO NODE   3010.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   47.82
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.266
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        1.31      0.44     1.000     -
  COMMERCIAL                 A        0.49      0.98     0.100    32
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        0.47      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.39
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.806
  SUBAREA AREA(ACRES) =    2.27      SUBAREA RUNOFF(CFS) =    1.95
  EFFECTIVE AREA(ACRES) =   1018.93   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =     1163.5       PEAK FLOW RATE(CFS) =    1132.04
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   3010.00 TO NODE   3010.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5950.00 TO NODE   5951.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   530.00
  ELEVATION DATA: UPSTREAM(FEET) =   2957.20  DOWNSTREAM(FEET) =   2923.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.186
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.500
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        0.94      0.18     1.000    91   11.19
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.81
  TOTAL AREA(ACRES) =      0.94   PEAK FLOW RATE(CFS) =      2.81

****************************************************************************
  FLOW PROCESS FROM NODE   5951.00 TO NODE   3010.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2923.30  DOWNSTREAM(FEET) =   2901.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   704.00   CHANNEL SLOPE =  0.0307
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.81
  FLOW VELOCITY(FEET/SEC) =   3.24 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.62   Tc(MIN.) =   14.81
  LONGEST FLOWPATH FROM NODE   5950.00 TO NODE   3010.00 =    1234.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3010.00 TO NODE   3010.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.81
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.876
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED             -        1.10      0.44     1.000     -
  COMMERCIAL               A        0.01      0.98     0.100    32
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        1.76      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.997
  SUBAREA AREA(ACRES) =    2.87      SUBAREA RUNOFF(CFS) =    6.71
  EFFECTIVE AREA(ACRES) =      3.81   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.8       PEAK FLOW RATE(CFS) =       8.99

****************************************************************************
  FLOW PROCESS FROM NODE   3010.00 TO NODE   3010.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        8.99   14.81    2.876  0.26( 0.25) 1.00       3.8    5950.00
  LONGEST FLOWPATH FROM NODE   5950.00 TO NODE   3010.00 =    1234.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      989.68   19.51    2.371  0.29( 0.28) 0.97     398.7    5910.00
      2     1011.99   21.87    2.189  0.29( 0.28) 0.97     447.6    5900.00
      3     1015.17   22.31    2.159  0.29( 0.28) 0.97     456.2    5800.00
      4     1099.54   35.85    1.549  0.29( 0.28) 0.97     749.0    5600.00
      5     1102.54   36.70    1.524  0.29( 0.28) 0.97     769.0    4000.00
      6     1130.19   46.78    1.286  0.29( 0.28) 0.98     996.9    5700.00
      7     1131.38   47.35    1.275  0.28( 0.28) 0.98    1009.3    3000.00
      8     1132.04   47.82    1.266  0.28( 0.28) 0.98    1018.9    5370.00
      9     1131.99   48.10    1.261  0.28( 0.28) 0.98    1024.9    5550.00
     10     1126.80   49.12    1.242  0.28( 0.28) 0.98    1042.4    3200.00
     11     1120.42   50.31    1.222  0.28( 0.28) 0.98    1062.3    5500.00
     12     1091.66   54.10    1.161  0.28( 0.27) 0.98    1115.9    5540.00
     13     1058.68   56.98    1.120  0.27( 0.27) 0.98    1142.4    5360.00
     14     1053.12   57.48    1.113  0.27( 0.27) 0.98    1146.7    5200.00
     15     1037.27   58.65    1.097  0.27( 0.27) 0.98    1153.3    5340.00
     16     1029.79   59.13    1.091  0.27( 0.27) 0.98    1154.9    5240.00
     17     1025.36   59.41    1.088  0.27( 0.27) 0.98    1155.6    5230.00
     18      970.27   62.89    1.045  0.27( 0.27) 0.98    1162.4    5100.00
     19      949.45   64.24    1.030  0.27( 0.27) 0.98    1163.5    5000.00
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   3010.00 =   27774.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
```

```
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      941.29   14.81    2.876  0.29( 0.28) 0.97     306.4    5950.00
      2      996.94   19.51    2.371  0.29( 0.28) 0.97     402.5    5910.00
      3     1018.62   21.87    2.189  0.29( 0.28) 0.97     451.4    5900.00
      4     1021.70   22.31    2.159  0.29( 0.28) 0.97     460.0    5800.00
      5     1103.97   35.85    1.549  0.29( 0.28) 0.97     752.8    5600.00
      6     1106.89   36.70    1.524  0.29( 0.28) 0.97     772.8    4000.00
      7     1133.73   46.78    1.286  0.28( 0.28) 0.98    1000.7    5700.00
      8     1134.88   47.35    1.275  0.28( 0.28) 0.98    1013.1    3000.00
      9     1135.50   47.82    1.266  0.28( 0.28) 0.98    1022.7    5370.00
     10     1135.44   48.10    1.261  0.28( 0.28) 0.98    1028.7    5550.00
     11     1130.19   49.12    1.242  0.28( 0.28) 0.98    1046.2    3200.00
     12     1123.74   50.31    1.222  0.28( 0.28) 0.98    1066.1    5500.00
     13     1094.77   54.10    1.161  0.28( 0.27) 0.98    1119.7    5540.00
     14     1061.65   56.98    1.120  0.27( 0.27) 0.98    1146.2    5360.00
     15     1056.07   57.48    1.113  0.27( 0.27) 0.98    1150.5    5200.00
     16     1040.16   58.65    1.097  0.27( 0.27) 0.98    1157.1    5340.00
     17     1032.66   59.13    1.091  0.27( 0.27) 0.98    1158.7    5240.00
     18     1028.22   59.41    1.088  0.27( 0.27) 0.98    1159.4    5230.00
     19      972.98   62.89    1.045  0.27( 0.27) 0.98    1166.2    5100.00
     20      952.10   64.24    1.030  0.27( 0.27) 0.98    1167.3    5000.00
    TOTAL AREA(ACRES) =      1167.3

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     1135.50  Tc(MIN.) =   47.816
  EFFECTIVE AREA(ACRES) =   1022.74  AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =     1167.3
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   3010.00 =   27774.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3010.00 TO NODE   3010.50 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2901.70  DOWNSTREAM(FEET) =   2900.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   118.00   CHANNEL SLOPE =  0.0085
  CHANNEL FLOW THRU SUBAREA(CFS) =    1135.50
  FLOW VELOCITY(FEET/SEC) =   9.41 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.21   Tc(MIN.) =   48.03
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   3010.50 =   27892.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3010.50 TO NODE   3010.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   48.03
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.262
```

```
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        1.56      0.44      1.000     -
  COMMERCIAL                  A        0.31      0.98      0.100    32
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        0.39      0.18      1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.877
  SUBAREA AREA(ACRES) =    2.26      SUBAREA RUNOFF(CFS) =    1.86
  EFFECTIVE AREA(ACRES) =   1025.00   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =     1169.6       PEAK FLOW RATE(CFS) =    1135.50
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   3010.50 TO NODE   3011.00 IS CODE =  37
----------------------------------------------------------------------------
  >>>>>COMPUTE CULVERT TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED CULVERT SIZE<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2900.70  DOWNSTREAM(FEET) =  2898.50
  FLOW LENGTH(FEET) =   100.00   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) =  11.00
  NUMBER OF BARREL(S) =   1
  CULVERT-FLOW VELOCITY(FEET/SEC.) =  11.95
  CULVERT-FLOW(CFS) =    1135.50
  CULVERT-FLOW TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   48.16
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   3011.00 =   27992.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3011.00 TO NODE   1024.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2898.50  DOWNSTREAM(FEET) =   2896.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =    72.00   CHANNEL SLOPE =  0.0292
  CHANNEL FLOW THRU SUBAREA(CFS) =    1135.50
  FLOW VELOCITY(FEET/SEC) =  17.45 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.07   Tc(MIN.) =   48.23
  LONGEST FLOWPATH FROM NODE   5100.00 TO NODE   1024.00 =   28064.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
```

TOTAL AREA(ACRES) = 1169.6 TC(MIN.) = 48.23
EFFECTIVE AREA(ACRES) = 1025.00 AREA-AVERAGED Fm(INCH/HR)= 0.28
AREA-AVERAGED Fp(INCH/HR) = 0.28 AREA-AVERAGED Ap = 0.978
PEAK FLOW RATE(CFS) = 1135.50

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	941.29	15.24	2.819	0.29(0.28)	0.97	308.6	5950.00
2	996.94	19.94	2.335	0.29(0.28)	0.97	404.8	5910.00
3	1018.62	22.30	2.159	0.29(0.28)	0.97	453.7	5900.00
4	1021.70	22.74	2.130	0.29(0.28)	0.97	462.3	5800.00
5	1103.97	36.27	1.536	0.29(0.28)	0.97	755.0	5600.00
6	1106.89	37.12	1.511	0.29(0.28)	0.97	775.1	4000.00
7	1133.73	47.20	1.278	0.29(0.28)	0.98	1002.9	5700.00
8	1134.88	47.77	1.267	0.28(0.28)	0.98	1015.4	3000.00
9	1135.50	48.23	1.258	0.28(0.28)	0.98	1025.0	5370.00
10	1135.44	48.52	1.253	0.28(0.28)	0.98	1031.0	5550.00
11	1130.19	49.53	1.235	0.28(0.28)	0.98	1048.4	3200.00
12	1123.74	50.73	1.215	0.28(0.28)	0.98	1068.4	5500.00
13	1094.77	54.51	1.155	0.28(0.27)	0.98	1122.0	5540.00
14	1061.65	57.40	1.114	0.27(0.27)	0.98	1148.5	5360.00
15	1056.07	57.90	1.107	0.27(0.27)	0.98	1152.8	5200.00
16	1040.16	59.07	1.092	0.27(0.27)	0.98	1159.4	5340.00
17	1032.66	59.55	1.086	0.27(0.27)	0.98	1161.0	5240.00
18	1028.22	59.83	1.082	0.27(0.27)	0.98	1161.7	5230.00
19	972.98	63.32	1.040	0.27(0.27)	0.98	1168.4	5100.00
20	952.10	64.67	1.025	0.27(0.27)	0.98	1169.6	5000.00

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



```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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            Ver. 22.0  Release Date: 07/01/2015  License ID 1673

                          Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* APPLE VALLEY 143 ACRES - EXISTING CONDITION                           *
* 100-YR RATIONAL METHOD - WATERSHEDS F AND G                           *
* Q3 08/26/2022                                                         *
 ************************************************************************

  FILE NAME: APF_00E.DAT
  TIME/DATE OF STUDY: 17:44 08/26/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.7000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.0800

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 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.*
```

```
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE   6000.00 TO NODE   6001.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   988.00
  ELEVATION DATA: UPSTREAM(FEET) =   3252.70  DOWNSTREAM(FEET) =   3208.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.387
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.800
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  USER-DEFINED               -        8.15      0.44     1.000     -   15.39
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     17.31
  TOTAL AREA(ACRES) =      8.15   PEAK FLOW RATE(CFS) =     17.31

****************************************************************************
  FLOW PROCESS FROM NODE   6001.00 TO NODE   6002.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3208.10  DOWNSTREAM(FEET) =   3185.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   595.00   CHANNEL SLOPE =  0.0380
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0380 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      17.31
  FLOW VELOCITY(FEET/SEC) =   2.82 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.52   Tc(MIN.) =   18.90
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6002.00 =    1583.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6002.00 TO NODE   6002.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.90
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.424
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        8.30      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    8.30      SUBAREA RUNOFF(CFS) =   14.82
  EFFECTIVE AREA(ACRES) =     16.45   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       16.5       PEAK FLOW RATE(CFS) =      29.37

****************************************************************************
  FLOW PROCESS FROM NODE   6002.00 TO NODE   6003.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3185.50  DOWNSTREAM(FEET) =   3162.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   650.00   CHANNEL SLOPE =  0.0355
  CHANNEL FLOW THRU SUBAREA(CFS) =      29.37
  FLOW VELOCITY(FEET/SEC) =   6.28 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.73   Tc(MIN.) =   20.63
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6003.00 =    2233.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6003.00 TO NODE   6003.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.63
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.280
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        4.51      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.51      SUBAREA RUNOFF(CFS) =    7.47
  EFFECTIVE AREA(ACRES) =     20.96   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       21.0       PEAK FLOW RATE(CFS) =      34.71

****************************************************************************
  FLOW PROCESS FROM NODE   6003.00 TO NODE   6004.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3162.40  DOWNSTREAM(FEET) =   3129.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   905.00   CHANNEL SLOPE =  0.0369
  CHANNEL FLOW THRU SUBAREA(CFS) =      34.71
  FLOW VELOCITY(FEET/SEC) =   6.70 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.25   Tc(MIN.) =   22.88
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6004.00 =    3138.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   6004.00 TO NODE   6004.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   22.88
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.121
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        4.13      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.13      SUBAREA RUNOFF(CFS) =    6.25
  EFFECTIVE AREA(ACRES) =     25.09   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       25.1       PEAK FLOW RATE(CFS) =      37.95

****************************************************************************
  FLOW PROCESS FROM NODE   6004.00 TO NODE   6005.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3129.00  DOWNSTREAM(FEET) =   3076.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1568.00   CHANNEL SLOPE =  0.0338
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0338 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      37.95
  FLOW VELOCITY(FEET/SEC) =   3.46 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.56   Tc(MIN.) =   30.44
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6005.00 =    4706.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6005.00 TO NODE   6005.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   30.44
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.737
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        5.74      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.74      SUBAREA RUNOFF(CFS) =    6.70
  EFFECTIVE AREA(ACRES) =     30.83   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       30.8       PEAK FLOW RATE(CFS) =      37.95
```

```
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   6005.00 TO NODE   6005.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   6200.00 TO NODE   6201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   709.00
  ELEVATION DATA: UPSTREAM(FEET) =   3189.00  DOWNSTREAM(FEET) =   3158.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.623
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.049
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  USER-DEFINED               -        2.57      0.44     1.000     -   13.62
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      6.03
  TOTAL AREA(ACRES) =      2.57   PEAK FLOW RATE(CFS) =      6.03

****************************************************************************
  FLOW PROCESS FROM NODE   6201.00 TO NODE   6202.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3158.70  DOWNSTREAM(FEET) =   3122.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   906.00   CHANNEL SLOPE =  0.0397
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0397 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       6.03
  FLOW VELOCITY(FEET/SEC) =   2.03 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.43   Tc(MIN.) =   21.06
  LONGEST FLOWPATH FROM NODE   6200.00 TO NODE   6202.00 =    1615.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6202.00 TO NODE   6202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.06
```

```
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.248
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        4.81      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.81      SUBAREA RUNOFF(CFS) =    7.83
  EFFECTIVE AREA(ACRES) =      7.38   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        7.4       PEAK FLOW RATE(CFS) =      12.01

****************************************************************************
  FLOW PROCESS FROM NODE   6202.00 TO NODE   6005.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3122.70  DOWNSTREAM(FEET) =   3076.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1225.00   CHANNEL SLOPE =  0.0381
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0381 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      12.01
  FLOW VELOCITY(FEET/SEC) =   2.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   8.16   Tc(MIN.) =   29.22
  LONGEST FLOWPATH FROM NODE   6200.00 TO NODE   6005.00 =    2840.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6005.00 TO NODE   6005.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   29.22
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.787
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        5.33      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.33      SUBAREA RUNOFF(CFS) =    6.46
  EFFECTIVE AREA(ACRES) =     12.71   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       12.7       PEAK FLOW RATE(CFS) =      15.41

****************************************************************************
  FLOW PROCESS FROM NODE   6005.00 TO NODE   6005.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================
```

```
 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       15.41   29.22    1.787  0.44( 0.44) 1.00      12.7    6200.00
 LONGEST FLOWPATH FROM NODE   6200.00 TO NODE   6005.00 =    2840.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       37.95   30.44    1.737  0.44( 0.44) 1.00      30.8    6000.00
 LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6005.00 =    4706.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       53.26   29.22    1.787  0.44( 0.44) 1.00      42.3    6200.00
     2       52.78   30.44    1.737  0.44( 0.44) 1.00      43.5    6000.00
   TOTAL AREA(ACRES) =        43.5

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       53.26  Tc(MIN.) =   29.218
 EFFECTIVE AREA(ACRES) =     42.30  AREA-AVERAGED Fm(INCH/HR) =  0.44
 AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       43.5
 LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6005.00 =    4706.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   6005.00 TO NODE   6005.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE   6005.00 TO NODE   6006.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   3076.00  DOWNSTREAM(FEET) =   3057.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   567.00   CHANNEL SLOPE =  0.0335
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0335 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =      53.26
 FLOW VELOCITY(FEET/SEC) =   3.85 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.45   Tc(MIN.) =   31.67
 LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6006.00 =    5273.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   6006.00 TO NODE   6006.00 IS CODE =  81
```

```
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   31.67
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.689
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        4.90      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.90      SUBAREA RUNOFF(CFS) =    5.51
  EFFECTIVE AREA(ACRES) =     47.20   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       48.4       PEAK FLOW RATE(CFS) =      53.26
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

************************************************************************
  FLOW PROCESS FROM NODE   6006.00 TO NODE   6007.00 IS CODE =  53
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3057.00  DOWNSTREAM(FEET) =   3024.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1037.00   CHANNEL SLOPE =  0.0318
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0318 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      53.26
  FLOW VELOCITY(FEET/SEC) =   3.75 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.60   Tc(MIN.) =   36.28
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6007.00 =    6310.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE   6007.00 TO NODE   6007.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =   36.28
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.536
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.73      0.34     1.000    82
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        2.49      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.22      SUBAREA RUNOFF(CFS) =    3.82
  EFFECTIVE AREA(ACRES) =     50.42   AREA-AVERAGED Fm(INCH/HR) =  0.43
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       51.7       PEAK FLOW RATE(CFS) =      53.26
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   6007.00 TO NODE   6007.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   6300.00 TO NODE   6301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   892.00
  ELEVATION DATA: UPSTREAM(FEET) =   3096.70  DOWNSTREAM(FEET) =   3063.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.379
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.801
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  USER-DEFINED               -        2.51      0.44     1.000     -   15.38
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      5.33
  TOTAL AREA(ACRES) =      2.51   PEAK FLOW RATE(CFS) =      5.33

****************************************************************************
  FLOW PROCESS FROM NODE   6301.00 TO NODE   6007.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3063.80  DOWNSTREAM(FEET) =   3024.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1228.00   CHANNEL SLOPE =  0.0324
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0324 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       5.33
  FLOW VELOCITY(FEET/SEC) =   1.76 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  11.63   Tc(MIN.) =   27.01
  LONGEST FLOWPATH FROM NODE   6300.00 TO NODE   6007.00 =    2120.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6007.00 TO NODE   6007.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==========================================================================
  MAINLINE Tc(MIN.) =   27.01
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.888
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        2.31      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        3.65      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.96      SUBAREA RUNOFF(CFS) =    8.62
  EFFECTIVE AREA(ACRES) =      8.47   AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.33  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        8.5       PEAK FLOW RATE(CFS) =      11.90

**************************************************************************
  FLOW PROCESS FROM NODE   6007.00 TO NODE   6007.00 IS CODE =  11
--------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
==========================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       11.90   27.01    1.888  0.33( 0.33) 1.00       8.5    6300.00
  LONGEST FLOWPATH FROM NODE   6300.00 TO NODE   6007.00 =    2120.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       53.26   36.28    1.536  0.43( 0.43) 1.00      50.4    6200.00
      2       52.78   37.52    1.500  0.43( 0.43) 1.00      51.7    6000.00
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6007.00 =    6310.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       64.13   27.01    1.888  0.41( 0.41) 1.00      46.0    6300.00
      2       62.47   36.28    1.536  0.41( 0.41) 1.00      58.9    6200.00
      3       61.72   37.52    1.500  0.41( 0.41) 1.00      60.1    6000.00
    TOTAL AREA(ACRES) =        60.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       64.13  Tc(MIN.) =   27.006
  EFFECTIVE AREA(ACRES) =     46.01  AREA-AVERAGED Fm(INCH/HR) =  0.41
  AREA-AVERAGED Fp(INCH/HR) =  0.41  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       60.1
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6007.00 =    6310.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   6007.00 TO NODE   6007.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   6007.00 TO NODE   6008.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3024.00  DOWNSTREAM(FEET) =   3004.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   655.00   CHANNEL SLOPE =  0.0301
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0301 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      64.13
  FLOW VELOCITY(FEET/SEC) =   3.88 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.81   Tc(MIN.) =   29.82
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6008.00 =    6965.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6008.00 TO NODE   6008.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   29.82
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.762
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.73      0.34     1.000    82
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        2.49      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.22      SUBAREA RUNOFF(CFS) =    4.48
  EFFECTIVE AREA(ACRES) =     49.23   AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       63.4       PEAK FLOW RATE(CFS) =      64.13
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   6008.00 TO NODE   6008.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   29.82
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.762
```

```
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        2.17      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        5.93      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.37
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    8.10      SUBAREA RUNOFF(CFS) =   10.15
  EFFECTIVE AREA(ACRES) =     57.33   AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.39  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       71.5       PEAK FLOW RATE(CFS) =      70.69

****************************************************************************
  FLOW PROCESS FROM NODE   6008.00 TO NODE   6008.50 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3004.30  DOWNSTREAM(FEET) =   2979.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   873.00   CHANNEL SLOPE =  0.0281
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0281 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      70.69
  FLOW VELOCITY(FEET/SEC) =   3.87 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.76   Tc(MIN.) =   33.57
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6008.50 =    7838.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6008.50 TO NODE   6008.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   33.57
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.622
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        2.61      0.75     0.100    56
  USER-DEFINED               -        7.23      0.44     1.000     -
  COMMERCIAL                 D        1.52      0.47     0.100    75
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        2.86      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.38
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.739
  SUBAREA AREA(ACRES) =   14.22      SUBAREA RUNOFF(CFS) =   17.19
  EFFECTIVE AREA(ACRES) =     71.55   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.39  AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =       85.7       PEAK FLOW RATE(CFS) =      80.63
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   6008.50 TO NODE   6008.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   33.57
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.622
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        6.81      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    6.81      SUBAREA RUNOFF(CFS) =    8.84
  EFFECTIVE AREA(ACRES) =     78.36   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =       92.5       PEAK FLOW RATE(CFS) =      89.47

****************************************************************************
  FLOW PROCESS FROM NODE   6008.50 TO NODE   6009.00 IS CODE =  37
----------------------------------------------------------------------------
  >>>>>COMPUTE CULVERT TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED CULVERT SIZE<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2979.80  DOWNSTREAM(FEET) =  2973.40
  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) =   3.50
  NUMBER OF BARREL(S) =   1
  CULVERT-FLOW VELOCITY(FEET/SEC.) =   9.30
  CULVERT-FLOW(CFS) =      89.47
  CULVERT-FLOW TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =   34.02
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6009.00 =    8088.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6009.00 TO NODE   6010.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2973.40  DOWNSTREAM(FEET) =   2940.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1008.00   CHANNEL SLOPE =  0.0326
  CHANNEL FLOW THRU SUBAREA(CFS) =      89.47
  FLOW VELOCITY(FEET/SEC) =   8.29 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
  TRAVEL TIME(MIN.) =   2.03   Tc(MIN.) =   36.05
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6010.00 =    9096.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6010.00 TO NODE   6010.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   36.05
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.543
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        1.93      0.47     0.100    75
  NATURAL DESERT COVER
  "DESERT BRUSH"   ( 7.0%)   D        6.99      0.16     1.000    92
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.17
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.805
  SUBAREA AREA(ACRES) =    8.92      SUBAREA RUNOFF(CFS) =   11.30
  EFFECTIVE AREA(ACRES) =     87.28   AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.35  AREA-AVERAGED Ap =  0.94
  TOTAL AREA(ACRES) =      101.4       PEAK FLOW RATE(CFS) =      95.21

****************************************************************************
  FLOW PROCESS FROM NODE   6010.00 TO NODE   6011.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2940.50  DOWNSTREAM(FEET) =   2922.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =   669.00   CHANNEL SLOPE =  0.0268
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0268 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      95.21
  FLOW VELOCITY(FEET/SEC) =   4.18 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.67   Tc(MIN.) =   38.72
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6011.00 =    9765.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6011.00 TO NODE   6011.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   38.72
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.468
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        0.05      0.44     1.000     -
  COMMERCIAL                 D        1.31      0.47     0.100    75
```

```
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        7.77      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.19
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.871
  SUBAREA AREA(ACRES) =    9.13      SUBAREA RUNOFF(CFS) =   10.72
  EFFECTIVE AREA(ACRES) =     96.41   AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  0.93
  TOTAL AREA(ACRES) =      110.5       PEAK FLOW RATE(CFS) =     100.03

****************************************************************************
  FLOW PROCESS FROM NODE   6011.00 TO NODE   6011.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   7000.00 TO NODE   7001.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   936.00
  ELEVATION DATA: UPSTREAM(FEET) =   3259.80  DOWNSTREAM(FEET) =   3220.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.277
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.814
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  USER-DEFINED               -        5.56      0.44     1.000     -   15.28
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     11.88
  TOTAL AREA(ACRES) =      5.56   PEAK FLOW RATE(CFS) =     11.88

****************************************************************************
  FLOW PROCESS FROM NODE   7001.00 TO NODE   7002.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3220.50  DOWNSTREAM(FEET) =   3142.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1747.00   CHANNEL SLOPE =  0.0447
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0447 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      11.88
  FLOW VELOCITY(FEET/SEC) =   2.70 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  10.79   Tc(MIN.) =   26.06
  LONGEST FLOWPATH FROM NODE   7000.00 TO NODE   7002.00 =    2683.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   7002.00 TO NODE   7002.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   26.06
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.936
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       14.64      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   14.64      SUBAREA RUNOFF(CFS) =   19.71
  EFFECTIVE AREA(ACRES) =     20.20   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       20.2       PEAK FLOW RATE(CFS) =      27.19

****************************************************************************
  FLOW PROCESS FROM NODE   7002.00 TO NODE   7003.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3142.40  DOWNSTREAM(FEET) =   3105.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   975.00   CHANNEL SLOPE =  0.0376
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0376 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      27.19
  FLOW VELOCITY(FEET/SEC) =   3.26 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.98   Tc(MIN.) =   31.04
  LONGEST FLOWPATH FROM NODE   7000.00 TO NODE   7003.00 =    3658.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7003.00 TO NODE   7003.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   31.04
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.713
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       11.99      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   11.99      SUBAREA RUNOFF(CFS) =   13.74
  EFFECTIVE AREA(ACRES) =     32.19   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
```

```
  TOTAL AREA(ACRES) =       32.2       PEAK FLOW RATE(CFS) =      36.88

****************************************************************************
  FLOW PROCESS FROM NODE   7003.00 TO NODE   7004.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3105.70  DOWNSTREAM(FEET) =   3076.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   821.00   CHANNEL SLOPE =  0.0357
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0357 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      36.88
  FLOW VELOCITY(FEET/SEC) =   3.52 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.89   Tc(MIN.) =   34.93
  LONGEST FLOWPATH FROM NODE   7000.00 TO NODE   7004.00 =    4479.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7004.00 TO NODE   7004.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   34.93
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.577
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        6.49      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    6.49      SUBAREA RUNOFF(CFS) =    6.64
  EFFECTIVE AREA(ACRES) =     38.68   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       38.7       PEAK FLOW RATE(CFS) =      39.58

****************************************************************************
  FLOW PROCESS FROM NODE   7004.00 TO NODE   7005.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3076.40  DOWNSTREAM(FEET) =   3042.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1024.00   CHANNEL SLOPE =  0.0328
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0328 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      39.58
  FLOW VELOCITY(FEET/SEC) =   3.45 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.94   Tc(MIN.) =   39.88
  LONGEST FLOWPATH FROM NODE   7000.00 TO NODE   7005.00 =    5503.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   7005.00 TO NODE   7005.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   39.88
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.438
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        7.13      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    7.13      SUBAREA RUNOFF(CFS) =    6.40
  EFFECTIVE AREA(ACRES) =     45.81   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       45.8       PEAK FLOW RATE(CFS) =      41.12

****************************************************************************
  FLOW PROCESS FROM NODE   7005.00 TO NODE   7006.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3042.80  DOWNSTREAM(FEET) =   3012.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1002.00   CHANNEL SLOPE =  0.0304
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0304 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      41.12
  FLOW VELOCITY(FEET/SEC) =   3.37 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.96   Tc(MIN.) =   44.83
  LONGEST FLOWPATH FROM NODE   7000.00 TO NODE   7006.00 =    6505.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7006.00 TO NODE   7006.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   44.83
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.324
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        6.39      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        0.79      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.41
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    7.18      SUBAREA RUNOFF(CFS) =    5.90
  EFFECTIVE AREA(ACRES) =     52.99   AREA-AVERAGED Fm(INCH/HR) =  0.44
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       53.0       PEAK FLOW RATE(CFS) =      42.35

****************************************************************************
  FLOW PROCESS FROM NODE   7006.00 TO NODE   7006.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   7200.00 TO NODE   7201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   932.00
  ELEVATION DATA: UPSTREAM(FEET) =   3218.00  DOWNSTREAM(FEET) =   3171.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.734
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.886
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  USER-DEFINED               -        6.73      0.44     1.000     -   14.73
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     14.82
  TOTAL AREA(ACRES) =      6.73   PEAK FLOW RATE(CFS) =     14.82

****************************************************************************
  FLOW PROCESS FROM NODE   7201.00 TO NODE   7202.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3171.50  DOWNSTREAM(FEET) =   3143.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   660.00   CHANNEL SLOPE =  0.0426
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0426 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      14.82
  FLOW VELOCITY(FEET/SEC) =   2.84 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.88   Tc(MIN.) =   18.61
  LONGEST FLOWPATH FROM NODE   7200.00 TO NODE   7202.00 =    1592.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7202.00 TO NODE   7202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
  MAINLINE Tc(MIN.) =   18.61
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.450
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        5.15      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.15      SUBAREA RUNOFF(CFS) =    9.32
  EFFECTIVE AREA(ACRES) =     11.88   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       11.9       PEAK FLOW RATE(CFS) =      21.49

****************************************************************************
  FLOW PROCESS FROM NODE   7202.00 TO NODE   7203.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3143.40  DOWNSTREAM(FEET) =   3125.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   511.00   CHANNEL SLOPE =  0.0356
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0356 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      21.49
  FLOW VELOCITY(FEET/SEC) =   2.94 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.90   Tc(MIN.) =   21.51
  LONGEST FLOWPATH FROM NODE   7200.00 TO NODE   7203.00 =    2103.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7203.00 TO NODE   7203.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.51
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.214
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        2.93      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.93      SUBAREA RUNOFF(CFS) =    4.68
  EFFECTIVE AREA(ACRES) =     14.81   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       14.8       PEAK FLOW RATE(CFS) =      23.65

****************************************************************************
  FLOW PROCESS FROM NODE   7203.00 TO NODE   7204.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
```

```
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3125.20  DOWNSTREAM(FEET) =   3106.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =   552.00   CHANNEL SLOPE =  0.0337
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0337 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      23.65
  FLOW VELOCITY(FEET/SEC) =   2.95 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.12   Tc(MIN.) =   24.64
  LONGEST FLOWPATH FROM NODE   7200.00 TO NODE   7204.00 =    2655.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7204.00 TO NODE   7204.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   24.64
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.014
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        1.24      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.24      SUBAREA RUNOFF(CFS) =    1.76
  EFFECTIVE AREA(ACRES) =     16.05   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       16.1       PEAK FLOW RATE(CFS) =      23.65
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   7204.00 TO NODE   7205.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3106.60  DOWNSTREAM(FEET) =   3079.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =   732.00   CHANNEL SLOPE =  0.0369
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0369 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      23.65
  FLOW VELOCITY(FEET/SEC) =   3.08 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.96   Tc(MIN.) =   28.59
  LONGEST FLOWPATH FROM NODE   7200.00 TO NODE   7205.00 =    3387.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7205.00 TO NODE   7205.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
```

```
  MAINLINE Tc(MIN.) =   28.59
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.814
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        3.39      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.39      SUBAREA RUNOFF(CFS) =    4.19
  EFFECTIVE AREA(ACRES) =     19.44   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       19.4       PEAK FLOW RATE(CFS) =      24.05

****************************************************************************
  FLOW PROCESS FROM NODE   7205.00 TO NODE   7206.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3079.60  DOWNSTREAM(FEET) =   3045.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1048.00   CHANNEL SLOPE =  0.0326
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0326 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      24.05
  FLOW VELOCITY(FEET/SEC) =   2.92 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.99   Tc(MIN.) =   34.58
  LONGEST FLOWPATH FROM NODE   7200.00 TO NODE   7206.00 =    4435.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7206.00 TO NODE   7206.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   34.58
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.588
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        4.49      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        0.17      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.66      SUBAREA RUNOFF(CFS) =    4.86
  EFFECTIVE AREA(ACRES) =     24.10   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       24.1       PEAK FLOW RATE(CFS) =      24.95

****************************************************************************
  FLOW PROCESS FROM NODE   7206.00 TO NODE   7206.00 IS CODE =  10
```

```
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   7220.00 TO NODE   7221.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   854.00
  ELEVATION DATA: UPSTREAM(FEET) =   3168.50  DOWNSTREAM(FEET) =   3135.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.965
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.855
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  USER-DEFINED               -        2.26      0.44     1.000     -   14.96
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      4.91
  TOTAL AREA(ACRES) =      2.26   PEAK FLOW RATE(CFS) =      4.91

****************************************************************************
  FLOW PROCESS FROM NODE   7221.00 TO NODE   7222.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3135.40  DOWNSTREAM(FEET) =   3095.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   902.00   CHANNEL SLOPE =  0.0442
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0442 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       4.91
  FLOW VELOCITY(FEET/SEC) =   2.00 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.51   Tc(MIN.) =   22.48
  LONGEST FLOWPATH FROM NODE   7220.00 TO NODE   7222.00 =    1756.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7222.00 TO NODE   7222.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   22.48
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.147
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  USER-DEFINED               -        4.32      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.32      SUBAREA RUNOFF(CFS) =    6.64
  EFFECTIVE AREA(ACRES) =      6.58   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        6.6       PEAK FLOW RATE(CFS) =      10.11

****************************************************************************
  FLOW PROCESS FROM NODE   7222.00 TO NODE   7223.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3095.50  DOWNSTREAM(FEET) =   3074.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   683.00   CHANNEL SLOPE =  0.0310
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0310 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      10.11
  FLOW VELOCITY(FEET/SEC) =   2.13 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.34   Tc(MIN.) =   27.82
  LONGEST FLOWPATH FROM NODE   7220.00 TO NODE   7223.00 =    2439.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7223.00 TO NODE   7223.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.82
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.850
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        2.32      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.32      SUBAREA RUNOFF(CFS) =    2.94
  EFFECTIVE AREA(ACRES) =      8.90   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        8.9       PEAK FLOW RATE(CFS) =      11.29

****************************************************************************
  FLOW PROCESS FROM NODE   7223.00 TO NODE   7223.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.82
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.850
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -        4.93      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.93      SUBAREA RUNOFF(CFS) =    6.25
  EFFECTIVE AREA(ACRES) =     13.83   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       13.8       PEAK FLOW RATE(CFS) =      17.55

****************************************************************************
  FLOW PROCESS FROM NODE   7223.00 TO NODE   7206.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3074.30  DOWNSTREAM(FEET) =   3045.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   843.00   CHANNEL SLOPE =  0.0343
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0343 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      17.55
  FLOW VELOCITY(FEET/SEC) =   2.69 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.22   Tc(MIN.) =   33.04
  LONGEST FLOWPATH FROM NODE   7220.00 TO NODE   7206.00 =    3282.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7206.00 TO NODE   7206.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   33.04
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.640
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED              -        2.47      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        0.47      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.94      SUBAREA RUNOFF(CFS) =    3.28
  EFFECTIVE AREA(ACRES) =     16.77   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       16.8       PEAK FLOW RATE(CFS) =      18.22

****************************************************************************
  FLOW PROCESS FROM NODE   7206.00 TO NODE   7206.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================
```

```
  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       18.22   33.04    1.640  0.43( 0.43) 1.00      16.8    7220.00
  LONGEST FLOWPATH FROM NODE   7220.00 TO NODE   7206.00 =    3282.00 FEET.

  ** MEMORY BANK #  3 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       24.95   34.58    1.588  0.44( 0.44) 1.00      24.1    7200.00
  LONGEST FLOWPATH FROM NODE   7200.00 TO NODE   7206.00 =    4435.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       43.12   33.04    1.640  0.44( 0.44) 1.00      39.8    7220.00
      2       42.39   34.58    1.588  0.44( 0.44) 1.00      40.9    7200.00
    TOTAL AREA(ACRES) =        40.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       43.12  Tc(MIN.) =   33.037
  EFFECTIVE AREA(ACRES) =     39.79  AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       40.9
  LONGEST FLOWPATH FROM NODE   7200.00 TO NODE   7206.00 =    4435.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7206.00 TO NODE   7206.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   7206.00 TO NODE   7006.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3045.40  DOWNSTREAM(FEET) =   3012.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1102.00   CHANNEL SLOPE =  0.0300
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0300 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      43.12
  FLOW VELOCITY(FEET/SEC) =   3.40 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.40   Tc(MIN.) =   38.44
  LONGEST FLOWPATH FROM NODE   7200.00 TO NODE   7006.00 =    5537.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7006.00 TO NODE   7006.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   38.44
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.475
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        0.36      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        7.43      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.19
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    7.79      SUBAREA RUNOFF(CFS) =    8.99
  EFFECTIVE AREA(ACRES) =     47.58   AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       48.7       PEAK FLOW RATE(CFS) =      46.21

********************************************************************************
  FLOW PROCESS FROM NODE   7006.00 TO NODE   7006.00 IS CODE =  11
--------------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
================================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       46.21   38.44    1.475  0.40( 0.40) 1.00      47.6    7220.00
      2       45.42   40.02    1.434  0.40( 0.40) 1.00      48.7    7200.00
  LONGEST FLOWPATH FROM NODE   7200.00 TO NODE   7006.00 =    5537.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       42.35   44.83    1.324  0.44( 0.44) 1.00      53.0    7000.00
  LONGEST FLOWPATH FROM NODE   7000.00 TO NODE   7006.00 =    6505.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       88.56   38.44    1.475  0.42( 0.42) 1.00      93.0    7220.00
      2       87.77   40.02    1.434  0.42( 0.42) 1.00      96.0    7200.00
      3       82.97   44.83    1.324  0.42( 0.42) 1.00     101.7    7000.00
    TOTAL AREA(ACRES) =       101.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       88.56  Tc(MIN.) =   38.441
  EFFECTIVE AREA(ACRES) =     93.02  AREA-AVERAGED Fm(INCH/HR) =  0.42
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      101.7
  LONGEST FLOWPATH FROM NODE   7000.00 TO NODE   7006.00 =    6505.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   7006.00 TO NODE   7006.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   7006.00 TO NODE   7006.50 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3012.30  DOWNSTREAM(FEET) =   2953.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1966.00   CHANNEL SLOPE =  0.0298
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0298 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      88.56
  FLOW VELOCITY(FEET/SEC) =   4.30 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.62   Tc(MIN.) =   46.06
  LONGEST FLOWPATH FROM NODE   7000.00 TO NODE   7006.50 =    8471.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7006.50 TO NODE   7006.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   46.06
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.300
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        5.51      0.44     1.000     -
  COMMERCIAL                 D        3.06      0.47     0.100    75
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        8.68      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.840
  SUBAREA AREA(ACRES) =   17.25      SUBAREA RUNOFF(CFS) =   16.46
  EFFECTIVE AREA(ACRES) =    110.27   AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      118.9       PEAK FLOW RATE(CFS) =      90.45

****************************************************************************
  FLOW PROCESS FROM NODE   7006.50 TO NODE   7006.50 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

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

```
 FLOW PROCESS FROM NODE   7240.00 TO NODE   7241.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   785.00
 ELEVATION DATA: UPSTREAM(FEET) =   3016.90  DOWNSTREAM(FEET) =   2990.70

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.908
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.862
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL DESERT COVER
 "DESERT BRUSH"   (30.0%)   D        3.06      0.18     1.000    91   14.91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      7.39
 TOTAL AREA(ACRES) =      3.06   PEAK FLOW RATE(CFS) =      7.39

****************************************************************************
 FLOW PROCESS FROM NODE   7241.00 TO NODE   7006.50 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   2990.70  DOWNSTREAM(FEET) =   2953.80
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1167.00   CHANNEL SLOPE =  0.0316
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0316 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =       7.39
 FLOW VELOCITY(FEET/SEC) =   1.94 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =  10.04   Tc(MIN.) =   24.94
 LONGEST FLOWPATH FROM NODE   7240.00 TO NODE   7006.50 =    1952.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   7006.50 TO NODE   7006.50 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   24.94
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.996
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D        3.51      0.47     0.100    75
 NATURAL DESERT COVER
 "DESERT BRUSH"   (30.0%)   D        6.42      0.18     1.000    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.682
  SUBAREA AREA(ACRES) =    9.93      SUBAREA RUNOFF(CFS) =   16.65
  EFFECTIVE AREA(ACRES) =     12.99   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.19  AREA-AVERAGED Ap =  0.76
  TOTAL AREA(ACRES) =       13.0       PEAK FLOW RATE(CFS) =      21.66

****************************************************************************
  FLOW PROCESS FROM NODE   7006.50 TO NODE   7006.50 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       21.66   24.94    1.996  0.19( 0.14) 0.76      13.0    7240.00
  LONGEST FLOWPATH FROM NODE   7240.00 TO NODE   7006.50 =    1952.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       90.45   46.06    1.300  0.40( 0.39) 0.98     110.3    7220.00
      2       89.61   47.66    1.269  0.40( 0.39) 0.98     113.2    7200.00
      3       84.78   52.62    1.184  0.40( 0.39) 0.98     118.9    7000.00
  LONGEST FLOWPATH FROM NODE   7000.00 TO NODE   7006.50 =    8471.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      108.09   24.94    1.996  0.37( 0.34) 0.94      72.7    7240.00
      2      103.96   46.06    1.300  0.38( 0.36) 0.95     123.3    7220.00
      3      102.76   47.66    1.269  0.38( 0.36) 0.95     126.2    7200.00
      4       96.94   52.62    1.184  0.38( 0.37) 0.96     131.9    7000.00
    TOTAL AREA(ACRES) =       131.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      108.09  Tc(MIN.) =   24.944
  EFFECTIVE AREA(ACRES) =     72.70  AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.94
  TOTAL AREA(ACRES) =      131.9
  LONGEST FLOWPATH FROM NODE   7000.00 TO NODE   7006.50 =    8471.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7006.50 TO NODE   7006.50 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   7006.50 TO NODE   7007.00 IS CODE =  37
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE CULVERT TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED CULVERT SIZE<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2953.80  DOWNSTREAM(FEET) =  2948.60
  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) =   4.00
  NUMBER OF BARREL(S) =   1
  CULVERT-FLOW VELOCITY(FEET/SEC.) =   8.60
  CULVERT-FLOW(CFS) =     108.09
  CULVERT-FLOW TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =   25.43
  LONGEST FLOWPATH FROM NODE   7000.00 TO NODE   7007.00 =    8721.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7007.00 TO NODE   6011.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2948.60  DOWNSTREAM(FEET) =   2922.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =   789.00   CHANNEL SLOPE =  0.0330
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0330 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     108.09
  FLOW VELOCITY(FEET/SEC) =   4.83 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.72   Tc(MIN.) =   28.15
  LONGEST FLOWPATH FROM NODE   7000.00 TO NODE   6011.00 =    9510.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6011.00 TO NODE   6011.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   28.15
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.834
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.02      0.98     0.100    32
  COMMERCIAL                 D        2.72      0.47     0.100    75
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        5.51      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.19
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.701
```

```
  SUBAREA AREA(ACRES) =    8.25      SUBAREA RUNOFF(CFS) =   12.61
  EFFECTIVE AREA(ACRES) =     80.95   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.35  AREA-AVERAGED Ap =  0.91
  TOTAL AREA(ACRES) =      140.1       PEAK FLOW RATE(CFS) =     110.11

****************************************************************************
  FLOW PROCESS FROM NODE   6011.00 TO NODE   6011.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      110.11   28.15    1.834  0.35( 0.32) 0.91      81.0    7240.00
      2      105.41   49.32    1.239  0.37( 0.35) 0.94     131.5    7220.00
      3      104.19   50.93    1.211  0.37( 0.35) 0.94     134.4    7200.00
      4       98.38   55.98    1.134  0.38( 0.35) 0.94     140.1    7000.00
  LONGEST FLOWPATH FROM NODE   7000.00 TO NODE   6011.00 =    9510.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      100.03   38.72    1.468  0.34( 0.31) 0.93      96.4    6300.00
      2       91.49   48.25    1.258  0.35( 0.33) 0.94     109.3    6200.00
      3       90.09   49.56    1.235  0.35( 0.33) 0.94     110.5    6000.00
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6011.00 =    9765.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      205.97   28.15    1.834  0.35( 0.32) 0.92     151.0    7240.00
      2      207.79   38.72    1.468  0.35( 0.33) 0.93     202.6    6300.00
      3      197.14   48.25    1.258  0.36( 0.34) 0.94     238.2    6200.00
      4      195.75   49.32    1.239  0.36( 0.34) 0.94     241.8    7220.00
      5      195.32   49.56    1.235  0.36( 0.34) 0.94     242.5    6000.00
      6      191.94   50.93    1.211  0.36( 0.34) 0.94     245.0    7200.00
      7      178.42   55.98    1.134  0.36( 0.34) 0.94     250.7    7000.00
    TOTAL AREA(ACRES) =       250.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      207.79  Tc(MIN.) =   38.717
  EFFECTIVE AREA(ACRES) =    202.60  AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  0.94
  TOTAL AREA(ACRES) =      250.7
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6011.00 =    9765.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6011.00 TO NODE   6011.00 IS CODE =  12
----------------------------------------------------------------------------
```

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

****************************************************************************
  FLOW PROCESS FROM NODE   6011.00 TO NODE   6011.50 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2922.60  DOWNSTREAM(FEET) =   2902.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1029.00   CHANNEL SLOPE =  0.0192
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0192 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     207.79
  FLOW VELOCITY(FEET/SEC) =   4.59 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.73   Tc(MIN.) =   42.45
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6011.50 =   10794.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6011.50 TO NODE   6011.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   42.45
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.376
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.42      0.98     0.100    32
  USER-DEFINED               -        5.88      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        5.27      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.32
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.967
  SUBAREA AREA(ACRES) =   11.57      SUBAREA RUNOFF(CFS) =   11.11
  EFFECTIVE AREA(ACRES) =    214.17   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.35  AREA-AVERAGED Ap =  0.93
  TOTAL AREA(ACRES) =      262.2       PEAK FLOW RATE(CFS) =     207.79
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   6011.50 TO NODE   6012.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2902.80  DOWNSTREAM(FEET) =  2897.90
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  33.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  25.03
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     207.79
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   42.52
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   6012.00 =   10894.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6012.00 TO NODE   1025.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2897.90  DOWNSTREAM(FEET) =   2894.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   269.00   CHANNEL SLOPE =  0.0138
  CHANNEL FLOW THRU SUBAREA(CFS) =     207.79
  FLOW VELOCITY(FEET/SEC) =   6.96 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.64   Tc(MIN.) =   43.16
  LONGEST FLOWPATH FROM NODE   6000.00 TO NODE   1025.00 =   11163.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1025.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   43.16
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.360
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.23      0.98     0.100    32
  USER-DEFINED               -        0.83      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.805
  SUBAREA AREA(ACRES) =    1.06      SUBAREA RUNOFF(CFS) =    0.95
  EFFECTIVE AREA(ACRES) =    215.23   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.35  AREA-AVERAGED Ap =  0.93
  TOTAL AREA(ACRES) =      263.3       PEAK FLOW RATE(CFS) =     207.79
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      263.3  TC(MIN.) =     43.16
  EFFECTIVE AREA(ACRES) =    215.23  AREA-AVERAGED Fm(INCH/HR)=  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.35  AREA-AVERAGED Ap = 0.929
  PEAK FLOW RATE(CFS)   =     207.79

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      205.97   32.61    1.655  0.35( 0.32) 0.92     163.7    7240.00
      2      207.79   43.16    1.360  0.35( 0.32) 0.93     215.2    6300.00
      3      197.14   52.77    1.182  0.36( 0.34) 0.94     250.9    6200.00
```

```
      4      195.75   53.85    1.165  0.36( 0.34) 0.94     254.4    7220.00
      5      195.32   54.09    1.161  0.36( 0.34) 0.94     255.1    6000.00
      6      191.94   55.50    1.141  0.36( 0.34) 0.94     257.6    7200.00
      7      178.42   60.65    1.072  0.36( 0.34) 0.94     263.3    7000.00
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```



```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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            Ver. 22.0  Release Date: 07/01/2015  License ID 1673

                          Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* APPLE VALLEY 143 ACRES - EXISTING CONDITION                           *
* 100-YR RATIONAL METHOD - WATERSHED A                                  *
* Q3 08/26/2022                                                         *
 ************************************************************************

  FILE NAME: API_00E.DAT
  TIME/DATE OF STUDY: 18:14 08/26/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.7000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.0800

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 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.*
```

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  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE   1000.00 TO NODE   1001.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   601.00
  ELEVATION DATA: UPSTREAM(FEET) =   3740.10  DOWNSTREAM(FEET) =   3640.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.730
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.859
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        7.58      0.18     1.000    91    9.73
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     25.10
  TOTAL AREA(ACRES) =      7.58   PEAK FLOW RATE(CFS) =     25.10

****************************************************************************
  FLOW PROCESS FROM NODE   1001.00 TO NODE   1002.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3640.80  DOWNSTREAM(FEET) =   3581.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1030.00   CHANNEL SLOPE =  0.0574
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0574 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      25.10
  FLOW VELOCITY(FEET/SEC) =   3.92 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.38   Tc(MIN.) =   14.11
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1002.00 =    1631.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1002.00 TO NODE   1002.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.11
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.976
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
```

```
  "DESERT BRUSH"   (30.0%)   D        5.55      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.55      SUBAREA RUNOFF(CFS) =   13.96
  EFFECTIVE AREA(ACRES) =     13.13   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       13.1       PEAK FLOW RATE(CFS) =      33.03

****************************************************************************
  FLOW PROCESS FROM NODE   1002.00 TO NODE   1002.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.11
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.976
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        5.31      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.31      SUBAREA RUNOFF(CFS) =   13.36
  EFFECTIVE AREA(ACRES) =     18.44   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       18.4       PEAK FLOW RATE(CFS) =      46.39

****************************************************************************
  FLOW PROCESS FROM NODE   1002.00 TO NODE   1003.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3581.70  DOWNSTREAM(FEET) =   3541.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   815.00   CHANNEL SLOPE =  0.0494
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0494 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      46.39
  FLOW VELOCITY(FEET/SEC) =   4.47 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.04   Tc(MIN.) =   17.14
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1003.00 =    2446.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1003.00 TO NODE   1003.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.14
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.596
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        9.25      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    9.25      SUBAREA RUNOFF(CFS) =   20.11
  EFFECTIVE AREA(ACRES) =     27.69   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       27.7       PEAK FLOW RATE(CFS) =      60.20

****************************************************************************
  FLOW PROCESS FROM NODE   1003.00 TO NODE   1004.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3541.40  DOWNSTREAM(FEET) =   3501.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   940.00   CHANNEL SLOPE =  0.0422
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0422 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      60.20
  FLOW VELOCITY(FEET/SEC) =   4.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.48   Tc(MIN.) =   20.62
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1004.00 =    3386.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1004.00 TO NODE   1004.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.62
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.281
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        9.06      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    9.06      SUBAREA RUNOFF(CFS) =   17.13
  EFFECTIVE AREA(ACRES) =     36.75   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       36.8       PEAK FLOW RATE(CFS) =      69.48

****************************************************************************
  FLOW PROCESS FROM NODE   1004.00 TO NODE   1005.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3501.70  DOWNSTREAM(FEET) =   3462.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   907.00   CHANNEL SLOPE =  0.0436
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0436 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      69.48
  FLOW VELOCITY(FEET/SEC) =   4.80 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.15   Tc(MIN.) =   23.77
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1005.00 =    4293.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1005.00 TO NODE   1005.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   23.77
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.065
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D       13.74      0.18     1.000    91
  USER-DEFINED               -        2.03      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   15.77      SUBAREA RUNOFF(CFS) =   26.27
  EFFECTIVE AREA(ACRES) =     52.52   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.19  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       52.5       PEAK FLOW RATE(CFS) =      88.61

****************************************************************************
  FLOW PROCESS FROM NODE   1005.00 TO NODE   1006.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3462.20  DOWNSTREAM(FEET) =   3384.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1877.00   CHANNEL SLOPE =  0.0417
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0417 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      88.61
  FLOW VELOCITY(FEET/SEC) =   5.09 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.15   Tc(MIN.) =   29.92
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1006.00 =    6170.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1006.00 TO NODE   1006.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
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```
  MAINLINE Tc(MIN.) =   29.92
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.758
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        5.17      0.18     1.000    91
  USER-DEFINED                -       18.98      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.38
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   24.15      SUBAREA RUNOFF(CFS) =   29.85
  EFFECTIVE AREA(ACRES) =     76.67   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       76.7       PEAK FLOW RATE(CFS) =     103.95

****************************************************************************
  FLOW PROCESS FROM NODE   1006.00 TO NODE   1007.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3384.00  DOWNSTREAM(FEET) =   3346.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1010.00   CHANNEL SLOPE =  0.0368
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0368 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     103.95
  FLOW VELOCITY(FEET/SEC) =   5.05 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.34   Tc(MIN.) =   33.26
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1007.00 =    7180.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1007.00 TO NODE   1007.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   33.26
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.632
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED                -        6.62      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    6.62      SUBAREA RUNOFF(CFS) =    7.10
  EFFECTIVE AREA(ACRES) =     83.29   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       83.3       PEAK FLOW RATE(CFS) =     103.95
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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

```
  FLOW PROCESS FROM NODE   1007.00 TO NODE   1008.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3346.80  DOWNSTREAM(FEET) =   3224.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  3042.00   CHANNEL SLOPE =  0.0404
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0404 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     103.95
  FLOW VELOCITY(FEET/SEC) =   5.28 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   9.60   Tc(MIN.) =   42.86
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1008.00 =   10222.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1008.00 TO NODE   1008.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   42.86
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.367
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       20.17      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B       27.64      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.38
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   47.81      SUBAREA RUNOFF(CFS) =   42.27
  EFFECTIVE AREA(ACRES) =    131.10   AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.31  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      131.1       PEAK FLOW RATE(CFS) =     124.76

****************************************************************************
  FLOW PROCESS FROM NODE   1008.00 TO NODE   1009.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3224.00  DOWNSTREAM(FEET) =   3143.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2349.00   CHANNEL SLOPE =  0.0344
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0344 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     124.76
  FLOW VELOCITY(FEET/SEC) =   5.18 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.56   Tc(MIN.) =   50.41
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1009.00 =   12571.00 FEET.

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

```
 FLOW PROCESS FROM NODE   1009.00 TO NODE   1009.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   50.41
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.220
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -       29.88      0.44     1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   29.88      SUBAREA RUNOFF(CFS) =   20.97
 EFFECTIVE AREA(ACRES) =    160.98   AREA-AVERAGED Fm(INCH/HR) =  0.33
 AREA-AVERAGED Fp(INCH/HR) =  0.33  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      161.0       PEAK FLOW RATE(CFS) =     128.41

****************************************************************************
 FLOW PROCESS FROM NODE   1009.00 TO NODE   1010.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   3143.20  DOWNSTREAM(FEET) =   3093.80
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1460.00   CHANNEL SLOPE =  0.0338
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0338 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =     128.41
 FLOW VELOCITY(FEET/SEC) =   5.19 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   4.69   Tc(MIN.) =   55.10
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1010.00 =   14031.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1010.00 TO NODE   1010.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   55.10
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.146
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 USER-DEFINED               -       20.56      0.44     1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   20.56      SUBAREA RUNOFF(CFS) =   13.07
 EFFECTIVE AREA(ACRES) =    181.54   AREA-AVERAGED Fm(INCH/HR) =  0.35
 AREA-AVERAGED Fp(INCH/HR) =  0.35  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =      181.5       PEAK FLOW RATE(CFS) =     130.81
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1010.00 TO NODE   1011.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3093.80  DOWNSTREAM(FEET) =   3059.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   945.00   CHANNEL SLOPE =  0.0360
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0360 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     130.81
  FLOW VELOCITY(FEET/SEC) =   5.38 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.93   Tc(MIN.) =   58.03
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1011.00 =   14976.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1011.00 TO NODE   1011.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   58.03
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.106
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       15.78      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   15.78      SUBAREA RUNOFF(CFS) =    9.45
  EFFECTIVE AREA(ACRES) =    197.32   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.35  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      197.3       PEAK FLOW RATE(CFS) =     133.60

****************************************************************************
  FLOW PROCESS FROM NODE   1011.00 TO NODE   1011.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1200.00 TO NODE   1200.50 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   579.00
  ELEVATION DATA: UPSTREAM(FEET) =   3502.00  DOWNSTREAM(FEET) =   3481.90

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.096
```

```
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.134
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  USER-DEFINED               -        1.71      0.44     1.000     -   13.10
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        0.82      0.18     1.000    91   13.10
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.36
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      6.33
  TOTAL AREA(ACRES) =      2.53   PEAK FLOW RATE(CFS) =      6.33

****************************************************************************
  FLOW PROCESS FROM NODE   1200.50 TO NODE   1201.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3481.90  DOWNSTREAM(FEET) =   3461.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   579.00   CHANNEL SLOPE =  0.0347
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0347 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       6.33
  FLOW VELOCITY(FEET/SEC) =   1.93 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.00   Tc(MIN.) =   18.10
  LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1201.00 =    1158.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1201.00 TO NODE   1201.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.10
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.499
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        0.82      0.18     1.000    91
  USER-DEFINED               -        1.71      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.36
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.53      SUBAREA RUNOFF(CFS) =    4.88
  EFFECTIVE AREA(ACRES) =      5.06   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        5.1       PEAK FLOW RATE(CFS) =       9.76

****************************************************************************
  FLOW PROCESS FROM NODE   1201.00 TO NODE   1201.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   18.10
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.499
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        2.01      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        3.12      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.13      SUBAREA RUNOFF(CFS) =   10.24
  EFFECTIVE AREA(ACRES) =     10.19   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.32  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       10.2       PEAK FLOW RATE(CFS) =      20.00

********************************************************************************
  FLOW PROCESS FROM NODE   1201.00 TO NODE   1202.00 IS CODE =  53
--------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3461.80  DOWNSTREAM(FEET) =   3398.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1417.00   CHANNEL SLOPE =  0.0450
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0450 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      20.00
  FLOW VELOCITY(FEET/SEC) =   3.22 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.34   Tc(MIN.) =   25.43
  LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1202.00 =    2575.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE   1202.00 TO NODE   1202.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   25.43
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.969
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       15.53      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.01      0.34     1.000    82
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        3.04      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   18.58      SUBAREA RUNOFF(CFS) =   26.28
```

```
  EFFECTIVE AREA(ACRES) =     28.77   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       28.8       PEAK FLOW RATE(CFS) =      41.42

****************************************************************************
  FLOW PROCESS FROM NODE   1202.00 TO NODE   1203.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3398.10  DOWNSTREAM(FEET) =   3338.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1400.00   CHANNEL SLOPE =  0.0429
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0429 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      41.42
  FLOW VELOCITY(FEET/SEC) =   4.01 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.82   Tc(MIN.) =   31.25
  LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1203.00 =    3975.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1203.00 TO NODE   1203.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   31.25
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.705
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       12.43      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        7.71      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   20.14      SUBAREA RUNOFF(CFS) =   23.59
  EFFECTIVE AREA(ACRES) =     48.91   AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       48.9       PEAK FLOW RATE(CFS) =      58.17

****************************************************************************
  FLOW PROCESS FROM NODE   1203.00 TO NODE   1204.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3338.00  DOWNSTREAM(FEET) =   3300.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   871.00   CHANNEL SLOPE =  0.0426
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0426 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      58.17
```

```
  FLOW VELOCITY(FEET/SEC) =   4.47 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.25   Tc(MIN.) =   34.50
  LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1204.00 =    4846.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1204.00 TO NODE   1204.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   34.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.591
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        8.76      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        6.27      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   15.03      SUBAREA RUNOFF(CFS) =   16.11
  EFFECTIVE AREA(ACRES) =     63.94   AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.39  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       63.9       PEAK FLOW RATE(CFS) =      69.26

****************************************************************************
  FLOW PROCESS FROM NODE   1204.00 TO NODE   1205.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3300.90  DOWNSTREAM(FEET) =   3261.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1210.00   CHANNEL SLOPE =  0.0322
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0322 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      69.26
  FLOW VELOCITY(FEET/SEC) =   4.12 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.89   Tc(MIN.) =   39.39
  LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1205.00 =    6056.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1205.00 TO NODE   1205.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   39.39
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.450
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        9.86      0.44     1.000     -
```

```
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        2.36      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   12.22      SUBAREA RUNOFF(CFS) =   11.31
  EFFECTIVE AREA(ACRES) =     76.16   AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.39  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       76.2       PEAK FLOW RATE(CFS) =      72.46

****************************************************************************
  FLOW PROCESS FROM NODE   1205.00 TO NODE   1206.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3261.90  DOWNSTREAM(FEET) =   3220.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1019.00   CHANNEL SLOPE =  0.0411
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0411 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      72.46
  FLOW VELOCITY(FEET/SEC) =   4.73 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.59   Tc(MIN.) =   42.98
  LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1206.00 =    7075.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1206.00 TO NODE   1206.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   42.98
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.364
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       13.25      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   13.25      SUBAREA RUNOFF(CFS) =   11.02
  EFFECTIVE AREA(ACRES) =     89.41   AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       89.4       PEAK FLOW RATE(CFS) =      77.58

****************************************************************************
  FLOW PROCESS FROM NODE   1206.00 TO NODE   1207.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3220.00  DOWNSTREAM(FEET) =   3180.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   832.00   CHANNEL SLOPE =  0.0472
```

```
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0472 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      77.58
  FLOW VELOCITY(FEET/SEC) =   5.18 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.68   Tc(MIN.) =   45.66
  LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1207.00 =    7907.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1207.00 TO NODE   1207.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   45.66
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.308
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -       14.84      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   14.84      SUBAREA RUNOFF(CFS) =   11.59
  EFFECTIVE AREA(ACRES) =    104.25   AREA-AVERAGED Fm(INCH/HR) =  0.41
  AREA-AVERAGED Fp(INCH/HR) =  0.41  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      104.2       PEAK FLOW RATE(CFS) =      84.63

****************************************************************************
  FLOW PROCESS FROM NODE   1207.00 TO NODE   1208.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3180.70  DOWNSTREAM(FEET) =   3126.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1559.00   CHANNEL SLOPE =  0.0350
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0350 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      84.63
  FLOW VELOCITY(FEET/SEC) =   4.59 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.66   Tc(MIN.) =   51.31
  LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1208.00 =    9466.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1208.00 TO NODE   1208.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   51.31
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.205
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  USER-DEFINED               -       16.67      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   16.67      SUBAREA RUNOFF(CFS) =   11.47
  EFFECTIVE AREA(ACRES) =    120.92   AREA-AVERAGED Fm(INCH/HR) =  0.41
  AREA-AVERAGED Fp(INCH/HR) =  0.41  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      120.9       PEAK FLOW RATE(CFS) =      86.47

****************************************************************************
  FLOW PROCESS FROM NODE   1208.00 TO NODE   1209.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3126.10  DOWNSTREAM(FEET) =   3091.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1009.00   CHANNEL SLOPE =  0.0344
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0344 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      86.47
  FLOW VELOCITY(FEET/SEC) =   4.59 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.67   Tc(MIN.) =   54.98
  LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1209.00 =   10475.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1209.00 TO NODE   1209.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   54.98
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.148
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        6.45      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    6.45      SUBAREA RUNOFF(CFS) =    4.11
  EFFECTIVE AREA(ACRES) =    127.37   AREA-AVERAGED Fm(INCH/HR) =  0.41
  AREA-AVERAGED Fp(INCH/HR) =  0.41  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      127.4       PEAK FLOW RATE(CFS) =      86.47
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1209.00 TO NODE   1210.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3091.40  DOWNSTREAM(FEET) =   3059.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   894.00   CHANNEL SLOPE =  0.0353
```

```
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0353 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      86.47
  FLOW VELOCITY(FEET/SEC) =   4.65 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.21   Tc(MIN.) =   58.19
  LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1210.00 =   11369.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1210.00 TO NODE   1210.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   58.19
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.103
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.39      0.98     0.100    32
  USER-DEFINED               -        3.65      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.46
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.752
  SUBAREA AREA(ACRES) =    5.04      SUBAREA RUNOFF(CFS) =    3.44
  EFFECTIVE AREA(ACRES) =    132.41   AREA-AVERAGED Fm(INCH/HR) =  0.41
  AREA-AVERAGED Fp(INCH/HR) =  0.41  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =      132.4       PEAK FLOW RATE(CFS) =      86.47
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1210.00 TO NODE   1210.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       86.47   58.19    1.103  0.41( 0.41) 0.99     132.4    1200.00
  LONGEST FLOWPATH FROM NODE   1200.00 TO NODE   1210.00 =   11369.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      133.60   58.03    1.106  0.35( 0.35) 1.00     197.3    1000.00
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1210.00 =   14976.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      220.07   58.03    1.106  0.38( 0.38) 1.00     329.4    1000.00
      2      219.69   58.19    1.103  0.38( 0.38) 1.00     329.7    1200.00
```

```
    TOTAL AREA(ACRES) =       329.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      220.07  Tc(MIN.) =   58.028
  EFFECTIVE AREA(ACRES) =    329.37  AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      329.7
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1210.00 =   14976.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1210.00 TO NODE   1210.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1210.00 TO NODE   1011.50 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3059.80  DOWNSTREAM(FEET) =   3052.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   500.00   CHANNEL SLOPE =  0.0156
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0156 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     220.07
  FLOW VELOCITY(FEET/SEC) =   4.22 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.98   Tc(MIN.) =   60.01
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1011.50 =   15476.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1011.50 TO NODE   1011.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   60.01
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.080
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        3.92      0.98     0.100    32
  USER-DEFINED               -        2.61      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.51
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.460
  SUBAREA AREA(ACRES) =    6.53      SUBAREA RUNOFF(CFS) =    4.97
  EFFECTIVE AREA(ACRES) =    335.90   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =      336.3       PEAK FLOW RATE(CFS) =     220.07
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1011.50 TO NODE   1012.00 IS CODE =  37
----------------------------------------------------------------------------
  >>>>>COMPUTE CULVERT TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED CULVERT SIZE<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3052.00  DOWNSTREAM(FEET) =  3049.90
  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) =   5.50
  NUMBER OF BARREL(S) =   1
  CULVERT-FLOW VELOCITY(FEET/SEC.) =   9.26
  CULVERT-FLOW(CFS) =     220.07
  CULVERT-FLOW TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =   60.46
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1012.00 =   15726.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1012.00 TO NODE   1013.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3049.90  DOWNSTREAM(FEET) =   3027.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   516.00   CHANNEL SLOPE =  0.0426
  CHANNEL FLOW THRU SUBAREA(CFS) =     220.07
  FLOW VELOCITY(FEET/SEC) =  12.47 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.69   Tc(MIN.) =   61.14
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1013.00 =   16242.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1013.00 TO NODE   1013.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   61.14
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.066
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.17      0.98     0.100    32
  COMMERCIAL                 B        0.73      0.75     0.100    56
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.68      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.487
```

```
  SUBAREA AREA(ACRES) =    1.58      SUBAREA RUNOFF(CFS) =    1.24
  EFFECTIVE AREA(ACRES) =    337.48   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      337.8       PEAK FLOW RATE(CFS) =     220.07
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1013.00 TO NODE   1013.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1300.00 TO NODE   1301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   324.00
  ELEVATION DATA: UPSTREAM(FEET) =   3055.40  DOWNSTREAM(FEET) =   3040.90

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.714
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.601
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.15      0.98     0.100    32    5.71
  COMMERCIAL                 B        0.20      0.75     0.100    56    5.71
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.04      0.34     1.000    82    9.87
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.58
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.192
  SUBAREA RUNOFF(CFS) =      1.93
  TOTAL AREA(ACRES) =      0.39   PEAK FLOW RATE(CFS) =      1.93

****************************************************************************
  FLOW PROCESS FROM NODE   1301.00 TO NODE   1013.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3040.90  DOWNSTREAM(FEET) =   3027.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   387.00   CHANNEL SLOPE =  0.0336
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.93
  FLOW VELOCITY(FEET/SEC) =   3.13 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.06   Tc(MIN.) =    7.77
  LONGEST FLOWPATH FROM NODE   1300.00 TO NODE   1013.00 =     711.00 FEET.

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

```
  FLOW PROCESS FROM NODE   1013.00 TO NODE   1013.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.77
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.515
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.76      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.76      SUBAREA RUNOFF(CFS) =    2.85
  EFFECTIVE AREA(ACRES) =      1.15   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.73
  TOTAL AREA(ACRES) =        1.1       PEAK FLOW RATE(CFS) =       4.40

****************************************************************************
  FLOW PROCESS FROM NODE   1013.00 TO NODE   1013.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        4.40    7.77    4.515  0.37( 0.27) 0.73       1.1    1300.00
  LONGEST FLOWPATH FROM NODE   1300.00 TO NODE   1013.00 =     711.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      220.07   61.14    1.066  0.38( 0.37) 0.98     337.5    1000.00
      2      219.69   61.31    1.064  0.38( 0.37) 0.98     337.8    1200.00
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1013.00 =   16242.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      171.52    7.77    4.515  0.38( 0.37) 0.98      44.1    1300.00
      2      220.90   61.14    1.066  0.38( 0.37) 0.98     338.6    1000.00
      3      220.52   61.31    1.064  0.38( 0.37) 0.98     339.0    1200.00
    TOTAL AREA(ACRES) =       339.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      220.90  Tc(MIN.) =   61.144
  EFFECTIVE AREA(ACRES) =    338.63  AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      339.0
```

```
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1013.00 =   16242.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1013.00 TO NODE   1014.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   3027.90  DOWNSTREAM(FEET) =   2997.30
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1227.00   CHANNEL SLOPE =  0.0249
 CHANNEL FLOW THRU SUBAREA(CFS) =     220.90
 FLOW VELOCITY(FEET/SEC) =   9.55 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.14   Tc(MIN.) =   63.29
 LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1014.00 =   17469.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1014.00 TO NODE   1014.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   63.29
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.040
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL DESERT COVER
 "DESERT BRUSH"   (30.0%)   B        3.93      0.34     1.000    82
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    3.93      SUBAREA RUNOFF(CFS) =    2.46
 EFFECTIVE AREA(ACRES) =    342.56   AREA-AVERAGED Fm(INCH/HR) =  0.37
 AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  0.98
 TOTAL AREA(ACRES) =      342.9       PEAK FLOW RATE(CFS) =     220.90
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE   1014.00 TO NODE   1014.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE   1014.00 TO NODE   1014.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE   1310.00 TO NODE   1311.00 IS CODE =  21
----------------------------------------------------------------------------
```

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   557.00
  ELEVATION DATA: UPSTREAM(FEET) =   3063.00  DOWNSTREAM(FEET) =   3040.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.250
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.741
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.94      0.98     0.100    32    7.25
  COMMERCIAL                 B        0.06      0.75     0.100    56    7.25
  USER-DEFINED               -        0.18      0.44     1.000     -   12.52
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.27      0.34     1.000    82   12.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.49
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.379
  SUBAREA RUNOFF(CFS) =      5.95
  TOTAL AREA(ACRES) =      1.45   PEAK FLOW RATE(CFS) =      5.95

********************************************************************************
  FLOW PROCESS FROM NODE   1311.00 TO NODE   1312.00 IS CODE =  52
--------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3040.60  DOWNSTREAM(FEET) =   3022.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   683.00   CHANNEL SLOPE =  0.0261
  CHANNEL FLOW THRU SUBAREA(CFS) =       5.95
  FLOW VELOCITY(FEET/SEC) =   3.55 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.21   Tc(MIN.) =   10.46
  LONGEST FLOWPATH FROM NODE   1310.00 TO NODE   1312.00 =    1240.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE   1312.00 TO NODE   1312.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   10.46
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.669
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.33      0.98     0.100    32
  COMMERCIAL                 B        0.26      0.75     0.100    56
  USER-DEFINED               -        0.33      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        3.41      0.34     1.000    82
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.36
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.877
  SUBAREA AREA(ACRES) =    4.33      SUBAREA RUNOFF(CFS) =   13.06
  EFFECTIVE AREA(ACRES) =      5.78   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  0.75
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      17.61

****************************************************************************
  FLOW PROCESS FROM NODE   1312.00 TO NODE   1014.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3022.80  DOWNSTREAM(FEET) =   2997.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   965.00   CHANNEL SLOPE =  0.0264
  CHANNEL FLOW THRU SUBAREA(CFS) =      17.61
  FLOW VELOCITY(FEET/SEC) =   4.71 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.42   Tc(MIN.) =   13.87
  LONGEST FLOWPATH FROM NODE   1310.00 TO NODE   1014.00 =    2205.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1014.00 TO NODE   1014.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.87
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.010
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        2.21      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.21      SUBAREA RUNOFF(CFS) =    5.30
  EFFECTIVE AREA(ACRES) =      7.99   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.82
  TOTAL AREA(ACRES) =        8.0       PEAK FLOW RATE(CFS) =      19.49

****************************************************************************
  FLOW PROCESS FROM NODE   1014.00 TO NODE   1014.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       19.49   13.87    3.010  0.37( 0.30) 0.82       8.0    1310.00
  LONGEST FLOWPATH FROM NODE   1310.00 TO NODE   1014.00 =    2205.00 FEET.
```

```
  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      171.52   10.09    3.762  0.38( 0.37) 0.98      48.0    1300.00
      2      220.90   63.29    1.040  0.38( 0.37) 0.98     342.6    1000.00
      3      220.52   63.45    1.039  0.38( 0.37) 0.98     342.9    1200.00
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1014.00 =   17469.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      189.62   10.09    3.762  0.37( 0.36) 0.96      53.8    1300.00
      2      194.52   13.87    3.010  0.37( 0.36) 0.96      76.9    1310.00
      3      226.22   63.29    1.040  0.38( 0.37) 0.98     350.5    1000.00
      4      225.83   63.45    1.039  0.38( 0.37) 0.98     350.9    1200.00
    TOTAL AREA(ACRES) =       350.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      226.22  Tc(MIN.) =   63.285
  EFFECTIVE AREA(ACRES) =    350.55  AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      350.9
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1014.00 =   17469.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1014.00 TO NODE   1014.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1014.00 TO NODE   1015.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2997.30  DOWNSTREAM(FEET) =   2984.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   549.00   CHANNEL SLOPE =  0.0240
  CHANNEL FLOW THRU SUBAREA(CFS) =     226.22
  FLOW VELOCITY(FEET/SEC) =   9.45 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.97   Tc(MIN.) =   64.25
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1015.00 =   18018.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1015.00 TO NODE   1015.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   64.25
```

```
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.029
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        3.13      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.13      SUBAREA RUNOFF(CFS) =    1.93
  EFFECTIVE AREA(ACRES) =    353.68   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      354.0       PEAK FLOW RATE(CFS) =     226.22
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1015.00 TO NODE   1015.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1320.00 TO NODE   1321.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   459.00
  ELEVATION DATA: UPSTREAM(FEET) =   3044.40  DOWNSTREAM(FEET) =   3029.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.079
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.317
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.65      0.34     1.000    82   12.08
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.74
  TOTAL AREA(ACRES) =      0.65   PEAK FLOW RATE(CFS) =      1.74

****************************************************************************
  FLOW PROCESS FROM NODE   1321.00 TO NODE   1322.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3029.40  DOWNSTREAM(FEET) =   3018.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   399.00   CHANNEL SLOPE =  0.0278
```

```
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.74
  FLOW VELOCITY(FEET/SEC) =   2.79 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.38   Tc(MIN.) =   14.46
  LONGEST FLOWPATH FROM NODE   1320.00 TO NODE   1322.00 =     858.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1322.00 TO NODE   1322.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.46
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.924
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        1.31      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.31      SUBAREA RUNOFF(CFS) =    3.04
  EFFECTIVE AREA(ACRES) =      1.96   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        2.0       PEAK FLOW RATE(CFS) =       4.55

****************************************************************************
  FLOW PROCESS FROM NODE   1322.00 TO NODE   1323.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3018.30  DOWNSTREAM(FEET) =   2998.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   786.00   CHANNEL SLOPE =  0.0254
  CHANNEL FLOW THRU SUBAREA(CFS) =       4.55
  FLOW VELOCITY(FEET/SEC) =   3.29 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.98   Tc(MIN.) =   18.44
  LONGEST FLOWPATH FROM NODE   1320.00 TO NODE   1323.00 =    1644.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1323.00 TO NODE   1323.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.44
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.466
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        3.17      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.17      SUBAREA RUNOFF(CFS) =    6.05
  EFFECTIVE AREA(ACRES) =      5.13   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        5.1       PEAK FLOW RATE(CFS) =       9.80

****************************************************************************
  FLOW PROCESS FROM NODE   1323.00 TO NODE   1015.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2998.30  DOWNSTREAM(FEET) =   2984.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   596.00   CHANNEL SLOPE =  0.0238
  CHANNEL FLOW THRU SUBAREA(CFS) =       9.80
  FLOW VELOCITY(FEET/SEC) =   3.84 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.59   Tc(MIN.) =   21.03
  LONGEST FLOWPATH FROM NODE   1320.00 TO NODE   1015.00 =    2240.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1015.00 TO NODE   1015.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.03
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.250
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        3.16      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.16      SUBAREA RUNOFF(CFS) =    5.42
  EFFECTIVE AREA(ACRES) =      8.29   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        8.3       PEAK FLOW RATE(CFS) =      14.22

****************************************************************************
  FLOW PROCESS FROM NODE   1015.00 TO NODE   1015.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       14.22   21.03    2.250  0.34( 0.34) 1.00       8.3    1320.00
  LONGEST FLOWPATH FROM NODE   1320.00 TO NODE   1015.00 =    2240.00 FEET.
```

```
  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      189.62   11.11    3.516  0.37( 0.36) 0.96      56.9    1300.00
      2      194.52   14.89    2.865  0.37( 0.36) 0.96      80.1    1310.00
      3      226.22   64.25    1.029  0.38( 0.37) 0.98     353.7    1000.00
      4      225.83   64.42    1.028  0.38( 0.37) 0.98     354.0    1200.00
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1015.00 =   18018.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      202.13   11.11    3.516  0.37( 0.36) 0.97      61.3    1300.00
      2      207.84   14.89    2.865  0.37( 0.36) 0.97      85.9    1310.00
      3      212.68   21.03    2.250  0.37( 0.36) 0.97     122.4    1320.00
      4      231.34   64.25    1.029  0.38( 0.37) 0.98     362.0    1000.00
      5      230.93   64.42    1.028  0.38( 0.37) 0.98     362.3    1200.00
    TOTAL AREA(ACRES) =       362.3

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      231.34  Tc(MIN.) =   64.254
  EFFECTIVE AREA(ACRES) =    361.97  AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      362.3
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1015.00 =   18018.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1015.00 TO NODE   1015.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1015.00 TO NODE   1016.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2984.10  DOWNSTREAM(FEET) =   2947.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1806.00   CHANNEL SLOPE =  0.0204
  CHANNEL FLOW THRU SUBAREA(CFS) =     231.34
  FLOW VELOCITY(FEET/SEC) =   8.76 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.44   Tc(MIN.) =   67.69
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1016.00 =   19824.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1016.00 TO NODE   1016.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
  MAINLINE Tc(MIN.) =   67.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  0.993
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B       12.04      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   12.04      SUBAREA RUNOFF(CFS) =    7.03
  EFFECTIVE AREA(ACRES) =    374.01   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      374.4       PEAK FLOW RATE(CFS) =     231.34
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1016.00 TO NODE   1016.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1330.00 TO NODE   1331.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   962.00
  ELEVATION DATA: UPSTREAM(FEET) =   3005.30  DOWNSTREAM(FEET) =   2978.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   16.791
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.634
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        2.43      0.34     1.000    82   16.79
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      5.01
  TOTAL AREA(ACRES) =      2.43   PEAK FLOW RATE(CFS) =      5.01

****************************************************************************
  FLOW PROCESS FROM NODE   1331.00 TO NODE   1016.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2978.70  DOWNSTREAM(FEET) =   2947.30
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1538.00   CHANNEL SLOPE =  0.0204
  CHANNEL FLOW THRU SUBAREA(CFS) =       5.01
  FLOW VELOCITY(FEET/SEC) =   3.02 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   8.50   Tc(MIN.) =   25.29
  LONGEST FLOWPATH FROM NODE   1330.00 TO NODE   1016.00 =    2500.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1016.00 TO NODE   1016.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   25.29
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.977
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        7.23      0.34     1.000    82
  USER-DEFINED               -        0.01      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    7.24      SUBAREA RUNOFF(CFS) =   10.64
  EFFECTIVE AREA(ACRES) =      9.67   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        9.7       PEAK FLOW RATE(CFS) =      14.21

****************************************************************************
  FLOW PROCESS FROM NODE   1016.00 TO NODE   1016.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       14.21   25.29    1.977  0.34( 0.34) 1.00       9.7    1330.00
  LONGEST FLOWPATH FROM NODE   1330.00 TO NODE   1016.00 =    2500.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      202.13   14.70    2.891  0.37( 0.36) 0.97      73.4    1300.00
      2      207.84   18.44    2.466  0.37( 0.36) 0.97      98.0    1310.00
      3      212.68   24.56    2.018  0.37( 0.36) 0.97     134.4    1320.00
      4      231.34   67.69    0.993  0.38( 0.37) 0.98     374.0    1000.00
      5      230.93   67.85    0.991  0.38( 0.37) 0.98     374.4    1200.00
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1016.00 =   19824.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
```

```
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      215.01   14.70    2.891  0.36( 0.35) 0.97      79.0    1300.00
     2      221.30   18.44    2.466  0.37( 0.36) 0.97     105.0    1310.00
     3      226.83   24.56    2.018  0.37( 0.36) 0.97     143.8    1320.00
     4      227.21   25.29    1.977  0.37( 0.36) 0.97     148.2    1330.00
     5      236.98   67.69    0.993  0.37( 0.37) 0.98     383.7    1000.00
     6      236.56   67.85    0.991  0.37( 0.37) 0.98     384.0    1200.00
   TOTAL AREA(ACRES) =       384.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      236.98  Tc(MIN.) =   67.690
  EFFECTIVE AREA(ACRES) =    383.68  AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      384.0
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1016.00 =   19824.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1016.00 TO NODE   1016.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1016.00 TO NODE   1017.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2947.30  DOWNSTREAM(FEET) =   2929.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   749.00   CHANNEL SLOPE =  0.0239
  CHANNEL FLOW THRU SUBAREA(CFS) =     236.98
  FLOW VELOCITY(FEET/SEC) =   9.56 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.31   Tc(MIN.) =   69.00
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1017.00 =   20573.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1017.00 TO NODE   1017.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   69.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  0.979
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        3.04      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.62      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
```

```
  SUBAREA AREA(ACRES) =    3.66      SUBAREA RUNOFF(CFS) =    1.83
  EFFECTIVE AREA(ACRES) =    387.34   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      387.7       PEAK FLOW RATE(CFS) =     236.98
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1017.00 TO NODE   1017.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1340.00 TO NODE   1341.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   913.00
  ELEVATION DATA: UPSTREAM(FEET) =   3006.40  DOWNSTREAM(FEET) =   2981.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   16.437
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.673
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        2.45      0.34     1.000    82   16.44
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      5.14
  TOTAL AREA(ACRES) =      2.45   PEAK FLOW RATE(CFS) =      5.14

****************************************************************************
  FLOW PROCESS FROM NODE   1341.00 TO NODE   1342.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2981.10  DOWNSTREAM(FEET) =   2963.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   817.00   CHANNEL SLOPE =  0.0213
  CHANNEL FLOW THRU SUBAREA(CFS) =       5.14
  FLOW VELOCITY(FEET/SEC) =   3.10 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.39   Tc(MIN.) =   20.83
  LONGEST FLOWPATH FROM NODE   1340.00 TO NODE   1342.00 =    1730.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1342.00 TO NODE   1342.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   20.83
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.265
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        3.81      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.81      SUBAREA RUNOFF(CFS) =    6.59
  EFFECTIVE AREA(ACRES) =      6.26   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        6.3       PEAK FLOW RATE(CFS) =      10.82

********************************************************************************
  FLOW PROCESS FROM NODE   1342.00 TO NODE   1017.00 IS CODE =  52
--------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2963.70  DOWNSTREAM(FEET) =   2929.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1663.00   CHANNEL SLOPE =  0.0206
  CHANNEL FLOW THRU SUBAREA(CFS) =      10.82
  FLOW VELOCITY(FEET/SEC) =   3.66 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.57   Tc(MIN.) =   28.40
  LONGEST FLOWPATH FROM NODE   1340.00 TO NODE   1017.00 =    3393.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE   1017.00 TO NODE   1017.00 IS CODE =  81
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   28.40
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.823
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        2.65      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B       13.62      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.36
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   16.27      SUBAREA RUNOFF(CFS) =   21.43
  EFFECTIVE AREA(ACRES) =     22.53   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       22.5       PEAK FLOW RATE(CFS) =      29.76

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

```
  FLOW PROCESS FROM NODE   1017.00 TO NODE   1017.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       29.76   28.40    1.823  0.36( 0.36) 1.00      22.5    1340.00
  LONGEST FLOWPATH FROM NODE   1340.00 TO NODE   1017.00 =    3393.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      215.01   16.04    2.719  0.37( 0.36) 0.97      82.6    1300.00
      2      221.30   19.78    2.349  0.37( 0.36) 0.97     108.7    1310.00
      3      226.83   25.88    1.945  0.37( 0.36) 0.97     147.5    1320.00
      4      227.21   26.62    1.908  0.37( 0.36) 0.97     151.8    1330.00
      5      236.98   69.00    0.979  0.38( 0.37) 0.98     387.3    1000.00
      6      236.56   69.16    0.978  0.38( 0.37) 0.98     387.7    1200.00
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1017.00 =   20573.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      242.09   16.04    2.719  0.37( 0.36) 0.98      95.4    1300.00
      2      249.45   19.78    2.349  0.37( 0.36) 0.98     124.4    1310.00
      3      256.22   25.88    1.945  0.37( 0.36) 0.98     168.0    1320.00
      4      256.72   26.62    1.908  0.37( 0.36) 0.98     173.0    1330.00
      5      257.39   28.40    1.823  0.37( 0.36) 0.98     184.3    1340.00
      6      249.63   69.00    0.979  0.37( 0.37) 0.98     409.9    1000.00
      7      249.18   69.16    0.978  0.37( 0.37) 0.98     410.2    1200.00
    TOTAL AREA(ACRES) =       410.2

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      257.39  Tc(MIN.) =   28.400
  EFFECTIVE AREA(ACRES) =    184.29  AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      410.2
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1017.00 =   20573.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1017.00 TO NODE   1017.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1017.00 TO NODE   1018.00 IS CODE =  52
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2929.40  DOWNSTREAM(FEET) =   2922.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   702.00   CHANNEL SLOPE =  0.0100
  CHANNEL FLOW THRU SUBAREA(CFS) =     257.39
  FLOW VELOCITY(FEET/SEC) =   6.34 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.85   Tc(MIN.) =   30.25
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1018.00 =   21275.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1018.00 TO NODE   1018.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   30.25
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.744
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.20      0.98     0.100    32
  USER-DEFINED               -        0.91      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        2.39      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.37
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.949
  SUBAREA AREA(ACRES) =    3.50      SUBAREA RUNOFF(CFS) =    4.38
  EFFECTIVE AREA(ACRES) =    187.79   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      413.7       PEAK FLOW RATE(CFS) =     257.39
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1018.00 TO NODE   1018.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1350.00 TO NODE   1351.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   705.00
  ELEVATION DATA: UPSTREAM(FEET) =   2976.70  DOWNSTREAM(FEET) =   2955.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.609
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.903
```

```
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        2.49      0.34     1.000    82   14.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      5.74
  TOTAL AREA(ACRES) =      2.49   PEAK FLOW RATE(CFS) =      5.74

****************************************************************************
  FLOW PROCESS FROM NODE   1351.00 TO NODE   1352.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2955.70  DOWNSTREAM(FEET) =   2943.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   630.00   CHANNEL SLOPE =  0.0189
  CHANNEL FLOW THRU SUBAREA(CFS) =       5.74
  FLOW VELOCITY(FEET/SEC) =   3.00 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.51   Tc(MIN.) =   18.11
  LONGEST FLOWPATH FROM NODE   1350.00 TO NODE   1352.00 =    1335.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1352.00 TO NODE   1352.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.11
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.498
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        4.25      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.25      SUBAREA RUNOFF(CFS) =    8.24
  EFFECTIVE AREA(ACRES) =      6.74   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        6.7       PEAK FLOW RATE(CFS) =      13.06

****************************************************************************
  FLOW PROCESS FROM NODE   1352.00 TO NODE   1018.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2943.80  DOWNSTREAM(FEET) =   2922.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   832.00   CHANNEL SLOPE =  0.0257
```

```
  CHANNEL FLOW THRU SUBAREA(CFS) =      13.06
  FLOW VELOCITY(FEET/SEC) =   4.29 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.23   Tc(MIN.) =   21.34
  LONGEST FLOWPATH FROM NODE   1350.00 TO NODE   1018.00 =    2167.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1018.00 TO NODE   1018.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.34
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.227
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.02      0.98     0.100    32
  USER-DEFINED               -        0.29      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        4.14      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.35
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.996
  SUBAREA AREA(ACRES) =    4.45      SUBAREA RUNOFF(CFS) =    7.52
  EFFECTIVE AREA(ACRES) =     11.19   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.35  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       11.2       PEAK FLOW RATE(CFS) =      18.94

****************************************************************************
  FLOW PROCESS FROM NODE   1018.00 TO NODE   1018.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       18.94   21.34    2.227  0.35( 0.35) 1.00      11.2    1350.00
  LONGEST FLOWPATH FROM NODE   1350.00 TO NODE   1018.00 =    2167.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      242.09   17.93    2.516  0.37( 0.36) 0.98      98.9    1300.00
      2      249.45   21.64    2.205  0.37( 0.36) 0.98     127.9    1310.00
      3      256.22   27.73    1.854  0.37( 0.36) 0.98     171.5    1320.00
      4      256.72   28.46    1.820  0.37( 0.36) 0.98     176.5    1330.00
      5      257.39   30.25    1.744  0.37( 0.36) 0.98     187.8    1340.00
      6      249.63   70.86    0.961  0.37( 0.37) 0.98     413.4    1000.00
      7      249.18   71.03    0.960  0.37( 0.37) 0.98     413.7    1200.00
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1018.00 =   21275.00 FEET.
```

```
  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      260.44   17.93    2.516  0.36( 0.36) 0.98     108.3    1300.00
      2      267.80   21.34    2.227  0.36( 0.36) 0.98     136.8    1350.00
      3      268.17   21.64    2.205  0.37( 0.36) 0.98     139.1    1310.00
      4      271.40   27.73    1.854  0.37( 0.36) 0.98     182.7    1320.00
      5      271.56   28.46    1.820  0.37( 0.36) 0.98     187.6    1330.00
      6      271.47   30.25    1.744  0.37( 0.36) 0.98     199.0    1340.00
      7      255.83   70.86    0.961  0.37( 0.37) 0.98     424.6    1000.00
      8      255.36   71.03    0.960  0.37( 0.37) 0.98     424.9    1200.00
    TOTAL AREA(ACRES) =       424.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      271.56  Tc(MIN.) =   28.464
  EFFECTIVE AREA(ACRES) =    187.65  AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      424.9
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1018.00 =   21275.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1018.00 TO NODE   1018.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1018.00 TO NODE   1019.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2922.40  DOWNSTREAM(FEET) =   2919.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   500.00   CHANNEL SLOPE =  0.0060
  CHANNEL FLOW THRU SUBAREA(CFS) =     271.56
  FLOW VELOCITY(FEET/SEC) =   5.00 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.67   Tc(MIN.) =   30.13
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1019.00 =   21775.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1019.00 TO NODE   1019.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   30.13
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.749
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.30      0.98     0.100    32
```

```
  USER-DEFINED               -        1.44      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.49      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.879
  SUBAREA AREA(ACRES) =    2.23      SUBAREA RUNOFF(CFS) =    2.76
  EFFECTIVE AREA(ACRES) =    189.88   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      427.1       PEAK FLOW RATE(CFS) =     271.56
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1019.00 TO NODE   1020.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2919.40  DOWNSTREAM(FEET) =   2918.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   120.00   CHANNEL SLOPE =  0.0042
  CHANNEL FLOW THRU SUBAREA(CFS) =     271.56
  FLOW VELOCITY(FEET/SEC) =   4.16 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.48   Tc(MIN.) =   30.61
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1020.00 =   21895.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1020.00 TO NODE   1020.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   2000.00 TO NODE   2000.50 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   856.00
  ELEVATION DATA: UPSTREAM(FEET) =   3080.00  DOWNSTREAM(FEET) =   3043.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.500
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.242
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        1.77      0.98     0.100    32    8.50
  COMMERCIAL                 B        0.35      0.75     0.100    56    8.50
  USER-DEFINED               -        2.56      0.44     1.000     -   14.68
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.48
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.592
```

```
  SUBAREA RUNOFF(CFS) =     16.67
  TOTAL AREA(ACRES) =      4.68   PEAK FLOW RATE(CFS) =     16.67

****************************************************************************
  FLOW PROCESS FROM NODE   2000.50 TO NODE   2001.00 IS CODE =  37
----------------------------------------------------------------------------
  >>>>>COMPUTE CULVERT TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED CULVERT SIZE<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3043.30  DOWNSTREAM(FEET) =  3041.20
  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) =   1.75
  NUMBER OF BARREL(S) =   1
  CULVERT-FLOW VELOCITY(FEET/SEC.) =   6.93
  CULVERT-FLOW(CFS) =      16.67
  CULVERT-FLOW TRAVEL TIME(MIN.) =   0.60    Tc(MIN.) =    9.10
  LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   2001.00 =    1106.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2001.00 TO NODE   2002.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3041.20  DOWNSTREAM(FEET) =   3002.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1270.00   CHANNEL SLOPE =  0.0306
  CHANNEL FLOW THRU SUBAREA(CFS) =      16.67
  FLOW VELOCITY(FEET/SEC) =   4.99 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.24   Tc(MIN.) =   13.34
  LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   2002.00 =    2376.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2002.00 TO NODE   2002.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.34
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.093
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        1.30      0.75     0.100    56
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        7.34      0.34     1.000    82
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.35
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.865
  SUBAREA AREA(ACRES) =    8.64      SUBAREA RUNOFF(CFS) =   21.69
  EFFECTIVE AREA(ACRES) =     13.32   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.39  AREA-AVERAGED Ap =  0.77
  TOTAL AREA(ACRES) =       13.3       PEAK FLOW RATE(CFS) =      33.53

****************************************************************************
  FLOW PROCESS FROM NODE   2002.00 TO NODE   2003.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3002.40  DOWNSTREAM(FEET) =   2980.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   913.00   CHANNEL SLOPE =  0.0245
  CHANNEL FLOW THRU SUBAREA(CFS) =      33.53
  FLOW VELOCITY(FEET/SEC) =   5.41 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.81   Tc(MIN.) =   16.16
  LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   2003.00 =    3289.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2003.00 TO NODE   2003.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.16
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.706
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B       10.74      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   10.74      SUBAREA RUNOFF(CFS) =   22.83
  EFFECTIVE AREA(ACRES) =     24.06   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  0.87
  TOTAL AREA(ACRES) =       24.1       PEAK FLOW RATE(CFS) =      51.71

****************************************************************************
  FLOW PROCESS FROM NODE   2003.00 TO NODE   2004.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2980.00  DOWNSTREAM(FEET) =   2958.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1004.00   CHANNEL SLOPE =  0.0219
  CHANNEL FLOW THRU SUBAREA(CFS) =      51.71
  FLOW VELOCITY(FEET/SEC) =   5.79 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.89   Tc(MIN.) =   19.05
```

```
 LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   2004.00 =    4293.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   2004.00 TO NODE   2004.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   19.05
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.411
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL DESERT COVER
 "DESERT BRUSH"   (30.0%)   B       12.87      0.34     1.000    82
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =   12.87      SUBAREA RUNOFF(CFS) =   23.94
 EFFECTIVE AREA(ACRES) =     36.93   AREA-AVERAGED Fm(INCH/HR) =  0.33
 AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  0.92
 TOTAL AREA(ACRES) =       36.9       PEAK FLOW RATE(CFS) =      69.28

****************************************************************************
 FLOW PROCESS FROM NODE   2004.00 TO NODE   1020.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   2958.00  DOWNSTREAM(FEET) =   2919.90
 CHANNEL LENGTH THRU SUBAREA(FEET) =  2059.00   CHANNEL SLOPE =  0.0185
 CHANNEL FLOW THRU SUBAREA(CFS) =      69.28
 FLOW VELOCITY(FEET/SEC) =   5.79 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   5.93   Tc(MIN.) =   24.98
 LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   1020.00 =    6352.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1020.00 TO NODE   1020.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   24.98
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.995
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.10      0.98     0.100    32
 USER-DEFINED               -        0.37      0.44     1.000     -
 NATURAL DESERT COVER
 "DESERT BRUSH"   (30.0%)   B        9.39      0.34     1.000    82
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.35
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.991
```

```
  SUBAREA AREA(ACRES) =    9.86      SUBAREA RUNOFF(CFS) =   14.64
  EFFECTIVE AREA(ACRES) =     46.79   AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.35  AREA-AVERAGED Ap =  0.93
  TOTAL AREA(ACRES) =       46.8       PEAK FLOW RATE(CFS) =      70.07

****************************************************************************
  FLOW PROCESS FROM NODE   1020.00 TO NODE   1020.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       70.07   24.98    1.995  0.35( 0.33) 0.93      46.8    2000.00
  LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   1020.00 =    6352.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      260.44   20.10    2.322  0.37( 0.36) 0.98     110.5    1300.00
      2      267.80   23.50    2.081  0.37( 0.36) 0.98     139.0    1350.00
      3      268.17   23.80    2.063  0.37( 0.36) 0.98     141.3    1310.00
      4      271.40   29.88    1.759  0.37( 0.36) 0.98     184.9    1320.00
      5      271.56   30.61    1.730  0.37( 0.36) 0.98     189.9    1330.00
      6      271.47   32.39    1.663  0.37( 0.36) 0.98     201.2    1340.00
      7      255.83   73.05    0.941  0.37( 0.37) 0.98     426.8    1000.00
      8      255.36   73.22    0.940  0.37( 0.37) 0.98     427.1    1200.00
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1020.00 =   21895.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      327.93   20.10    2.322  0.36( 0.35) 0.97     148.1    1300.00
      2      337.18   23.50    2.081  0.36( 0.35) 0.97     183.0    1350.00
      3      337.69   23.80    2.063  0.36( 0.35) 0.97     185.9    1310.00
      4      338.87   24.98    1.995  0.36( 0.35) 0.97     196.5    2000.00
      5      331.57   29.88    1.759  0.36( 0.35) 0.97     231.7    1320.00
      6      330.48   30.61    1.730  0.36( 0.35) 0.97     236.7    1330.00
      7      327.56   32.39    1.663  0.36( 0.35) 0.97     248.0    1340.00
      8      281.53   73.05    0.941  0.37( 0.36) 0.98     473.6    1000.00
      9      281.00   73.22    0.940  0.37( 0.36) 0.98     473.9    1200.00
    TOTAL AREA(ACRES) =       473.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      338.87  Tc(MIN.) =   24.976
  EFFECTIVE AREA(ACRES) =    196.54  AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =      473.9
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1020.00 =   21895.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1020.00 TO NODE   1020.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1020.00 TO NODE   1021.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2919.90  DOWNSTREAM(FEET) =   2918.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   269.00   CHANNEL SLOPE =  0.0041
  CHANNEL FLOW THRU SUBAREA(CFS) =     338.87
  FLOW VELOCITY(FEET/SEC) =   4.42 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.01   Tc(MIN.) =   25.99
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1021.00 =   22164.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1021.00 TO NODE   1021.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3300.00 TO NODE   3301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   590.00
  ELEVATION DATA: UPSTREAM(FEET) =   2983.60  DOWNSTREAM(FEET) =   2965.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.555
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.060
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        1.47      0.34     1.000    82   13.55
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      3.59
  TOTAL AREA(ACRES) =      1.47   PEAK FLOW RATE(CFS) =      3.59

****************************************************************************
  FLOW PROCESS FROM NODE   3301.00 TO NODE   3302.00 IS CODE =  52
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2965.70  DOWNSTREAM(FEET) =    249.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   678.00   CHANNEL SLOPE =  4.0059
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.59
  FLOW VELOCITY(FEET/SEC) =   6.18 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.83   Tc(MIN.) =   15.38
  LONGEST FLOWPATH FROM NODE   3300.00 TO NODE   3302.00 =    1268.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3302.00 TO NODE   3302.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.38
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.800
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        3.83      0.34     1.000    82
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.01      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.84      SUBAREA RUNOFF(CFS) =    8.49
  EFFECTIVE AREA(ACRES) =      5.31   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        5.3       PEAK FLOW RATE(CFS) =      11.74

****************************************************************************
  FLOW PROCESS FROM NODE   3302.00 TO NODE   3303.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2949.70  DOWNSTREAM(FEET) =   2930.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   885.00   CHANNEL SLOPE =  0.0218
  CHANNEL FLOW THRU SUBAREA(CFS) =      11.74
  FLOW VELOCITY(FEET/SEC) =   3.84 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.84   Tc(MIN.) =   19.22
  LONGEST FLOWPATH FROM NODE   3300.00 TO NODE   3303.00 =    2153.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3303.00 TO NODE   3303.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==========================================================================
  MAINLINE Tc(MIN.) =   19.22
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.396
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        5.14      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.14      SUBAREA RUNOFF(CFS) =    9.49
  EFFECTIVE AREA(ACRES) =     10.45   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       10.4       PEAK FLOW RATE(CFS) =      19.30

**************************************************************************
  FLOW PROCESS FROM NODE   3303.00 TO NODE   1021.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2930.40  DOWNSTREAM(FEET) =   2918.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   666.00   CHANNEL SLOPE =  0.0174
  CHANNEL FLOW THRU SUBAREA(CFS) =      19.30
  FLOW VELOCITY(FEET/SEC) =   3.92 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.83   Tc(MIN.) =   22.05
  LONGEST FLOWPATH FROM NODE   3300.00 TO NODE   1021.00 =    2819.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE   1021.00 TO NODE   1021.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   22.05
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.176
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.46      0.98     0.100    32
  USER-DEFINED               -        2.69      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        6.51      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.38
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.957
  SUBAREA AREA(ACRES) =    9.66      SUBAREA RUNOFF(CFS) =   15.80
  EFFECTIVE AREA(ACRES) =     20.11   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =       20.1       PEAK FLOW RATE(CFS) =      33.03

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

```
  FLOW PROCESS FROM NODE   1021.00 TO NODE   1021.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       33.03   22.05    2.176  0.36( 0.35) 0.98      20.1    3300.00
  LONGEST FLOWPATH FROM NODE   3300.00 TO NODE   1021.00 =    2819.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      327.93   21.13    2.243  0.36( 0.35) 0.97     148.1    1300.00
      2      337.18   24.52    2.021  0.36( 0.35) 0.97     183.0    1350.00
      3      337.69   24.81    2.004  0.36( 0.35) 0.97     185.9    1310.00
      4      338.87   25.99    1.940  0.36( 0.35) 0.97     196.5    2000.00
      5      331.57   30.90    1.719  0.36( 0.35) 0.97     231.7    1320.00
      6      330.48   31.63    1.691  0.36( 0.35) 0.97     236.7    1330.00
      7      327.56   33.42    1.627  0.36( 0.35) 0.97     248.0    1340.00
      8      281.53   74.12    0.931  0.37( 0.36) 0.98     473.6    1000.00
      9      281.00   74.29    0.930  0.37( 0.36) 0.98     473.9    1200.00
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1021.00 =   22164.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      360.72   21.13    2.243  0.36( 0.35) 0.97     167.4    1300.00
      2      363.49   22.05    2.176  0.36( 0.35) 0.97     177.8    3300.00
      3      367.39   24.52    2.021  0.36( 0.35) 0.97     203.1    1350.00
      4      367.60   24.81    2.004  0.36( 0.35) 0.97     206.0    1310.00
      5      367.62   25.99    1.940  0.36( 0.35) 0.97     216.7    2000.00
      6      356.31   30.90    1.719  0.36( 0.35) 0.97     251.8    1320.00
      7      354.72   31.63    1.691  0.36( 0.35) 0.97     256.8    1330.00
      8      350.65   33.42    1.627  0.36( 0.35) 0.97     268.1    1340.00
      9      292.03   74.12    0.931  0.37( 0.36) 0.98     493.7    1000.00
     10      291.47   74.29    0.930  0.37( 0.36) 0.98     494.0    1200.00
    TOTAL AREA(ACRES) =       494.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      367.62  Tc(MIN.) =   25.990
  EFFECTIVE AREA(ACRES) =    216.65  AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =      494.0
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1021.00 =   22164.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1021.00 TO NODE   1021.00 IS CODE =  12
----------------------------------------------------------------------------
```

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

****************************************************************************
  FLOW PROCESS FROM NODE   1021.00 TO NODE   1022.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2918.80  DOWNSTREAM(FEET) =   2916.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   113.00   CHANNEL SLOPE =  0.0248
  CHANNEL FLOW THRU SUBAREA(CFS) =     367.62
  FLOW VELOCITY(FEET/SEC) =  11.17 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.17   Tc(MIN.) =   26.16
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1022.00 =   22277.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1022.00 TO NODE   1022.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1500.00 TO NODE   1501.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   586.00
  ELEVATION DATA: UPSTREAM(FEET) =   2925.30  DOWNSTREAM(FEET) =   2918.90

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.602
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.895
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.47      0.98     0.100    32    9.60
  USER-DEFINED               -        1.39      0.44     1.000     -   16.58
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.46
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.773
  SUBAREA RUNOFF(CFS) =      5.93
  TOTAL AREA(ACRES) =      1.86   PEAK FLOW RATE(CFS) =      5.93

****************************************************************************
  FLOW PROCESS FROM NODE   1501.00 TO NODE   1502.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
```

```
 ELEVATION DATA: UPSTREAM(FEET) =   2918.90  DOWNSTREAM(FEET) =   2916.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   429.00   CHANNEL SLOPE =  0.0068
 CHANNEL FLOW THRU SUBAREA(CFS) =       5.93
 FLOW VELOCITY(FEET/SEC) =   1.81 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   3.96   Tc(MIN.) =   13.56
 LONGEST FLOWPATH FROM NODE   1500.00 TO NODE   1502.00 =    1015.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1502.00 TO NODE   1502.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.56
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.059
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.34      0.98     0.100    32
 USER-DEFINED               -        2.68      0.44     1.000     -
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.899
 SUBAREA AREA(ACRES) =    3.02      SUBAREA RUNOFF(CFS) =    7.22
 EFFECTIVE AREA(ACRES) =      4.88   AREA-AVERAGED Fm(INCH/HR) =  0.38
 AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =        4.9       PEAK FLOW RATE(CFS) =      11.75

****************************************************************************
 FLOW PROCESS FROM NODE   1502.00 TO NODE   1502.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       11.75   13.56    3.059  0.45( 0.38) 0.85       4.9    1500.00
 LONGEST FLOWPATH FROM NODE   1500.00 TO NODE   1502.00 =    1015.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      360.72   21.29    2.230  0.36( 0.35) 0.97     167.4    1300.00
     2      363.49   22.22    2.165  0.36( 0.35) 0.97     177.8    3300.00
     3      367.39   24.69    2.011  0.36( 0.35) 0.97     203.1    1350.00
     4      367.60   24.98    1.994  0.36( 0.35) 0.97     206.0    1310.00
     5      367.62   26.16    1.931  0.36( 0.35) 0.97     216.7    2000.00
     6      356.31   31.07    1.712  0.36( 0.35) 0.97     251.8    1320.00
     7      354.72   31.80    1.684  0.36( 0.35) 0.97     256.8    1330.00
     8      350.65   33.59    1.621  0.36( 0.35) 0.97     268.1    1340.00
     9      292.03   74.30    0.930  0.37( 0.36) 0.98     493.7    1000.00
```

```
    10      291.47   74.47    0.928  0.37( 0.36) 0.98     494.0    1200.00
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1502.00 =   22277.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      342.70   13.56    3.059  0.37( 0.35) 0.96     111.5    1500.00
      2      368.83   21.29    2.230  0.36( 0.35) 0.96     172.3    1300.00
      3      371.31   22.22    2.165  0.36( 0.35) 0.96     182.7    3300.00
      4      374.54   24.69    2.011  0.36( 0.35) 0.96     208.0    1350.00
      5      374.68   24.98    1.994  0.36( 0.35) 0.96     210.9    1310.00
      6      374.42   26.16    1.931  0.36( 0.35) 0.96     221.5    2000.00
      7      362.15   31.07    1.712  0.37( 0.35) 0.97     256.7    1320.00
      8      360.44   31.80    1.684  0.37( 0.35) 0.97     261.7    1330.00
      9      356.08   33.59    1.621  0.37( 0.35) 0.97     273.0    1340.00
     10      294.43   74.30    0.930  0.37( 0.36) 0.98     498.6    1000.00
     11      293.87   74.47    0.928  0.37( 0.36) 0.98     498.9    1200.00
    TOTAL AREA(ACRES) =       498.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      374.68  Tc(MIN.) =   24.980
  EFFECTIVE AREA(ACRES) =    210.86  AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  0.96
  TOTAL AREA(ACRES) =      498.9
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1502.00 =   22277.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1502.00 TO NODE   1502.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1022.00 TO NODE   1023.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2916.00  DOWNSTREAM(FEET) =   2906.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   907.00   CHANNEL SLOPE =  0.0108
  CHANNEL FLOW THRU SUBAREA(CFS) =     374.68
  FLOW VELOCITY(FEET/SEC) =   7.42 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.04   Tc(MIN.) =   27.02
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1023.00 =   23184.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1023.00 TO NODE   1023.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
  MAINLINE Tc(MIN.) =   27.02
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.888
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.44      0.98     0.100    32
  USER-DEFINED               -        8.33      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.955
  SUBAREA AREA(ACRES) =    8.77      SUBAREA RUNOFF(CFS) =   11.56
  EFFECTIVE AREA(ACRES) =    219.63   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.96
  TOTAL AREA(ACRES) =      507.7       PEAK FLOW RATE(CFS) =     374.68
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1023.00 TO NODE   1024.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2906.20  DOWNSTREAM(FEET) =   2896.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1100.00   CHANNEL SLOPE =  0.0089
  CHANNEL FLOW THRU SUBAREA(CFS) =     374.68
  FLOW VELOCITY(FEET/SEC) =   6.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.72   Tc(MIN.) =   29.74
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1024.00 =   24284.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1024.00 TO NODE   1024.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   29.74
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.765
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.98      0.98     0.100    32
  USER-DEFINED               -        8.08      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.903
  SUBAREA AREA(ACRES) =    9.06      SUBAREA RUNOFF(CFS) =   11.11
  EFFECTIVE AREA(ACRES) =    228.69   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.96
  TOTAL AREA(ACRES) =      516.8       PEAK FLOW RATE(CFS) =     374.68
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1024.00 TO NODE   1024.00 IS CODE =  10
```

```
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5100.00 TO NODE   1024.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   48.23   RAINFALL INTENSITY(INCH/HR) =  1.26
  EFFECTIVE AREA(ACRES) =  1025.00
  TOTAL AREA(ACRES) =  1169.60        PEAK FLOW RATE(CFS) =   1135.50
  AREA-AVERAGED Fm(INCH/HR) =   0.27  AREA-AVERAGED Fp(INCH/HR) =   0.28
  AREA-AVERAGED Ap =  0.98
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE   1024.00 TO NODE   1024.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1135.50   48.23    1.258  0.28( 0.27) 0.98    1025.0    1000.00
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1024.00 =   24284.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      342.70   18.45    2.465  0.38( 0.36) 0.96     129.3    1500.00
      2      368.83   26.07    1.935  0.37( 0.36) 0.96     190.1    1300.00
      3      371.31   26.99    1.889  0.37( 0.36) 0.96     200.5    3300.00
      4      374.54   29.44    1.778  0.37( 0.36) 0.96     225.8    1350.00
      5      374.68   29.74    1.765  0.37( 0.36) 0.96     228.7    1310.00
      6      374.42   30.92    1.718  0.37( 0.36) 0.96     239.4    2000.00
      7      362.15   35.88    1.548  0.37( 0.36) 0.96     274.6    1320.00
      8      360.44   36.62    1.526  0.37( 0.36) 0.96     279.5    1330.00
      9      356.08   38.42    1.475  0.37( 0.36) 0.96     290.8    1340.00
     10      294.43   79.44    0.887  0.37( 0.36) 0.97     516.4    1000.00
     11      293.87   79.61    0.886  0.37( 0.36) 0.97     516.8    1200.00
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1024.00 =   24284.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1309.77   18.45    2.465  0.30( 0.30) 0.97     521.5    1500.00
```

```
      2     1404.89   26.07    1.935  0.30( 0.30) 0.97     744.3    1300.00
      3     1413.94   26.99    1.889  0.30( 0.30) 0.97     774.1    3300.00
      4     1433.33   29.44    1.778  0.30( 0.30) 0.97     851.5    1350.00
      5     1435.28   29.74    1.765  0.30( 0.30) 0.97     860.7    1310.00
      6     1442.03   30.92    1.718  0.30( 0.30) 0.97     896.4    2000.00
      7     1455.27   35.88    1.548  0.30( 0.30) 0.97    1037.0    1320.00
      8     1456.87   36.62    1.526  0.30( 0.30) 0.97    1057.7    1330.00
      9     1460.13   38.42    1.475  0.30( 0.30) 0.97    1107.4    1340.00
     10     1476.84   48.23    1.258  0.30( 0.30) 0.98    1369.8    1000.00
     11     1002.07   79.44    0.887  0.31( 0.30) 0.98    1541.4    1000.00
     12      999.96   79.61    0.886  0.31( 0.30) 0.98    1541.8    1200.00
    TOTAL AREA(ACRES) =      1686.4

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     1476.84  Tc(MIN.) =   48.230
  EFFECTIVE AREA(ACRES) =   1369.76  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =     1686.4
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1024.00 =   24284.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1024.00 TO NODE   1024.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1024.00 TO NODE   1025.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2896.40  DOWNSTREAM(FEET) =   2894.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   563.00   CHANNEL SLOPE =  0.0039
  CHANNEL FLOW THRU SUBAREA(CFS) =    1476.84
  FLOW VELOCITY(FEET/SEC) =   6.96 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.35   Tc(MIN.) =   49.58
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1025.00 =   24847.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1025.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   49.58
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.234
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.14      0.98     0.100    32
```

```
  USER-DEFINED                -        1.25      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.909
  SUBAREA AREA(ACRES) =    1.39      SUBAREA RUNOFF(CFS) =    1.04
  EFFECTIVE AREA(ACRES) =   1371.15   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =     1687.8       PEAK FLOW RATE(CFS) =    1476.84
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1025.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   7240.00 TO NODE   1025.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   43.16   RAINFALL INTENSITY(INCH/HR) =  1.36
  EFFECTIVE AREA(ACRES) =   215.23
  TOTAL AREA(ACRES) =   263.30        PEAK FLOW RATE(CFS) =    207.79
  AREA-AVERAGED Fm(INCH/HR) =   0.33  AREA-AVERAGED Fp(INCH/HR) =   0.35
  AREA-AVERAGED Ap =  0.93
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1025.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      207.79   43.16    1.360  0.35( 0.33) 0.93     215.2    1000.00
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1025.00 =   24847.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1309.77   19.86    2.342  0.30( 0.30) 0.97     522.9    1500.00
      2     1404.89   27.44    1.867  0.30( 0.30) 0.97     745.6    1300.00
      3     1413.94   28.36    1.825  0.30( 0.30) 0.97     775.5    3300.00
      4     1433.33   30.80    1.722  0.30( 0.30) 0.97     852.9    1350.00
      5     1435.28   31.10    1.711  0.30( 0.30) 0.97     862.0    1310.00
      6     1442.03   32.27    1.667  0.30( 0.30) 0.97     897.8    2000.00
```

```
     7     1455.27   37.23    1.508  0.30( 0.30) 0.97    1038.4    1320.00
     8     1456.87   37.97    1.488  0.30( 0.30) 0.97    1059.1    1330.00
     9     1460.13   39.78    1.440  0.30( 0.30) 0.97    1108.8    1340.00
    10     1476.84   49.58    1.234  0.30( 0.30) 0.98    1371.1    1000.00
    11     1002.07   80.97    0.876  0.31( 0.30) 0.98    1542.8    1000.00
    12      999.96   81.14    0.874  0.31( 0.30) 0.98    1543.2    1200.00
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1025.00 =   24847.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1     1496.07   19.86    2.342  0.31( 0.30) 0.97     621.9    1500.00
     2     1601.77   27.44    1.867  0.31( 0.30) 0.97     882.5    1300.00
     3     1611.79   28.36    1.825  0.31( 0.30) 0.97     916.9    3300.00
     4     1633.53   30.80    1.722  0.31( 0.30) 0.97    1006.5    1350.00
     5     1635.74   31.10    1.711  0.31( 0.30) 0.97    1017.1    1310.00
     6     1643.48   32.27    1.667  0.31( 0.30) 0.97    1058.7    2000.00
     7     1660.19   37.23    1.508  0.31( 0.30) 0.97    1224.1    1320.00
     8     1662.22   37.97    1.488  0.31( 0.30) 0.97    1248.4    1330.00
     9     1666.43   39.78    1.440  0.31( 0.30) 0.97    1307.2    1340.00
    10     1673.69   43.16    1.360  0.31( 0.30) 0.97    1414.6    1000.00
    11     1659.38   49.58    1.234  0.31( 0.30) 0.97    1586.4    1000.00
    12     1112.58   80.97    0.876  0.32( 0.31) 0.97    1758.0    1000.00
    13     1110.21   81.14    0.874  0.32( 0.31) 0.97    1758.4    1200.00
   TOTAL AREA(ACRES) =      1951.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     1673.69  Tc(MIN.) =   43.160
  EFFECTIVE AREA(ACRES) =   1414.60  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.31  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =     1951.1
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1025.00 =   24847.00 FEET.
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     1951.1  TC(MIN.) =     43.16
  EFFECTIVE AREA(ACRES) =   1414.60  AREA-AVERAGED Fm(INCH/HR)=  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.31  AREA-AVERAGED Ap = 0.968
  PEAK FLOW RATE(CFS)   =    1673.69

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1     1496.07   19.86    2.342  0.31( 0.30) 0.97     621.9    1500.00
     2     1601.77   27.44    1.867  0.31( 0.30) 0.97     882.5    1300.00
     3     1611.79   28.36    1.825  0.31( 0.30) 0.97     916.9    3300.00
     4     1633.53   30.80    1.722  0.31( 0.30) 0.97    1006.5    1350.00
     5     1635.74   31.10    1.711  0.31( 0.30) 0.97    1017.1    1310.00
     6     1643.48   32.27    1.667  0.31( 0.30) 0.97    1058.7    2000.00
     7     1660.19   37.23    1.508  0.31( 0.30) 0.97    1224.1    1320.00
     8     1662.22   37.97    1.488  0.31( 0.30) 0.97    1248.4    1330.00
```

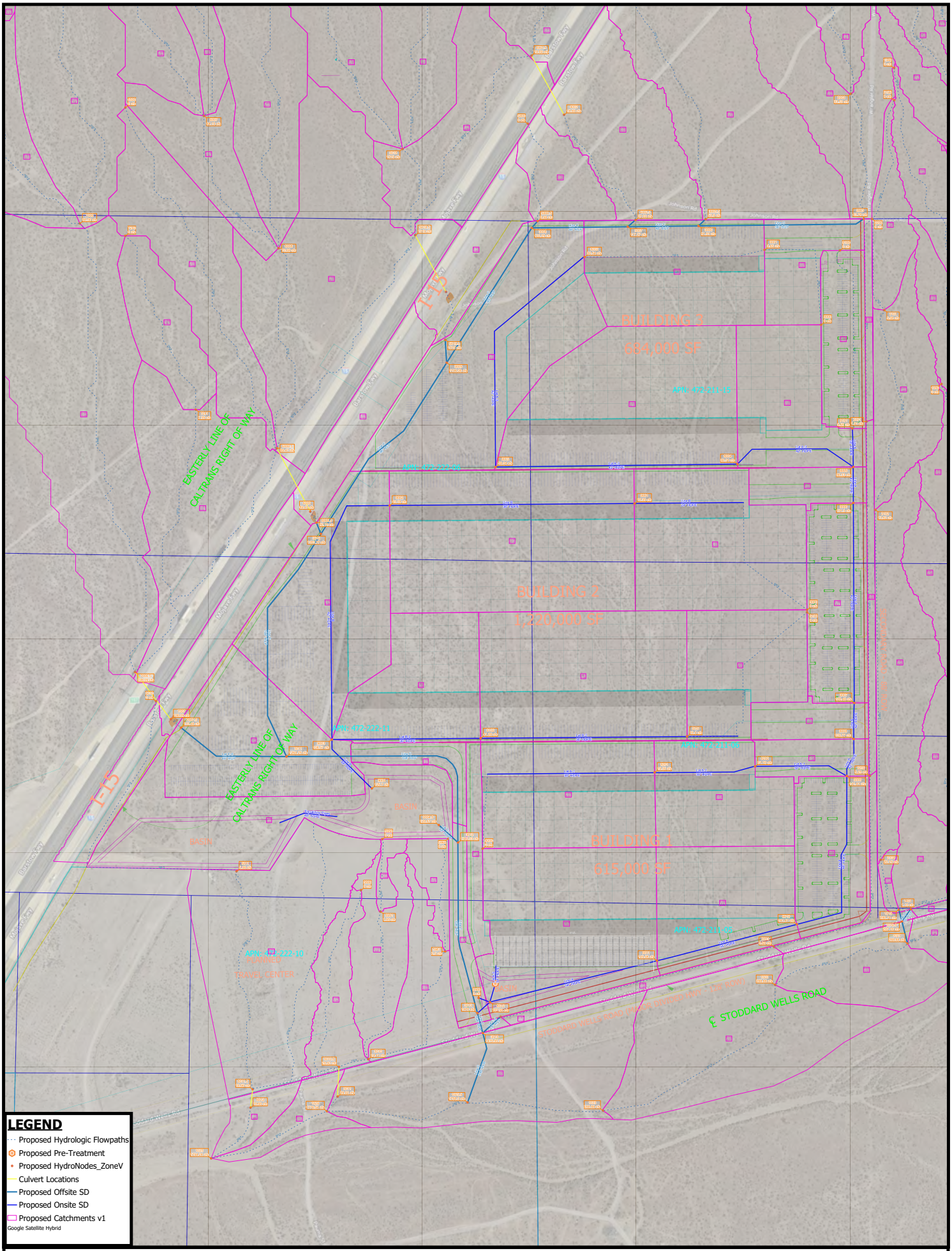
9	1666.43	39.78	1.440	0.31(0.30)	0.97	1307.2	1340.00
10	1673.69	43.16	1.360	0.31(0.30)	0.97	1414.6	1000.00
11	1659.38	49.58	1.234	0.31(0.30)	0.97	1586.4	1000.00
12	1112.58	80.97	0.876	0.32(0.31)	0.97	1758.0	1000.00
13	1110.21	81.14	0.874	0.32(0.31)	0.97	1758.4	1200.00

END OF RATIONAL METHOD ANALYSIS



Appendix H

Proposed Condition Hydrology – Rational Method



Conceptual Onsite Storm Drain Layout - Conceptual Sizes for Q100

Apple Valley 143-Acre Project, Apple Valley, California
For: Covington Development Partners, LLC

2022-09-23

N:\40.TEMP.XXX Apple Valley

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        (c) Copyright 1983-2015 Advanced Engineering Software (aes)
            Ver. 22.0  Release Date: 07/01/2015  License ID 1673

                          Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* Right side of node 3013 (Basin 1) 10 yr                               *
* Q3 9/16/2022                                                          *
*                                                                       *
 *************************************************************************

  FILE NAME: 10P_13.DAT
  TIME/DATE OF STUDY: 15:12 09/21/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.7000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.6060

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150
  2   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.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
 FLOW PROCESS FROM NODE   8000.00 TO NODE   8001.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   489.00
 ELEVATION DATA: UPSTREAM(FEET) =   2990.90  DOWNSTREAM(FEET) =   2987.50

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.776
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.158
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 B        2.55      0.75     0.100    56    9.78
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      4.78
 TOTAL AREA(ACRES) =      2.55   PEAK FLOW RATE(CFS) =      4.78

****************************************************************************
 FLOW PROCESS FROM NODE   8001.00 TO NODE   8002.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   2987.50  DOWNSTREAM(FEET) =   2986.70
 CHANNEL LENGTH THRU SUBAREA(FEET) =   706.00   CHANNEL SLOPE =  0.0011
 CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.00

        ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
            CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
            ALLOWABLE DEPTH).
            AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
            ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.

 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.157
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        6.45      0.75     0.100    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.83
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = ******
```

```
  AVERAGE FLOW DEPTH(FEET) =   0.00   TRAVEL TIME(MIN.) =   0.01
  Tc(MIN.) =    9.78
  SUBAREA AREA(ACRES) =     6.45       SUBAREA RUNOFF(CFS) =   12.09
  EFFECTIVE AREA(ACRES) =      9.00     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.75  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        9.0         PEAK FLOW RATE(CFS) =      16.87

         ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
             CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
             ALLOWABLE DEPTH).
             AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
             ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.


  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.00   FLOW VELOCITY(FEET/SEC.) = ******

  ==>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH

  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8002.00 =    1195.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   8002.00 TO NODE   8003.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2986.70  DOWNSTREAM(FEET) =  2979.30
  FLOW LENGTH(FEET) =   981.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.72
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.87
  PIPE TRAVEL TIME(MIN.) =   2.43    Tc(MIN.) =   12.21
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8003.00 =    2176.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   8003.00 TO NODE   8003.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.21
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.847
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        1.56      0.47     0.100    75
  COMMERCIAL                 B        9.42      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.71
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
```

```
  SUBAREA AREA(ACRES) =   10.98      SUBAREA RUNOFF(CFS) =   17.55
  EFFECTIVE AREA(ACRES) =     19.98   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.73  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       20.0       PEAK FLOW RATE(CFS) =      31.90

****************************************************************************
  FLOW PROCESS FROM NODE   8003.00 TO NODE   8004.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2979.30  DOWNSTREAM(FEET) =  2973.00
  FLOW LENGTH(FEET) =   943.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  21.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.63
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      31.90
  PIPE TRAVEL TIME(MIN.) =   2.06    Tc(MIN.) =   14.27
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8004.00 =    3119.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   8004.00 TO NODE   8004.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.27
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.656
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B       10.17      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   10.17      SUBAREA RUNOFF(CFS) =   14.47
  EFFECTIVE AREA(ACRES) =     30.15   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.73  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       30.1       PEAK FLOW RATE(CFS) =      42.94

****************************************************************************
  FLOW PROCESS FROM NODE   8004.00 TO NODE   8005.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2973.00  DOWNSTREAM(FEET) =  2956.00
  FLOW LENGTH(FEET) =   497.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.15
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      42.94
```

```
  PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =   14.82
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8005.00 =    3616.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   8005.00 TO NODE   8005.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.82
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.613
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        4.82      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    4.82      SUBAREA RUNOFF(CFS) =    6.67
  EFFECTIVE AREA(ACRES) =     34.97   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       35.0       PEAK FLOW RATE(CFS) =      48.44

****************************************************************************
  FLOW PROCESS FROM NODE   8005.00 TO NODE   8005.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   8100.00 TO NODE   8101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   735.00
  ELEVATION DATA: UPSTREAM(FEET) =   2989.10  DOWNSTREAM(FEET) =   2972.90

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.136
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.263
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        2.72      0.75     0.100    56    9.14
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      5.36
  TOTAL AREA(ACRES) =      2.72   PEAK FLOW RATE(CFS) =      5.36

****************************************************************************
  FLOW PROCESS FROM NODE   8101.00 TO NODE   8005.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2972.90  DOWNSTREAM(FEET) =  2956.00
  FLOW LENGTH(FEET) =   150.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.87
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.36
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =    9.32
  LONGEST FLOWPATH FROM NODE   8100.00 TO NODE   8005.00 =     885.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   8005.00 TO NODE   8005.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        5.36    9.32    2.232  0.75( 0.07) 0.10       2.7    8100.00
  LONGEST FLOWPATH FROM NODE   8100.00 TO NODE   8005.00 =     885.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       48.44   14.82    1.613  0.74( 0.07) 0.10      35.0    8000.00
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8005.00 =    3616.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       48.06    9.32    2.232  0.74( 0.07) 0.10      24.7    8100.00
      2       52.26   14.82    1.613  0.74( 0.07) 0.10      37.7    8000.00
    TOTAL AREA(ACRES) =        37.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       52.26  Tc(MIN.) =   14.821
  EFFECTIVE AREA(ACRES) =     37.69  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       37.7
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8005.00 =    3616.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   8005.00 TO NODE   8005.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
```

```
==============================================================================

******************************************************************************
  FLOW PROCESS FROM NODE   8005.00 TO NODE   8006.00 IS CODE =  31
------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2956.00  DOWNSTREAM(FEET) =  2955.00
  FLOW LENGTH(FEET) =   140.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  28.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.62
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      52.26
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   15.09
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8006.00 =    3756.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE   8006.00 TO NODE   8006.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   15.09
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.592
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        1.51      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.51      SUBAREA RUNOFF(CFS) =    2.06
  EFFECTIVE AREA(ACRES) =     39.20   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       39.2       PEAK FLOW RATE(CFS) =      53.58

******************************************************************************
  FLOW PROCESS FROM NODE   8006.00 TO NODE   8007.00 IS CODE =  31
------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2955.00  DOWNSTREAM(FEET) =  2945.00
  FLOW LENGTH(FEET) =   780.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  25.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.88
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      53.58
  PIPE TRAVEL TIME(MIN.) =   1.20    Tc(MIN.) =   16.29
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8007.00 =    4536.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   8007.00 TO NODE   8007.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.29
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.510
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        4.20      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    4.20      SUBAREA RUNOFF(CFS) =    5.42
  EFFECTIVE AREA(ACRES) =     43.40   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       43.4       PEAK FLOW RATE(CFS) =      56.09

****************************************************************************
  FLOW PROCESS FROM NODE   8007.00 TO NODE   8008.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2945.00  DOWNSTREAM(FEET) =  2932.00
  FLOW LENGTH(FEET) =   140.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.40
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      56.09
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   16.39
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8008.00 =    4676.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   8008.00 TO NODE   8008.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.39
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.503
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        1.52      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.52      SUBAREA RUNOFF(CFS) =    1.95
  EFFECTIVE AREA(ACRES) =     44.92   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       44.9       PEAK FLOW RATE(CFS) =      57.79
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   8008.00 TO NODE   8009.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2932.00  DOWNSTREAM(FEET) =  2925.00
  FLOW LENGTH(FEET) =   151.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.04
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      57.79
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   16.53
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8009.00 =    4827.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   8009.00 TO NODE   8009.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   8200.00 TO NODE   8201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   941.00
  ELEVATION DATA: UPSTREAM(FEET) =   2930.00  DOWNSTREAM(FEET) =   2920.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.669
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.907
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        4.83      0.47     0.100    75   11.67
  COMMERCIAL                 B        1.60      0.75     0.100    56   11.67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.54
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =     10.72
  TOTAL AREA(ACRES) =      6.43   PEAK FLOW RATE(CFS) =     10.72

****************************************************************************
  FLOW PROCESS FROM NODE   8201.00 TO NODE   8202.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =  2920.00  DOWNSTREAM(FEET) =  2918.00
  FLOW LENGTH(FEET) =   395.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.26
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.72
  PIPE TRAVEL TIME(MIN.) =   1.25    Tc(MIN.) =   12.92
  LONGEST FLOWPATH FROM NODE   8200.00 TO NODE   8202.00 =    1336.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   8202.00 TO NODE   8202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.92
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.775
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        4.64      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    4.64      SUBAREA RUNOFF(CFS) =    7.10
  EFFECTIVE AREA(ACRES) =     11.07   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.63  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       11.1       PEAK FLOW RATE(CFS) =      17.06

****************************************************************************
  FLOW PROCESS FROM NODE   8202.00 TO NODE   8009.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2918.00  DOWNSTREAM(FEET) =  2917.00
  FLOW LENGTH(FEET) =   368.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.63
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.06
  PIPE TRAVEL TIME(MIN.) =   1.32    Tc(MIN.) =   14.24
  LONGEST FLOWPATH FROM NODE   8200.00 TO NODE   8009.00 =    1704.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   8009.00 TO NODE   8009.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.24
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.658
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        1.49      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.49      SUBAREA RUNOFF(CFS) =    2.12
  EFFECTIVE AREA(ACRES) =     12.56   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.64  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       12.6       PEAK FLOW RATE(CFS) =      18.02

****************************************************************************
  FLOW PROCESS FROM NODE   8009.00 TO NODE   8009.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       18.02   14.24    1.658  0.64( 0.06) 0.10      12.6    8200.00
  LONGEST FLOWPATH FROM NODE   8200.00 TO NODE   8009.00 =    1704.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       55.36   11.03    1.983  0.74( 0.07) 0.10      31.9    8100.00
      2       57.79   16.53    1.494  0.74( 0.07) 0.10      44.9    8000.00
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8009.00 =    4827.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       72.16   11.03    1.983  0.72( 0.07) 0.10      41.7    8100.00
      2       74.80   14.24    1.658  0.72( 0.07) 0.10      52.1    8200.00
      3       73.96   16.53    1.494  0.72( 0.07) 0.10      57.5    8000.00
    TOTAL AREA(ACRES) =       57.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       74.80  Tc(MIN.) =   14.245
  EFFECTIVE AREA(ACRES) =     52.08  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.72  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       57.5
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8009.00 =    4827.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   8009.00 TO NODE   8009.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   8009.00 TO NODE   8010.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2917.00  DOWNSTREAM(FEET) =  2915.00
  FLOW LENGTH(FEET) =   718.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  37.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.73
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      74.80
  PIPE TRAVEL TIME(MIN.) =   1.78    Tc(MIN.) =   16.02
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8010.00 =    5545.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   8010.00 TO NODE   8010.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.02
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.527
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.37      0.98     0.100    32
  COMMERCIAL                 B        2.61      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.83
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    3.98      SUBAREA RUNOFF(CFS) =    5.17
  EFFECTIVE AREA(ACRES) =     56.06   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.72  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       61.5       PEAK FLOW RATE(CFS) =      74.80
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   8010.00 TO NODE   8011.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2915.00  DOWNSTREAM(FEET) =  2913.00
  FLOW LENGTH(FEET) =   563.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.33
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      74.80
  PIPE TRAVEL TIME(MIN.) =   1.28    Tc(MIN.) =   17.30
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8011.00 =    6108.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   8011.00 TO NODE   8011.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.30
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.447
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        1.68      0.75     0.100    56
  COMMERCIAL                 A        3.72      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.90
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    5.40      SUBAREA RUNOFF(CFS) =    6.59
  EFFECTIVE AREA(ACRES) =     61.46   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       66.9       PEAK FLOW RATE(CFS) =      75.96

****************************************************************************
  FLOW PROCESS FROM NODE   8011.00 TO NODE   8012.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2913.00  DOWNSTREAM(FEET) =  2904.00
  FLOW LENGTH(FEET) =   671.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.25
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      75.96
  PIPE TRAVEL TIME(MIN.) =   0.91    Tc(MIN.) =   18.22
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8012.00 =    6779.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   8012.00 TO NODE   8012.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.22
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.396
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        1.08      0.75     0.100    56
  COMMERCIAL                 D        3.22      0.47     0.100    75
  COMMERCIAL                 A        4.78      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.77
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    9.07      SUBAREA RUNOFF(CFS) =   10.77
```

```
  EFFECTIVE AREA(ACRES) =     70.53   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       75.9       PEAK FLOW RATE(CFS) =      83.90

****************************************************************************
  FLOW PROCESS FROM NODE   8012.00 TO NODE   8012.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   8400.00 TO NODE   8012.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    47.00
  ELEVATION DATA: UPSTREAM(FEET) =   2912.00  DOWNSTREAM(FEET) =   2904.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.451
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.84      0.98     0.100    32    5.00
  COMMERCIAL                 D        1.97      0.47     0.100    75    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.62
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      8.57
  TOTAL AREA(ACRES) =      2.81   PEAK FLOW RATE(CFS) =      8.57

****************************************************************************
  FLOW PROCESS FROM NODE   8012.00 TO NODE   8012.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        8.57    5.00    3.451  0.62( 0.06) 0.10       2.8    8400.00
  LONGEST FLOWPATH FROM NODE   8400.00 TO NODE   8012.00 =      47.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       82.25   15.05    1.595  0.75( 0.07) 0.10      60.1    8100.00
      2       83.90   18.22    1.396  0.74( 0.07) 0.10      70.5    8200.00
      3       82.74   20.50    1.285  0.74( 0.07) 0.10      75.9    8000.00
```

```
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8012.00 =    6779.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       69.23    5.00    3.451  0.73( 0.07) 0.10      22.8    8400.00
      2       86.13   15.05    1.595  0.74( 0.07) 0.10      62.9    8100.00
      3       87.27   18.22    1.396  0.74( 0.07) 0.10      73.3    8200.00
      4       85.83   20.50    1.285  0.74( 0.07) 0.10      78.7    8000.00
    TOTAL AREA(ACRES) =        78.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       87.27  Tc(MIN.) =   18.216
  EFFECTIVE AREA(ACRES) =     73.34  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       78.7
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8012.00 =    6779.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   8012.00 TO NODE   8012.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   8012.00 TO NODE   3013.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2904.00  DOWNSTREAM(FEET) =  2903.00
  FLOW LENGTH(FEET) =    65.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.25
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      87.27
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   18.30
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   3013.00 =    6844.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       78.7  TC(MIN.) =     18.30
  EFFECTIVE AREA(ACRES) =     73.34  AREA-AVERAGED Fm(INCH/HR)=  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =      87.27

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       69.23    5.09    3.409  0.73( 0.07) 0.10      22.8    8400.00
      2       86.13   15.14    1.589  0.74( 0.07) 0.10      62.9    8100.00
```

3	87.27	18.30	1.392	0.74(0.07)	0.10	73.3	8200.00
4	85.83	20.58	1.281	0.74(0.07)	0.10	78.7	8000.00

END OF RATIONAL METHOD ANALYSIS

↟

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
         (c) Copyright 1983-2015 Advanced Engineering Software (aes)
             Ver. 22.0  Release Date: 07/01/2015  License ID 1673

                          Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* Proposed Up to Node 3012                                              *
* 10-Yr Rational Method                                                 *
* Q3 9/20/22                                                            *
 ************************************************************************

  FILE NAME: 10P_12.DAT
  TIME/DATE OF STUDY: 15:13 09/21/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.7000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.6060

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150
  2   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.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
FLOW PROCESS FROM NODE   9000.00 TO NODE   9001.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   964.00
ELEVATION DATA: UPSTREAM(FEET) =   2966.80  DOWNSTREAM(FEET) =   2963.80

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.062
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.595
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
COMMERCIAL                 B        7.77      0.75     0.100    56   15.06
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
SUBAREA RUNOFF(CFS) =     10.63
TOTAL AREA(ACRES) =      7.77   PEAK FLOW RATE(CFS) =     10.63

****************************************************************************
FLOW PROCESS FROM NODE   9001.00 TO NODE   9002.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  2963.80  DOWNSTREAM(FEET) =  2955.00
FLOW LENGTH(FEET) =   954.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   6.56
ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      10.63
PIPE TRAVEL TIME(MIN.) =   2.42    Tc(MIN.) =   17.49
LONGEST FLOWPATH FROM NODE   9000.00 TO NODE   9002.00 =    1918.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   9002.00 TO NODE   9002.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   17.49
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.436
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                 B        6.01      0.75     0.100    56
```

```
  COMMERCIAL                  D        6.11      0.47     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.61
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   12.12      SUBAREA RUNOFF(CFS) =   15.01
  EFFECTIVE AREA(ACRES) =     19.89   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.66  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       19.9       PEAK FLOW RATE(CFS) =      24.53

****************************************************************************
  FLOW PROCESS FROM NODE   9002.00 TO NODE   9003.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2955.00  DOWNSTREAM(FEET) =  2935.00
  FLOW LENGTH(FEET) =  1092.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.37
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      24.53
  PIPE TRAVEL TIME(MIN.) =   1.76    Tc(MIN.) =   19.24
  LONGEST FLOWPATH FROM NODE   9000.00 TO NODE   9003.00 =    3010.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   9003.00 TO NODE   9003.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.24
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.343
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        8.58      0.47     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.47
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    8.58      SUBAREA RUNOFF(CFS) =   10.01
  EFFECTIVE AREA(ACRES) =     28.47   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       28.5       PEAK FLOW RATE(CFS) =      32.87

****************************************************************************
  FLOW PROCESS FROM NODE   9003.00 TO NODE   9003.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   9100.00 TO NODE   9101.00 IS CODE =  21
----------------------------------------------------------------------------
```

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   819.00
  ELEVATION DATA: UPSTREAM(FEET) =   2966.80  DOWNSTREAM(FEET) =   2948.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.463
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.208
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        4.72      0.75     0.100    56    9.46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      9.06
  TOTAL AREA(ACRES) =      4.72   PEAK FLOW RATE(CFS) =      9.06

****************************************************************************
  FLOW PROCESS FROM NODE   9101.00 TO NODE   9102.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2948.00  DOWNSTREAM(FEET) =  2945.00
  FLOW LENGTH(FEET) =   804.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  17.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.35
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.06
  PIPE TRAVEL TIME(MIN.) =   3.08    Tc(MIN.) =   12.54
  LONGEST FLOWPATH FROM NODE   9100.00 TO NODE   9102.00 =    1623.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   9102.00 TO NODE   9102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.54
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.813
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        3.99      0.75     0.100    56
  COMMERCIAL                 D        5.39      0.47     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.59
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    9.39      SUBAREA RUNOFF(CFS) =   14.82
  EFFECTIVE AREA(ACRES) =     14.10   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.64  AREA-AVERAGED Ap =  0.10
```

```
  TOTAL AREA(ACRES) =       14.1       PEAK FLOW RATE(CFS) =      22.20

****************************************************************************
  FLOW PROCESS FROM NODE   9102.00 TO NODE   9003.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2945.00  DOWNSTREAM(FEET) =  2935.00
  FLOW LENGTH(FEET) =   580.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.94
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      22.20
  PIPE TRAVEL TIME(MIN.) =   0.97    Tc(MIN.) =   13.51
  LONGEST FLOWPATH FROM NODE   9100.00 TO NODE   9003.00 =    2203.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   9003.00 TO NODE   9003.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.51
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.720
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        5.09      0.47     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.47
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    5.09      SUBAREA RUNOFF(CFS) =    7.67
  EFFECTIVE AREA(ACRES) =     19.19   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       19.2       PEAK FLOW RATE(CFS) =      28.69

****************************************************************************
  FLOW PROCESS FROM NODE   9003.00 TO NODE   9003.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       28.69   13.51    1.720  0.60( 0.06) 0.10      19.2    9100.00
  LONGEST FLOWPATH FROM NODE   9100.00 TO NODE   9003.00 =    2203.00 FEET.

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

```
     1       32.87   19.24    1.343  0.60( 0.06) 0.10      28.5    9000.00
  LONGEST FLOWPATH FROM NODE   9000.00 TO NODE   9003.00 =    3010.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       58.56   13.51    1.720  0.60( 0.06) 0.10      39.2    9100.00
      2       55.05   19.24    1.343  0.60( 0.06) 0.10      47.7    9000.00
    TOTAL AREA(ACRES) =        47.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       58.56  Tc(MIN.) =   13.513
  EFFECTIVE AREA(ACRES) =     39.19  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       47.7
  LONGEST FLOWPATH FROM NODE   9000.00 TO NODE   9003.00 =    3010.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   9003.00 TO NODE   9003.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   9003.00 TO NODE   9004.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2935.00  DOWNSTREAM(FEET) =  2918.00
  FLOW LENGTH(FEET) =   255.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.06
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      58.56
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   13.72
  LONGEST FLOWPATH FROM NODE   9000.00 TO NODE   9004.00 =    3265.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   9004.00 TO NODE   9004.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.72
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.703
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        6.56      0.47     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.47
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    6.56      SUBAREA RUNOFF(CFS) =    9.78
  EFFECTIVE AREA(ACRES) =     45.75   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.58  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       54.2       PEAK FLOW RATE(CFS) =      67.71

****************************************************************************
  FLOW PROCESS FROM NODE   9004.00 TO NODE   9004.50 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2918.00  DOWNSTREAM(FEET) =   2917.99
  CHANNEL LENGTH THRU SUBAREA(FEET) =   291.60   CHANNEL SLOPE =  0.0000
  NOTE: CHANNEL SLOPE OF .001 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      67.71
  FLOW VELOCITY(FEET/SEC) =   1.34 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.64   Tc(MIN.) =   17.35
  LONGEST FLOWPATH FROM NODE   9000.00 TO NODE   9004.50 =    3556.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   9004.50 TO NODE   9004.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.35
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.444
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                D        7.86      0.47     0.850    75
  PUBLIC PARK                A        0.17      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.48
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    8.02      SUBAREA RUNOFF(CFS) =    7.48
  EFFECTIVE AREA(ACRES) =     53.77   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.52  AREA-AVERAGED Ap =  0.21
  TOTAL AREA(ACRES) =       62.2       PEAK FLOW RATE(CFS) =      67.71
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   9004.50 TO NODE   9004.50 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   8300.00 TO NODE   9004.50 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    87.00
  ELEVATION DATA: UPSTREAM(FEET) =   2935.00  DOWNSTREAM(FEET) =   2918.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.451
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        1.21      0.47     0.100    75    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.47
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      3.71
  TOTAL AREA(ACRES) =      1.21   PEAK FLOW RATE(CFS) =      3.71

********************************************************************************
  FLOW PROCESS FROM NODE   9004.50 TO NODE   9004.50 IS CODE =  11
--------------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
================================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        3.71    5.00    3.451  0.47( 0.05) 0.10       1.2    8300.00
  LONGEST FLOWPATH FROM NODE   8300.00 TO NODE   9004.50 =      87.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       67.71   17.35    1.444  0.52( 0.11) 0.21      53.8    9100.00
      2       62.21   23.18    1.179  0.53( 0.10) 0.20      62.2    9000.00
  LONGEST FLOWPATH FROM NODE   9000.00 TO NODE   9004.50 =    3556.60 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       52.57    5.00    3.451  0.52( 0.11) 0.20      16.7    8300.00
      2       69.24   17.35    1.444  0.52( 0.11) 0.21      55.0    9100.00
      3       63.44   23.18    1.179  0.53( 0.10) 0.19      63.5    9000.00
    TOTAL AREA(ACRES) =        63.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       69.24  Tc(MIN.) =   17.350
  EFFECTIVE AREA(ACRES) =     54.98  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.52  AREA-AVERAGED Ap =  0.21
  TOTAL AREA(ACRES) =       63.5
  LONGEST FLOWPATH FROM NODE   9000.00 TO NODE   9004.50 =    3556.60 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   9004.50 TO NODE   9004.50 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   9004.50 TO NODE   3100.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2918.00  DOWNSTREAM(FEET) =   2917.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    41.34   CHANNEL SLOPE =  0.0242
  CHANNEL FLOW THRU SUBAREA(CFS) =      69.24
  FLOW VELOCITY(FEET/SEC) =   6.62 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.10   Tc(MIN.) =   17.45
  LONGEST FLOWPATH FROM NODE   9000.00 TO NODE   3100.00 =    3597.94 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3100.00 TO NODE   3012.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2917.00  DOWNSTREAM(FEET) =  2915.00
  FLOW LENGTH(FEET) =   101.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  26.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.55
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      69.24
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   17.58
  LONGEST FLOWPATH FROM NODE   9000.00 TO NODE   3012.00 =    3698.94 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       63.5  TC(MIN.) =     17.58
  EFFECTIVE AREA(ACRES) =     54.98  AREA-AVERAGED Fm(INCH/HR)=  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.52  AREA-AVERAGED Ap = 0.209
  PEAK FLOW RATE(CFS)   =      69.24

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       52.57    5.25    3.337  0.52( 0.11) 0.20      16.7    8300.00
      2       69.24   17.58    1.431  0.52( 0.11) 0.21      55.0    9100.00
      3       63.44   23.41    1.171  0.53( 0.10) 0.19      63.5    9000.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```



```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
         (c) Copyright 1983-2015 Advanced Engineering Software (aes)
             Ver. 22.0  Release Date: 07/01/2015  License ID 1673

                          Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* Apple Valley 143 Acres - Proposed Condition 2                         *
* 10-Yr Rational Method - Line C up to Node 1023.5                      *
* Q3 9/21/22                                                            *
 ************************************************************************

  FILE NAME: LINEC_10.DAT
  TIME/DATE OF STUDY: 17:21 09/21/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

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

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.7000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.6060

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

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

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

```
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE   2002.00 TO NODE   2002.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   14.08   RAINFALL INTENSITY(INCH/HR) =  1.67
  EFFECTIVE AREA(ACRES) =    13.30
  TOTAL AREA(ACRES) =    13.30        PEAK FLOW RATE(CFS) =     16.49
  AREA-AVERAGED Fm(INCH/HR) =   0.27  AREA-AVERAGED Fp(INCH/HR) =   0.35
  AREA-AVERAGED Ap =  0.77
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE   2002.00 TO NODE   2003.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3002.40  DOWNSTREAM(FEET) =   2990.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   556.00   CHANNEL SLOPE =  0.0218
  CHANNEL FLOW THRU SUBAREA(CFS) =      16.49
  FLOW VELOCITY(FEET/SEC) =   4.20 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.21   Tc(MIN.) =   16.29
  LONGEST FLOWPATH FROM NODE   2002.00 TO NODE   2003.00 =     556.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2003.00 TO NODE   2003.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.29
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.510
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.75      0.75     0.100    56
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        5.21      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.35
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.887
  SUBAREA AREA(ACRES) =    5.96      SUBAREA RUNOFF(CFS) =    6.43
  EFFECTIVE AREA(ACRES) =     19.26   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.35  AREA-AVERAGED Ap =  0.81
  TOTAL AREA(ACRES) =       19.3       PEAK FLOW RATE(CFS) =      21.28

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

```
 FLOW PROCESS FROM NODE   2003.00 TO NODE   3006.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  2990.30  DOWNSTREAM(FEET) =  2982.00
 FLOW LENGTH(FEET) =   650.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.91
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      21.28
 PIPE TRAVEL TIME(MIN.) =   1.22    Tc(MIN.) =   17.50
 LONGEST FLOWPATH FROM NODE   2002.00 TO NODE   3006.00 =    1206.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   3006.00 TO NODE   3006.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE   3005.00 TO NODE   3005.00 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN.) =   37.09   RAINFALL INTENSITY(INCH/HR) =  0.85
 EFFECTIVE AREA(ACRES) =    32.97
 TOTAL AREA(ACRES) =    33.80        PEAK FLOW RATE(CFS) =     13.99
 AREA-AVERAGED Fm(INCH/HR) =   0.39  AREA-AVERAGED Fp(INCH/HR) =   0.45
 AREA-AVERAGED Ap =  0.86
 NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
       CONFLUENCE ANALYSES.

****************************************************************************
 FLOW PROCESS FROM NODE   3005.00 TO NODE   3005.50 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   3024.30  DOWNSTREAM(FEET) =   2997.10
 CHANNEL LENGTH THRU SUBAREA(FEET) =   974.00   CHANNEL SLOPE =  0.0279
 CHANNEL FLOW THRU SUBAREA(CFS) =      13.99
 FLOW VELOCITY(FEET/SEC) =   4.55 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   3.56   Tc(MIN.) =   40.65
 LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3005.50 =    2180.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   3005.50 TO NODE   3005.50 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   40.65
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.796
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        2.14      0.75     0.100    56
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B       13.07      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.35
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.873
  SUBAREA AREA(ACRES) =   15.21      SUBAREA RUNOFF(CFS) =    6.70
  EFFECTIVE AREA(ACRES) =     48.18   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =       49.0       PEAK FLOW RATE(CFS) =      18.83

****************************************************************************
  FLOW PROCESS FROM NODE   3005.50 TO NODE   3006.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2997.10  DOWNSTREAM(FEET) =  2982.00
  FLOW LENGTH(FEET) =    38.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  31.69
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.83
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   40.67
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3006.00 =    2218.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3006.00 TO NODE   3006.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       18.83   40.67    0.796  0.42( 0.36) 0.86      48.2    3005.00
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3006.00 =    2218.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       21.28   17.50    1.435  0.35( 0.28) 0.81      19.3    2002.00
  LONGEST FLOWPATH FROM NODE   2002.00 TO NODE   3006.00 =    1206.00 FEET.
```

```
  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       40.11   17.50    1.435  0.39( 0.32) 0.84      40.0    2002.00
      2       28.31   40.67    0.796  0.40( 0.34) 0.85      67.4    3005.00
    TOTAL AREA(ACRES) =        68.3

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       40.11  Tc(MIN.) =   17.504
  EFFECTIVE AREA(ACRES) =     39.99  AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =       68.3
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3006.00 =    2218.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3006.00 TO NODE   3006.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3006.00 TO NODE   3007.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2982.00  DOWNSTREAM(FEET) =  2980.00
  FLOW LENGTH(FEET) =   276.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.38
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      40.11
  PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =   18.05
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3007.00 =    2494.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3007.00 TO NODE   3007.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   4002.00 TO NODE   4002.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   23.48   RAINFALL INTENSITY(INCH/HR) =  1.17
  EFFECTIVE AREA(ACRES) =    10.90
```

```
  TOTAL AREA(ACRES) =    10.90        PEAK FLOW RATE(CFS) =      8.55
  AREA-AVERAGED Fm(INCH/HR) =   0.32  AREA-AVERAGED Fp(INCH/HR) =   0.43
  AREA-AVERAGED Ap =  0.74
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE   4002.00 TO NODE   4002.50 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3012.20  DOWNSTREAM(FEET) =   2997.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   543.00   CHANNEL SLOPE =  0.0273
  CHANNEL FLOW THRU SUBAREA(CFS) =       8.55
  FLOW VELOCITY(FEET/SEC) =   3.97 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.28   Tc(MIN.) =   25.76
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   4002.50 =    3037.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4002.50 TO NODE   4002.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   25.76
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.095
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        1.90      0.75     0.100    56
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        4.32      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.36
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.725
  SUBAREA AREA(ACRES) =    6.22      SUBAREA RUNOFF(CFS) =    4.67
  EFFECTIVE AREA(ACRES) =     17.12   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.41  AREA-AVERAGED Ap =  0.73
  TOTAL AREA(ACRES) =       17.1       PEAK FLOW RATE(CFS) =      12.29

****************************************************************************
  FLOW PROCESS FROM NODE   4002.50 TO NODE   3007.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2997.40  DOWNSTREAM(FEET) =  2980.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  29.04
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.29
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   25.78
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3007.00 =    3077.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3007.00 TO NODE   3007.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       12.29   25.78    1.095  0.41( 0.30) 0.73      17.1    3005.00
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3007.00 =    3077.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       40.11   18.05    1.405  0.39( 0.32) 0.84      40.0    2002.00
      2       28.31   41.27    0.787  0.40( 0.34) 0.85      67.4    3005.00
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3007.00 =    2494.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       52.07   18.05    1.405  0.39( 0.32) 0.81      52.0    2002.00
      2       48.47   25.78    1.095  0.39( 0.32) 0.81      66.3    3005.00
      3       35.86   41.27    0.787  0.40( 0.33) 0.82      84.6    3005.00
    TOTAL AREA(ACRES) =        85.4

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       52.07  Tc(MIN.) =   18.053
  EFFECTIVE AREA(ACRES) =     51.98  AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.39  AREA-AVERAGED Ap =  0.81
  TOTAL AREA(ACRES) =       85.4
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3007.00 =    3077.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3007.00 TO NODE   3007.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3007.00 TO NODE   3008.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2980.00  DOWNSTREAM(FEET) =  2979.00
  FLOW LENGTH(FEET) =   374.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  32.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.20
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      52.07
  PIPE TRAVEL TIME(MIN.) =   1.01    Tc(MIN.) =   19.06
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3008.00 =    3451.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3008.00 TO NODE   3008.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5800.00 TO NODE   5800.50 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   428.00
  ELEVATION DATA: UPSTREAM(FEET) =   3017.20  DOWNSTREAM(FEET) =   3003.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.781
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.788
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        1.84      0.75     0.100    56    6.78
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.45      0.34     1.000    82   11.71
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.46
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.277
  SUBAREA RUNOFF(CFS) =      5.48
  TOTAL AREA(ACRES) =      2.29   PEAK FLOW RATE(CFS) =      5.48

****************************************************************************
  FLOW PROCESS FROM NODE   5800.50 TO NODE   3008.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3003.00  DOWNSTREAM(FEET) =  2979.00
  FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  26.97
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.48
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    6.80
  LONGEST FLOWPATH FROM NODE   5800.00 TO NODE   3008.00 =     463.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3008.00 TO NODE   3008.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        5.48    6.80    2.782  0.46( 0.13) 0.28       2.3    5800.00
  LONGEST FLOWPATH FROM NODE   5800.00 TO NODE   3008.00 =     463.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       52.07   19.06    1.352  0.39( 0.32) 0.81      52.0    2002.00
      2       48.47   26.82    1.065  0.39( 0.32) 0.81      66.3    3005.00
      3       35.86   42.37    0.773  0.40( 0.33) 0.82      84.6    3005.00
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3008.00 =    3451.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       49.73    6.80    2.782  0.39( 0.30) 0.75      20.8    5800.00
      2       54.60   19.06    1.352  0.39( 0.31) 0.79      54.3    2002.00
      3       50.40   26.82    1.065  0.40( 0.31) 0.79      68.5    3005.00
      4       37.19   42.37    0.773  0.40( 0.33) 0.81      86.8    3005.00
    TOTAL AREA(ACRES) =        87.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       54.60  Tc(MIN.) =   19.058
  EFFECTIVE AREA(ACRES) =     54.27  AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.39  AREA-AVERAGED Ap =  0.79
  TOTAL AREA(ACRES) =       87.7
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3008.00 =    3451.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3008.00 TO NODE   3008.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3008.00 TO NODE   3009.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2979.00  DOWNSTREAM(FEET) =  2972.00
  FLOW LENGTH(FEET) =   621.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  27.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.50
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      54.60
  PIPE TRAVEL TIME(MIN.) =   0.99    Tc(MIN.) =   20.04
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3009.00 =    4072.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3009.00 TO NODE   3009.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5019.00 TO NODE   5019.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   37.42   RAINFALL INTENSITY(INCH/HR) =  0.84
  EFFECTIVE AREA(ACRES) =   601.18
  TOTAL AREA(ACRES) =   997.00        PEAK FLOW RATE(CFS) =    448.85
  AREA-AVERAGED Fm(INCH/HR) =   0.28  AREA-AVERAGED Fp(INCH/HR) =   0.28
  AREA-AVERAGED Ap =  0.99
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE   5019.00 TO NODE   5019.50 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2988.80  DOWNSTREAM(FEET) =   2978.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   199.00   CHANNEL SLOPE =  0.0543
  CHANNEL FLOW THRU SUBAREA(CFS) =     448.85
  FLOW VELOCITY(FEET/SEC) =  17.62 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.19   Tc(MIN.) =   37.61
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   5019.50 =    4271.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5019.50 TO NODE   5019.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
  MAINLINE Tc(MIN.) =   37.61
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.840
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.82      0.75     0.100    56
  NATURAL DESERT COVER
  "DESERT BRUSH"   ( 0.0%)   B        1.67      0.31     1.000    84
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.704
  SUBAREA AREA(ACRES) =    2.49      SUBAREA RUNOFF(CFS) =    1.37
  EFFECTIVE AREA(ACRES) =    603.67   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =      999.5       PEAK FLOW RATE(CFS) =     448.85
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5019.50 TO NODE   3009.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2978.00  DOWNSTREAM(FEET) =  2972.00
  FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  40.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  35.25
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     448.85
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   37.65
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3009.00 =    4361.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3009.00 TO NODE   3009.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      448.85   37.65    0.840  0.28( 0.28) 0.99     603.7    3005.00
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3009.00 =    4361.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       49.73    7.79    2.529  0.39( 0.30) 0.75      20.8    5800.00
      2       54.60   20.04    1.306  0.39( 0.31) 0.79      54.3    2002.00
      3       50.40   27.81    1.038  0.40( 0.31) 0.79      68.5    3005.00
      4       37.19   43.43    0.760  0.40( 0.33) 0.81      86.8    3005.00
```

```
 LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3009.00 =    4072.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      421.57    7.79    2.529  0.29( 0.28) 0.96     145.8    5800.00
     2      491.35   20.04    1.306  0.29( 0.28) 0.96     375.6    2002.00
     3      498.82   27.81    1.038  0.29( 0.28) 0.96     514.5    3005.00
     4      490.93   37.65    0.840  0.29( 0.28) 0.97     683.7    3005.00
     5      422.29   43.43    0.760  0.29( 0.28) 0.97     690.5    3005.00
   TOTAL AREA(ACRES) =      1087.2

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      498.82  Tc(MIN.) =   27.813
 EFFECTIVE AREA(ACRES) =    514.49  AREA-AVERAGED Fm(INCH/HR) =  0.28
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.97
 TOTAL AREA(ACRES) =     1087.2
 LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3009.00 =    4361.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   3009.00 TO NODE   3009.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE   3009.00 TO NODE   3010.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  2972.00  DOWNSTREAM(FEET) =  2952.00
 FLOW LENGTH(FEET) =   835.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  66.0 INCH PIPE IS  53.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  24.30
 ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     498.82
 PIPE TRAVEL TIME(MIN.) =   0.57    Tc(MIN.) =   28.39
 LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3010.00 =    5196.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   3010.00 TO NODE   3010.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE   6009.00 TO NODE   6009.00 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
```

```
================================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   39.84   RAINFALL INTENSITY(INCH/HR) =  0.81
  EFFECTIVE AREA(ACRES) =    75.92
  TOTAL AREA(ACRES) =    92.50        PEAK FLOW RATE(CFS) =     31.71
  AREA-AVERAGED Fm(INCH/HR) =   0.35  AREA-AVERAGED Fp(INCH/HR) =   0.37
  AREA-AVERAGED Ap =  0.95
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE   6009.00 TO NODE   6009.50 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2973.40  DOWNSTREAM(FEET) =   2960.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    49.00   CHANNEL SLOPE =  0.2735
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      31.71
  FLOW VELOCITY(FEET/SEC) =  10.75 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.08   Tc(MIN.) =   39.92
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   6009.50 =    5245.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6009.50 TO NODE   6009.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   39.92
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.806
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.32      0.75     0.100    56
  COMMERCIAL                 D        0.46      0.47     0.100    75
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.78      0.34     1.000    82
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        1.40      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.763
  SUBAREA AREA(ACRES) =    2.96      SUBAREA RUNOFF(CFS) =    1.64
  EFFECTIVE AREA(ACRES) =     78.88   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.94
  TOTAL AREA(ACRES) =       95.5       PEAK FLOW RATE(CFS) =      32.70

****************************************************************************
  FLOW PROCESS FROM NODE   6009.50 TO NODE   3010.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2960.00  DOWNSTREAM(FEET) =  2952.00
  FLOW LENGTH(FEET) =    47.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  26.39
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      32.70
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   39.95
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3010.00 =    5292.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3010.00 TO NODE   3010.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       32.70   39.95    0.806  0.37( 0.35) 0.94      78.9    3005.00
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3010.00 =    5292.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      421.57    8.39    2.403  0.29( 0.28) 0.96     145.8    5800.00
      2      491.35   20.62    1.280  0.29( 0.28) 0.96     375.6    2002.00
      3      498.82   28.39    1.023  0.29( 0.28) 0.96     514.5    3005.00
      4      490.93   38.22    0.831  0.29( 0.28) 0.97     683.7    3005.00
      5      422.29   44.03    0.753  0.29( 0.28) 0.97     690.5    3005.00
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3010.00 =    5196.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      452.26    8.39    2.403  0.30( 0.29) 0.95     162.4    5800.00
      2      524.05   20.62    1.280  0.30( 0.29) 0.96     416.3    2002.00
      3      531.51   28.39    1.023  0.30( 0.29) 0.96     570.5    3005.00
      4      523.63   38.22    0.831  0.30( 0.29) 0.96     759.2    3005.00
      5      503.26   39.95    0.806  0.30( 0.29) 0.96     764.6    3005.00
      6      451.22   44.03    0.753  0.30( 0.29) 0.96     769.4    3005.00
    TOTAL AREA(ACRES) =      1182.6

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      531.51  Tc(MIN.) =   28.386
  EFFECTIVE AREA(ACRES) =    570.54  AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.96
  TOTAL AREA(ACRES) =     1182.6
```

```
 LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3010.00 =    5292.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   3010.00 TO NODE   3010.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE   3010.00 TO NODE   3011.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  2952.00  DOWNSTREAM(FEET) =  2943.00
 FLOW LENGTH(FEET) =   951.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  81.0 INCH PIPE IS  64.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.50
 ESTIMATED PIPE DIAMETER(INCH) =  81.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     531.51
 PIPE TRAVEL TIME(MIN.) =   0.91    Tc(MIN.) =   29.29
 LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3011.00 =    6243.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   3011.00 TO NODE   3011.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE   7007.00 TO NODE   7007.00 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN.) =   27.82   RAINFALL INTENSITY(INCH/HR) =  1.04
 EFFECTIVE AREA(ACRES) =    64.35
 TOTAL AREA(ACRES) =   131.90        PEAK FLOW RATE(CFS) =     39.00
 AREA-AVERAGED Fm(INCH/HR) =   0.33  AREA-AVERAGED Fp(INCH/HR) =   0.36
 AREA-AVERAGED Ap =  0.93
 NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
       CONFLUENCE ANALYSES.

****************************************************************************
 FLOW PROCESS FROM NODE   7007.00 TO NODE   7007.50 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   2948.60  DOWNSTREAM(FEET) =   2945.00
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =    52.00   CHANNEL SLOPE =  0.0692
  CHANNEL FLOW THRU SUBAREA(CFS) =      39.00
  FLOW VELOCITY(FEET/SEC) =   9.49 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.09   Tc(MIN.) =   27.91
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   7007.50 =    6295.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7007.50 TO NODE   7007.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.91
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.035
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        1.43      0.47     0.100    75
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        1.33      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.534
  SUBAREA AREA(ACRES) =    2.76      SUBAREA RUNOFF(CFS) =    2.30
  EFFECTIVE AREA(ACRES) =     67.11   AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  0.91
  TOTAL AREA(ACRES) =      134.7       PEAK FLOW RATE(CFS) =      42.87

****************************************************************************
  FLOW PROCESS FROM NODE   7007.50 TO NODE   3011.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2975.00  DOWNSTREAM(FEET) =  2943.00
  FLOW LENGTH(FEET) =   450.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.43
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      42.87
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   28.28
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3011.00 =    6745.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3011.00 TO NODE   3011.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

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

```
     1       42.87   28.28    1.026  0.36( 0.33) 0.91      67.1    3005.00
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3011.00 =    6745.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      452.26    9.32    2.232  0.30( 0.29) 0.95     162.4    5800.00
      2      524.05   21.52    1.242  0.30( 0.29) 0.96     416.3    2002.00
      3      531.51   29.29    1.001  0.30( 0.29) 0.96     570.5    3005.00
      4      523.63   39.13    0.817  0.30( 0.29) 0.96     759.2    3005.00
      5      503.26   40.86    0.793  0.30( 0.29) 0.96     764.6    3005.00
      6      451.22   44.96    0.742  0.30( 0.29) 0.96     769.4    3005.00
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3011.00 =    6243.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      490.71    9.32    2.232  0.31( 0.29) 0.95     184.5    5800.00
      2      566.75   21.52    1.242  0.31( 0.29) 0.95     467.4    2002.00
      3      573.42   28.28    1.026  0.31( 0.29) 0.96     617.5    3005.00
      4      572.86   29.29    1.001  0.31( 0.29) 0.96     637.6    3005.00
      5      553.73   39.13    0.817  0.30( 0.29) 0.96     826.3    3005.00
      6      531.87   40.86    0.793  0.30( 0.29) 0.96     831.7    3005.00
      7      476.68   44.96    0.742  0.30( 0.29) 0.96     836.5    3005.00
    TOTAL AREA(ACRES) =      1317.3

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      573.42  Tc(MIN.) =   28.279
  EFFECTIVE AREA(ACRES) =    617.54  AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.31  AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =     1317.3
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3011.00 =    6745.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3011.00 TO NODE   3011.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3011.00 TO NODE   3012.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2943.00  DOWNSTREAM(FEET) =  2915.00
  FLOW LENGTH(FEET) =   967.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  69.0 INCH PIPE IS  51.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  27.38
  ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =     573.42
  PIPE TRAVEL TIME(MIN.) =   0.59    Tc(MIN.) =   28.87
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3012.00 =    7712.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3012.00 TO NODE   3012.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3012.00 TO NODE   3012.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   17.58   RAINFALL INTENSITY(INCH/HR) =  1.43
  EFFECTIVE AREA(ACRES) =    54.98
  TOTAL AREA(ACRES) =    63.50        PEAK FLOW RATE(CFS) =     69.24
  AREA-AVERAGED Fm(INCH/HR) =   0.11  AREA-AVERAGED Fp(INCH/HR) =   0.52
  AREA-AVERAGED Ap =  0.21
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE   3012.00 TO NODE   3012.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       69.24   17.58    1.431  0.52( 0.11) 0.21      55.0    3005.00
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3012.00 =    7712.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      490.71    9.94    2.133  0.31( 0.29) 0.95     184.5    5800.00
      2      566.75   22.11    1.219  0.31( 0.29) 0.95     467.4    2002.00
      3      573.42   28.87    1.011  0.31( 0.29) 0.96     617.5    3005.00
      4      572.86   29.88    0.987  0.31( 0.29) 0.96     637.6    3005.00
      5      553.73   39.73    0.809  0.30( 0.29) 0.96     826.3    3005.00
      6      531.87   41.46    0.785  0.30( 0.29) 0.96     831.7    3005.00
      7      476.68   45.58    0.735  0.30( 0.29) 0.96     836.5    3005.00
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3012.00 =    7712.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
```

```
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      550.64    9.94    2.133  0.31( 0.26) 0.84     215.6    5800.00
     2      607.67   17.58    1.431  0.31( 0.27) 0.85     417.0    3005.00
     3      624.87   22.11    1.219  0.31( 0.27) 0.88     522.4    2002.00
     4      620.68   28.87    1.011  0.31( 0.28) 0.89     672.5    3005.00
     5      618.86   29.88    0.987  0.31( 0.28) 0.90     692.6    3005.00
     6      590.39   39.73    0.809  0.31( 0.28) 0.91     881.3    3005.00
     7      567.28   41.46    0.785  0.31( 0.28) 0.91     886.7    3005.00
     8      509.45   45.58    0.735  0.31( 0.28) 0.91     891.5    3005.00
   TOTAL AREA(ACRES) =      1380.8

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      624.87  Tc(MIN.) =   22.112
  EFFECTIVE AREA(ACRES) =    522.40  AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.31  AREA-AVERAGED Ap =  0.88
  TOTAL AREA(ACRES) =     1380.8
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3012.00 =    7712.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3012.00 TO NODE   3012.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3012.00 TO NODE   3013.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2915.00  DOWNSTREAM(FEET) =  2903.00
  FLOW LENGTH(FEET) =   674.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  78.0 INCH PIPE IS  58.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.30
  ESTIMATED PIPE DIAMETER(INCH) =  78.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     624.87
  PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =   22.59
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3013.00 =    8386.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2013.00 TO NODE   2013.00 IS CODE = 15.1
----------------------------------------------------------------------------
  >>>>>DEFINE MEMORY BANK # 1 <<<<<
============================================================================
  PEAK FLOWRATE TABLE FILE NAME: LineA_10.DNA
  MEMORY BANK #  1 DEFINED AS FOLLOWS:
   STREAM       Q      Tc      Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS) (MIN.)  (INCH/HR)          (ACRES)    NODE
      1       69.23    5.09  0.73( 0.07) 0.10      22.8    8400.00
      2       86.13   15.14  0.74( 0.07) 0.10      62.9    8100.00
```

```
     3       87.27   18.30  0.74( 0.07) 0.10      73.3    8200.00
     4       85.83   20.58  0.74( 0.07) 0.10      78.7    8000.00
   TOTAL AREA(ACRES) =       78.7

****************************************************************************
  FLOW PROCESS FROM NODE   3013.00 TO NODE   3013.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      550.64   10.45    2.060  0.31( 0.26) 0.84     215.6    5800.00
      2      607.67   18.07    1.404  0.31( 0.27) 0.85     417.0    3005.00
      3      624.87   22.59    1.201  0.31( 0.27) 0.88     522.4    2002.00
      4      620.68   29.35    1.000  0.31( 0.28) 0.89     672.5    3005.00
      5      618.86   30.36    0.976  0.31( 0.28) 0.90     692.6    3005.00
      6      590.39   40.23    0.802  0.31( 0.28) 0.91     881.3    3005.00
      7      567.28   41.95    0.778  0.31( 0.28) 0.91     886.7    3005.00
      8      509.45   46.09    0.729  0.31( 0.28) 0.91     891.5    3005.00
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3013.00 =    8386.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       69.23    5.09    3.409  0.73( 0.07) 0.10      22.8    8400.00
      2       86.13   15.14    1.589  0.74( 0.07) 0.10      62.9    8100.00
      3       87.27   18.30    1.392  0.74( 0.07) 0.10      73.3    8200.00
      4       85.83   20.58    1.281  0.74( 0.07) 0.10      78.7    8000.00
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   3013.00 =    6844.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      538.84    5.09    3.409  0.32( 0.23) 0.71     127.7    8400.00
      2      628.89   10.45    2.060  0.32( 0.23) 0.72     259.8    5800.00
      3      671.83   15.14    1.589  0.32( 0.24) 0.73     402.4    8100.00
      4      694.86   18.07    1.404  0.32( 0.24) 0.74     489.6    3005.00
      5      695.80   18.30    1.392  0.32( 0.24) 0.74     495.6    8200.00
      6      703.06   20.58    1.281  0.32( 0.24) 0.76     554.3    8000.00
      7      704.96   22.59    1.201  0.32( 0.25) 0.77     601.1    2002.00
      8      686.49   29.35    1.000  0.32( 0.26) 0.81     751.3    3005.00
      9      683.00   30.36    0.976  0.31( 0.26) 0.82     771.4    3005.00
     10      642.12   40.23    0.802  0.31( 0.26) 0.85     960.1    3005.00
     11      617.37   41.95    0.778  0.31( 0.26) 0.85     965.5    3005.00
     12      556.08   46.09    0.729  0.31( 0.26) 0.85     970.2    3005.00
    TOTAL AREA(ACRES) =      1459.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
```

```
  PEAK FLOW RATE(CFS) =      704.96  Tc(MIN.) =   22.594
  EFFECTIVE AREA(ACRES) =    601.14  AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.32  AREA-AVERAGED Ap =  0.73
  TOTAL AREA(ACRES) =     1459.5
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3013.00 =    8386.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3013.00 TO NODE   3013.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3013.00 TO NODE   3014.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2903.00  DOWNSTREAM(FEET) =  2900.00
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  69.0 INCH PIPE IS  55.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  31.33
  ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     704.96
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   22.64
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3014.00 =    8466.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3014.00 TO NODE   3014.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   2200.00 TO NODE   2201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   802.00
  ELEVATION DATA: UPSTREAM(FEET) =   2990.30  DOWNSTREAM(FEET) =   2970.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.202
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.251
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.54      0.75     0.100    56    9.20
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      1.06
  TOTAL AREA(ACRES) =      0.54   PEAK FLOW RATE(CFS) =      1.06

****************************************************************************
  FLOW PROCESS FROM NODE   2201.00 TO NODE   2202.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2970.00  DOWNSTREAM(FEET) =   2935.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1381.00   CHANNEL SLOPE =  0.0253
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.020   MAXIMUM DEPTH(FEET) =   0.00

         ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
             CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
             ALLOWABLE DEPTH).
             AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
             ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.

  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.232
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.95      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.98
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 197.96
  AVERAGE FLOW DEPTH(FEET) =   0.00   TRAVEL TIME(MIN.) =   0.12
  Tc(MIN.) =    9.32
  SUBAREA AREA(ACRES) =     0.95       SUBAREA RUNOFF(CFS) =    1.84
  EFFECTIVE AREA(ACRES) =      1.49     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.75  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       2.89

         ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
             CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
             ALLOWABLE DEPTH).
             AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
             ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.


  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.00   FLOW VELOCITY(FEET/SEC.) = 289.19

  ==>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH

  LONGEST FLOWPATH FROM NODE   2200.00 TO NODE   2202.00 =    2183.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   2202.00 TO NODE   2203.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2935.00  DOWNSTREAM(FEET) =   2920.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   947.00   CHANNEL SLOPE =  0.0158
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.020   MAXIMUM DEPTH(FEET) =   0.00

        ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
            CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
            ALLOWABLE DEPTH).
            AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
            ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.

  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.225
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.26      0.75     0.100    56
  COMMERCIAL                 D        0.71      0.47     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.54
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.84
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 383.91
  AVERAGE FLOW DEPTH(FEET) =   0.00   TRAVEL TIME(MIN.) =   0.04
  Tc(MIN.) =    9.36
  SUBAREA AREA(ACRES) =     0.97       SUBAREA RUNOFF(CFS) =    1.89
  EFFECTIVE AREA(ACRES) =      2.46     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.67  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        2.5         PEAK FLOW RATE(CFS) =       4.78

        ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
            CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
            ALLOWABLE DEPTH).
            AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
            ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.


  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.00   FLOW VELOCITY(FEET/SEC.) = 477.71

  ==>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH

  LONGEST FLOWPATH FROM NODE   2200.00 TO NODE   2203.00 =    3130.00 FEET.

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

```
  FLOW PROCESS FROM NODE   2203.00 TO NODE   2204.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2920.00  DOWNSTREAM(FEET) =   2908.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1103.00   CHANNEL SLOPE =  0.0106
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.020   MAXIMUM DEPTH(FEET) =   0.00

         ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
             CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
             ALLOWABLE DEPTH).
             AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
             ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.

  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.220
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        1.05      0.47     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.47
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.80
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 580.35
  AVERAGE FLOW DEPTH(FEET) =   0.00   TRAVEL TIME(MIN.) =   0.03
  Tc(MIN.) =    9.39
  SUBAREA AREA(ACRES) =     1.05       SUBAREA RUNOFF(CFS) =    2.05
  EFFECTIVE AREA(ACRES) =      3.51     AREA-AVERAGED Fm(INCH/HR) =   0.06
  AREA-AVERAGED Fp(INCH/HR) =   0.61  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        3.5         PEAK FLOW RATE(CFS) =       6.82

         ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
             CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
             ALLOWABLE DEPTH).
             AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
             ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.


  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.00   FLOW VELOCITY(FEET/SEC.) = 681.82

  ==>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH

  LONGEST FLOWPATH FROM NODE   2200.00 TO NODE   2204.00 =    4233.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2204.00 TO NODE   3014.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2908.30  DOWNSTREAM(FEET) =  2900.00
  FLOW LENGTH(FEET) =    94.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.88
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.82
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    9.50
  LONGEST FLOWPATH FROM NODE   2200.00 TO NODE   3014.00 =    4327.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3014.00 TO NODE   3014.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        6.82    9.50    2.201  0.61( 0.06) 0.10       3.5    2200.00
  LONGEST FLOWPATH FROM NODE   2200.00 TO NODE   3014.00 =    4327.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      538.84    5.13    3.388  0.32( 0.23) 0.71     127.7    8400.00
      2      628.89   10.49    2.054  0.32( 0.23) 0.72     259.8    5800.00
      3      671.83   15.18    1.586  0.32( 0.24) 0.73     402.4    8100.00
      4      694.86   18.11    1.401  0.32( 0.24) 0.74     489.6    3005.00
      5      695.80   18.34    1.389  0.32( 0.24) 0.74     495.6    8200.00
      6      703.06   20.63    1.280  0.32( 0.24) 0.76     554.3    8000.00
      7      704.96   22.64    1.199  0.32( 0.25) 0.77     601.1    2002.00
      8      686.49   29.39    0.999  0.32( 0.26) 0.81     751.3    3005.00
      9      683.00   30.41    0.975  0.31( 0.26) 0.82     771.4    3005.00
     10      642.12   40.27    0.801  0.31( 0.26) 0.85     960.1    3005.00
     11      617.37   42.00    0.778  0.31( 0.26) 0.85     965.5    3005.00
     12      556.08   46.14    0.728  0.31( 0.26) 0.85     970.2    3005.00
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3014.00 =    8466.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      544.56    5.13    3.388  0.33( 0.23) 0.70     129.6    8400.00
      2      619.11    9.50    2.201  0.33( 0.23) 0.71     238.9    2200.00
      3      635.24   10.49    2.054  0.33( 0.23) 0.71     263.3    5800.00
      4      676.69   15.18    1.586  0.32( 0.23) 0.73     405.9    8100.00
      5      699.13   18.11    1.401  0.32( 0.24) 0.74     493.1    3005.00
      6      700.03   18.34    1.389  0.32( 0.24) 0.74     499.1    8200.00
```

```
     7      706.95   20.63    1.280  0.32( 0.24) 0.75     557.8    8000.00
     8      708.58   22.64    1.199  0.32( 0.25) 0.77     604.7    2002.00
     9      689.47   29.39    0.999  0.32( 0.25) 0.81     754.8    3005.00
    10      685.91   30.41    0.975  0.32( 0.26) 0.81     774.9    3005.00
    11      644.48   40.27    0.801  0.31( 0.26) 0.84     963.6    3005.00
    12      619.65   42.00    0.778  0.31( 0.26) 0.84     969.0    3005.00
    13      558.20   46.14    0.728  0.31( 0.26) 0.84     973.7    3005.00
   TOTAL AREA(ACRES) =      1463.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      708.58  Tc(MIN.) =   22.637
  EFFECTIVE AREA(ACRES) =    604.65  AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.32  AREA-AVERAGED Ap =  0.77
  TOTAL AREA(ACRES) =     1463.0
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3014.00 =    8466.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3014.00 TO NODE   3014.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3014.00 TO NODE   1023.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2900.00  DOWNSTREAM(FEET) =  2898.00
  FLOW LENGTH(FEET) =   285.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  96.0 INCH PIPE IS  74.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.86
  ESTIMATED PIPE DIAMETER(INCH) =  96.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     708.58
  PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =   22.92
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   1023.50 =    8751.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     1463.0  TC(MIN.) =     22.92
  EFFECTIVE AREA(ACRES) =    604.65  AREA-AVERAGED Fm(INCH/HR)=  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.32  AREA-AVERAGED Ap = 0.770
  PEAK FLOW RATE(CFS)   =     708.58

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      544.56    5.43    3.256  0.33( 0.23) 0.70     129.6    8400.00
      2      619.11    9.80    2.155  0.33( 0.23) 0.71     238.9    2200.00
      3      635.24   10.78    2.015  0.33( 0.23) 0.71     263.3    5800.00
      4      676.69   15.47    1.565  0.32( 0.23) 0.73     405.9    8100.00
```

5	699.13	18.40	1.386	0.32(0.24) 0.74	493.1	3005.00
6	700.03	18.62	1.375	0.32(0.24) 0.74	499.1	8200.00
7	706.95	20.91	1.267	0.32(0.24) 0.75	557.8	8000.00
8	708.58	22.92	1.189	0.32(0.25) 0.77	604.7	2002.00
9	689.47	29.67	0.992	0.32(0.25) 0.81	754.8	3005.00
10	685.91	30.69	0.969	0.32(0.26) 0.81	774.9	3005.00
11	644.48	40.56	0.797	0.31(0.26) 0.84	963.6	3005.00
12	619.65	42.29	0.774	0.31(0.26) 0.84	969.0	3005.00
13	558.20	46.44	0.725	0.31(0.26) 0.84	973.7	3005.00

==========

==========

END OF RATIONAL METHOD ANALYSIS



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



 ************************* DESCRIPTION OF STUDY *************************
* Apple Valley 143 Acres - Proposed Condition Node 1025                  *
* 10-Yr Rational Method                                                  *
* Q3 9/20/22                                                             *
 **************************************************************************

  FILE NAME: 10P1025T.DAT
  TIME/DATE OF STUDY: 15:07 09/21/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.7000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.6060

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150
  2   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
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 OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
FLOW PROCESS FROM NODE   2100.00 TO NODE   2101.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   859.00
ELEVATION DATA: UPSTREAM(FEET) =   3000.00  DOWNSTREAM(FEET) =   2980.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.618
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.183
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
COMMERCIAL                 B        0.06      0.75     0.100    56    9.62
NATURAL DESERT COVER
"DESERT BRUSH"   (30.0%)   B        1.81      0.34     1.000    82   16.61
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.35
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.970
SUBAREA RUNOFF(CFS) =      3.11
TOTAL AREA(ACRES) =      1.87   PEAK FLOW RATE(CFS) =      3.11

****************************************************************************
FLOW PROCESS FROM NODE   2101.00 TO NODE   2102.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   2980.00  DOWNSTREAM(FEET) =   2961.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   887.00   CHANNEL SLOPE =  0.0214
CHANNEL FLOW THRU SUBAREA(CFS) =       3.11
FLOW VELOCITY(FEET/SEC) =   2.77 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   5.34   Tc(MIN.) =   14.95
LONGEST FLOWPATH FROM NODE   2100.00 TO NODE   2102.00 =    1746.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2102.00 TO NODE   2102.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   14.95
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.603
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL DESERT COVER
```

```
  "DESERT BRUSH"   (30.0%)   B        3.99      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.99      SUBAREA RUNOFF(CFS) =    4.52
  EFFECTIVE AREA(ACRES) =      5.86   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =        5.9       PEAK FLOW RATE(CFS) =       6.65

****************************************************************************
  FLOW PROCESS FROM NODE   2102.00 TO NODE   2104.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2961.00  DOWNSTREAM(FEET) =   2934.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1364.00   CHANNEL SLOPE =  0.0197
  CHANNEL FLOW THRU SUBAREA(CFS) =       6.65
  FLOW VELOCITY(FEET/SEC) =   3.17 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.17   Tc(MIN.) =   22.12
  LONGEST FLOWPATH FROM NODE   2100.00 TO NODE   2104.00 =    3110.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2014.00 TO NODE   2014.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   22.12
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.218
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        5.48      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.48      SUBAREA RUNOFF(CFS) =    4.31
  EFFECTIVE AREA(ACRES) =     11.34   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       11.3       PEAK FLOW RATE(CFS) =       8.94

****************************************************************************
  FLOW PROCESS FROM NODE   2104.00 TO NODE   1019.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2934.10  DOWNSTREAM(FEET) =   2920.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   221.00   CHANNEL SLOPE =  0.0602
  CHANNEL FLOW THRU SUBAREA(CFS) =       8.94
  FLOW VELOCITY(FEET/SEC) =   5.96 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
  TRAVEL TIME(MIN.) =   0.62   Tc(MIN.) =   22.74
  LONGEST FLOWPATH FROM NODE   2100.00 TO NODE   1019.00 =    3331.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1019.00 TO NODE   1019.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   22.74
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.195
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.07      0.34     1.000    82
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        0.21      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.28      SUBAREA RUNOFF(CFS) =    0.25
  EFFECTIVE AREA(ACRES) =     11.62   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       11.6       PEAK FLOW RATE(CFS) =       8.95

****************************************************************************
  FLOW PROCESS FROM NODE   1019.00 TO NODE   1019.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1018.00 TO NODE   1018.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   22.60   RAINFALL INTENSITY(INCH/HR) =  1.20
  EFFECTIVE AREA(ACRES) =   111.09
  TOTAL AREA(ACRES) =   424.00        PEAK FLOW RATE(CFS) =    110.94
  AREA-AVERAGED Fm(INCH/HR) =   0.35  AREA-AVERAGED Fp(INCH/HR) =   0.36
  AREA-AVERAGED Ap =  0.98
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE   1018.00 TO NODE   1019.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   2922.40  DOWNSTREAM(FEET) =   2920.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   218.70   CHANNEL SLOPE =  0.0073
  CHANNEL FLOW THRU SUBAREA(CFS) =     110.94
  FLOW VELOCITY(FEET/SEC) =   4.19 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.87   Tc(MIN.) =   23.48
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1019.00 =    3549.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1019.00 TO NODE   1019.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   23.48
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.169
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        0.98      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   ( 0.0%)   B        0.90      0.31     1.000    84
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.38
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.88      SUBAREA RUNOFF(CFS) =    1.34
  EFFECTIVE AREA(ACRES) =    112.97   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      425.9       PEAK FLOW RATE(CFS) =     110.94
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1019.00 TO NODE   1019.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      110.94   23.48    1.169  0.36( 0.35) 0.98     113.0    1018.00
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1019.00 =    3549.70 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        8.95   22.74    1.195  0.34( 0.34) 1.00      11.6    2100.00
  LONGEST FLOWPATH FROM NODE   2100.00 TO NODE   1019.00 =    3331.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      119.88   22.74    1.195  0.36( 0.35) 0.98     121.0    2100.00
```

```
      2      119.61   23.48    1.169  0.36( 0.35) 0.98     124.6    1018.00
    TOTAL AREA(ACRES) =       437.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      119.88  Tc(MIN.) =   22.739
  EFFECTIVE AREA(ACRES) =    121.05  AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      437.5
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1019.00 =    3549.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1019.00 TO NODE   1019.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1019.00 TO NODE   1019.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2920.80  DOWNSTREAM(FEET) =  2920.50
  FLOW LENGTH(FEET) =    47.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  39.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.25
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     119.88
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   22.81
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1019.50 =    3596.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1019.50 TO NODE   1019.50 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1400.00 TO NODE   1401.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   380.00
  ELEVATION DATA: UPSTREAM(FEET) =   2925.10  DOWNSTREAM(FEET) =   2921.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.094
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.463
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
```

```
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  A        0.19      0.98     0.100    32    8.09
  USER-DEFINED                -        0.10      0.44     1.000     -   13.98
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.52
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.415
  SUBAREA RUNOFF(CFS) =      0.61
  TOTAL AREA(ACRES) =      0.30   PEAK FLOW RATE(CFS) =      0.61

****************************************************************************
  FLOW PROCESS FROM NODE   1401.00 TO NODE   1019.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2921.00  DOWNSTREAM(FEET) =  2920.50
  FLOW LENGTH(FEET) =    58.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.97
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.61
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =    8.42
  LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1019.50 =     438.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1019.50 TO NODE   1019.50 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        0.61    8.42    2.396  0.52( 0.22) 0.41       0.3    1400.00
  LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1019.50 =     438.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      119.88   22.81    1.192  0.36( 0.35) 0.98     121.0    2100.00
      2      119.61   23.55    1.166  0.36( 0.35) 0.98     124.6    1018.00
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1019.50 =    3596.70 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      108.20    8.42    2.396  0.36( 0.35) 0.98      45.0    1400.00
      2      120.15   22.81    1.192  0.36( 0.35) 0.98     121.3    2100.00
      3      119.88   23.55    1.166  0.36( 0.35) 0.98     124.9    1018.00
```

```
    TOTAL AREA(ACRES) =       437.8

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      120.15  Tc(MIN.) =   22.815
  EFFECTIVE AREA(ACRES) =    121.35  AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      437.8
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1019.50 =    3596.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1019.50 TO NODE   1019.50 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1019.50 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) =  2920.50  DOWNSTREAM(FEET) =  2920.00
  FLOW LENGTH(FEET) =    89.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  38.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.89
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     120.15
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   22.97
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1021.00 =    3685.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1021.00 TO NODE   1021.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1500.00 TO NODE   1021.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   452.48
  ELEVATION DATA: UPSTREAM(FEET) =   2925.30  DOWNSTREAM(FEET) =   2920.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.538
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.373
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL               A        0.24      0.98     0.100    32    8.54
  USER-DEFINED             -        1.11      0.44     1.000     -   14.75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.839
  SUBAREA RUNOFF(CFS) =      2.42
  TOTAL AREA(ACRES) =      1.35   PEAK FLOW RATE(CFS) =      2.42

****************************************************************************
  FLOW PROCESS FROM NODE   1021.00 TO NODE   1021.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        2.42    8.54    2.373  0.45( 0.38) 0.84       1.4    1500.00
  LONGEST FLOWPATH FROM NODE   1500.00 TO NODE   1021.00 =     452.48 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      108.20    8.58    2.365  0.36( 0.35) 0.98      45.0    1400.00
      2      120.15   22.97    1.187  0.36( 0.35) 0.98     121.3    2100.00
      3      119.88   23.71    1.161  0.36( 0.35) 0.98     124.9    1018.00
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1021.00 =    3685.70 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      110.54    8.54    2.373  0.36( 0.35) 0.97      46.1    1500.00
      2      110.61    8.58    2.365  0.36( 0.35) 0.97      46.3    1400.00
      3      121.14   22.97    1.187  0.36( 0.35) 0.98     122.7    2100.00
      4      120.83   23.71    1.161  0.36( 0.35) 0.98     126.2    1018.00
    TOTAL AREA(ACRES) =       439.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      121.14  Tc(MIN.) =   22.965
  EFFECTIVE AREA(ACRES) =    122.70  AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      439.1
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1021.00 =    3685.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1021.00 TO NODE   1021.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1021.00 TO NODE   1022.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2920.00  DOWNSTREAM(FEET) =   2916.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   562.17   CHANNEL SLOPE =  0.0071
  CHANNEL FLOW THRU SUBAREA(CFS) =     121.14
  FLOW VELOCITY(FEET/SEC) =   4.24 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.21   Tc(MIN.) =   25.17
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1022.00 =    4247.87 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1021.00 TO NODE   1022.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   25.17
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.113
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.44      0.98     0.100    32
  USER-DEFINED               -        3.08      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.886
  SUBAREA AREA(ACRES) =    3.52      SUBAREA RUNOFF(CFS) =    2.27
  EFFECTIVE AREA(ACRES) =    126.22   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      442.7       PEAK FLOW RATE(CFS) =     121.14
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1022.00 TO NODE   1023.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2916.00  DOWNSTREAM(FEET) =   2906.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   911.00   CHANNEL SLOPE =  0.0108
  CHANNEL FLOW THRU SUBAREA(CFS) =     121.14
  FLOW VELOCITY(FEET/SEC) =   5.22 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.91   Tc(MIN.) =   28.08
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1023.00 =    5158.87 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1022.00 TO NODE   1023.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==========================================================================
  MAINLINE Tc(MIN.) =   28.08
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.031
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.35      0.98     0.100    32
  USER-DEFINED               -        8.42      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.964
  SUBAREA AREA(ACRES) =    8.77      SUBAREA RUNOFF(CFS) =    4.77
  EFFECTIVE AREA(ACRES) =    134.99   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      451.4       PEAK FLOW RATE(CFS) =     121.14
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

**************************************************************************
  FLOW PROCESS FROM NODE   1023.00 TO NODE   1023.50 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2906.20  DOWNSTREAM(FEET) =   2898.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   531.74   CHANNEL SLOPE =  0.0154
  CHANNEL FLOW THRU SUBAREA(CFS) =     121.14
  FLOW VELOCITY(FEET/SEC) =   6.25 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.42   Tc(MIN.) =   29.50
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1023.50 =    5690.61 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE   1023.50 TO NODE   1023.50 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   29.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.996
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.66      0.98     0.100    32
  USER-DEFINED               -        4.89      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.893
  SUBAREA AREA(ACRES) =    5.54      SUBAREA RUNOFF(CFS) =    2.98
  EFFECTIVE AREA(ACRES) =    140.53   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =      457.0       PEAK FLOW RATE(CFS) =     121.14
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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

```
  FLOW PROCESS FROM NODE   1023.50 TO NODE   1023.50 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1023.50 TO NODE   1023.50 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   19.39   RAINFALL INTENSITY(INCH/HR) =  1.34
  EFFECTIVE AREA(ACRES) =   522.62
  TOTAL AREA(ACRES) =  1463.00        PEAK FLOW RATE(CFS) =    836.22
  AREA-AVERAGED Fm(INCH/HR) =   0.24  AREA-AVERAGED Fp(INCH/HR) =   0.32
  AREA-AVERAGED Ap =  0.74
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE   1023.50 TO NODE   1023.50 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      836.22   19.39    1.336  0.32( 0.24) 0.74     522.6    1018.00
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1023.50 =    5690.61 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      110.54   15.26    1.580  0.38( 0.37) 0.96      64.0    1500.00
      2      110.61   15.30    1.578  0.38( 0.37) 0.96      64.2    1400.00
      3      121.14   29.50    0.996  0.37( 0.36) 0.97     140.5    2100.00
      4      120.83   30.25    0.979  0.37( 0.36) 0.97     144.1    1018.00
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1023.50 =    5690.61 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      914.61   15.26    1.580  0.33( 0.25) 0.77     475.3    1500.00
      2      915.02   15.30    1.578  0.33( 0.25) 0.77     476.4    1400.00
      3      949.86   19.39    1.336  0.33( 0.25) 0.77     608.8    1018.00
      4      698.68   29.50    0.996  0.33( 0.26) 0.79     663.1    2100.00
      5      685.26   30.25    0.979  0.33( 0.26) 0.79     666.7    1018.00
    TOTAL AREA(ACRES) =      1920.0
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      949.86  Tc(MIN.) =   19.390
  EFFECTIVE AREA(ACRES) =    608.78  AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.33  AREA-AVERAGED Ap =  0.77
  TOTAL AREA(ACRES) =     1920.0
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1023.50 =    5690.61 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1023.50 TO NODE   1023.50 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1023.50 TO NODE   1024.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2898.00  DOWNSTREAM(FEET) =   2896.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   565.00   CHANNEL SLOPE =  0.0028
  CHANNEL FLOW THRU SUBAREA(CFS) =     949.86
  FLOW VELOCITY(FEET/SEC) =   5.13 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.84   Tc(MIN.) =   21.23
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1024.00 =    6255.61 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1024.00 TO NODE   1024.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.23
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.254
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.48      0.98     0.100    32
  USER-DEFINED               -        3.49      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.891
  SUBAREA AREA(ACRES) =    3.97      SUBAREA RUNOFF(CFS) =    3.06
  EFFECTIVE AREA(ACRES) =    612.76   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.33  AREA-AVERAGED Ap =  0.77
  TOTAL AREA(ACRES) =     1924.0       PEAK FLOW RATE(CFS) =     949.86
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1024.00 TO NODE   1024.00 IS CODE = 15.1
----------------------------------------------------------------------------
  >>>>>DEFINE MEMORY BANK # 1 <<<<<
```

```
================================================================================
  PEAK FLOWRATE TABLE FILE NAME: 10p1024l.DNA
  MEMORY BANK #  1 DEFINED AS FOLLOWS:
   STREAM       Q      Tc      Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS) (MIN.)  (INCH/HR)          (ACRES)    NODE
      1       14.95   18.71  0.26( 0.25) 0.96      14.3    5960.00
      2       14.83   19.90  0.26( 0.25) 0.96      15.0    5950.00
      3       14.17   22.70  0.26( 0.25) 0.96      16.2    5960.00
      4       13.69   23.93  0.26( 0.25) 0.96      16.4    5950.00
    TOTAL AREA(ACRES) =       16.4

********************************************************************************
  FLOW PROCESS FROM NODE   1024.00 TO NODE   1024.00 IS CODE =  11
--------------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
================================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      914.61   17.12    1.458  0.33( 0.26) 0.77     479.3    1500.00
      2      915.02   17.15    1.456  0.33( 0.26) 0.77     480.4    1400.00
      3      949.86   21.23    1.254  0.33( 0.26) 0.77     612.8    1018.00
      4      698.68   31.53    0.951  0.33( 0.26) 0.79     667.1    2100.00
      5      685.26   32.29    0.935  0.33( 0.26) 0.79     670.7    1018.00
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1024.00 =    6255.61 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       14.95   18.71    1.370  0.26( 0.25) 0.96      14.3    5960.00
      2       14.83   19.90    1.312  0.26( 0.25) 0.96      15.0    5950.00
      3       14.17   22.70    1.197  0.26( 0.25) 0.96      16.2    5960.00
      4       13.69   23.93    1.153  0.26( 0.25) 0.96      16.4    5950.00
  LONGEST FLOWPATH FROM NODE   5960.00 TO NODE   1024.00 =    2208.30 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      929.36   17.12    1.458  0.33( 0.26) 0.77     492.4    1500.00
      2      929.77   17.15    1.456  0.33( 0.26) 0.77     493.6    1400.00
      3      943.24   18.71    1.370  0.33( 0.26) 0.78     545.2    5960.00
      4      953.37   19.90    1.312  0.33( 0.26) 0.78     584.8    5950.00
      5      964.38   21.23    1.254  0.33( 0.26) 0.78     628.3    1018.00
      6      928.12   22.70    1.197  0.33( 0.26) 0.78     636.7    5960.00
      7      897.77   23.93    1.153  0.33( 0.26) 0.78     643.4    5950.00
      8      709.30   31.53    0.951  0.33( 0.26) 0.79     683.5    2100.00
      9      695.64   32.29    0.935  0.33( 0.26) 0.79     687.1    1018.00
    TOTAL AREA(ACRES) =      1940.3
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      964.38  Tc(MIN.) =   21.226
  EFFECTIVE AREA(ACRES) =    628.33  AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.33  AREA-AVERAGED Ap =  0.78
  TOTAL AREA(ACRES) =     1940.3
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1024.00 =    6255.61 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1024.00 TO NODE   1024.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1024.00 TO NODE   1025.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2896.40  DOWNSTREAM(FEET) =   2894.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   491.09   CHANNEL SLOPE =  0.0045
  CHANNEL FLOW THRU SUBAREA(CFS) =     964.38
  FLOW VELOCITY(FEET/SEC) =   6.48 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.26   Tc(MIN.) =   22.49
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1025.00 =    6746.69 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1025.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   22.49
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.204
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.51      0.98     0.100    32
  USER-DEFINED               -        0.88      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.47
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.670
  SUBAREA AREA(ACRES) =    1.39      SUBAREA RUNOFF(CFS) =    1.11
  EFFECTIVE AREA(ACRES) =    629.72   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.33  AREA-AVERAGED Ap =  0.78
  TOTAL AREA(ACRES) =     1941.7       PEAK FLOW RATE(CFS) =     964.38
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1025.00 IS CODE = 15.1
----------------------------------------------------------------------------
  >>>>>DEFINE MEMORY BANK # 1 <<<<<
```

```
================================================================================
  PEAK FLOWRATE TABLE FILE NAME: 10p1025l.DNA
  MEMORY BANK #  1 DEFINED AS FOLLOWS:
   STREAM       Q      Tc      Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS) (MIN.)  (INCH/HR)         (ACRES)    NODE
      1        8.75   28.15  0.34( 0.30) 0.88      13.3    6010.00
    TOTAL AREA(ACRES) =       13.3

********************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1025.00 IS CODE =  11
--------------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
================================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      929.36   18.40    1.386  0.33( 0.26) 0.77     493.8    1500.00
      2      929.77   18.43    1.384  0.33( 0.26) 0.77     494.9    1400.00
      3      943.24   19.98    1.309  0.33( 0.26) 0.78     546.5    5960.00
      4      953.37   21.17    1.257  0.33( 0.26) 0.78     586.2    5950.00
      5      964.38   22.49    1.204  0.33( 0.26) 0.78     629.7    1018.00
      6      928.12   23.98    1.152  0.33( 0.26) 0.78     638.1    5960.00
      7      897.77   25.22    1.112  0.33( 0.26) 0.78     644.8    5950.00
      8      709.30   32.93    0.922  0.33( 0.26) 0.79     684.9    2100.00
      9      695.64   33.69    0.908  0.33( 0.26) 0.79     688.4    1018.00
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1025.00 =    6746.69 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        8.75   28.15    1.029  0.34( 0.30) 0.88      13.3    6010.00
  LONGEST FLOWPATH FROM NODE   6010.00 TO NODE   1025.00 =    2671.32 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      937.88   18.40    1.386  0.33( 0.26) 0.78     502.5    1500.00
      2      938.29   18.43    1.384  0.33( 0.26) 0.78     503.7    1400.00
      3      951.82   19.98    1.309  0.33( 0.26) 0.78     556.0    5960.00
      4      962.00   21.17    1.257  0.33( 0.26) 0.78     596.2    5950.00
      5      973.05   22.49    1.204  0.33( 0.26) 0.78     640.4    1018.00
      6      936.82   23.98    1.152  0.33( 0.26) 0.78     649.4    5960.00
      7      906.49   25.22    1.112  0.33( 0.26) 0.78     656.7    5950.00
      8      834.92   28.15    1.029  0.33( 0.26) 0.79     673.3    6010.00
      9      716.77   32.93    0.922  0.33( 0.26) 0.79     698.2    2100.00
     10      702.93   33.69    0.908  0.33( 0.26) 0.80     701.8    1018.00
    TOTAL AREA(ACRES) =      1955.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
```

```
  PEAK FLOW RATE(CFS) =      973.05  Tc(MIN.) =   22.489
  EFFECTIVE AREA(ACRES) =    640.36  AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.33  AREA-AVERAGED Ap =  0.78
  TOTAL AREA(ACRES) =     1955.0
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1025.00 =    6746.69 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1025.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     1955.0  TC(MIN.) =     22.49
  EFFECTIVE AREA(ACRES) =    640.36  AREA-AVERAGED Fm(INCH/HR)=  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.33  AREA-AVERAGED Ap = 0.778
  PEAK FLOW RATE(CFS)   =     973.05

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      937.88   18.40    1.386  0.33( 0.26) 0.78     502.5    1500.00
      2      938.29   18.43    1.384  0.33( 0.26) 0.78     503.7    1400.00
      3      951.82   19.98    1.309  0.33( 0.26) 0.78     556.0    5960.00
      4      962.00   21.17    1.257  0.33( 0.26) 0.78     596.2    5950.00
      5      973.05   22.49    1.204  0.33( 0.26) 0.78     640.4    1018.00
      6      936.82   23.98    1.152  0.33( 0.26) 0.78     649.4    5960.00
      7      906.49   25.22    1.112  0.33( 0.26) 0.78     656.7    5950.00
      8      834.92   28.15    1.029  0.33( 0.26) 0.79     673.3    6010.00
      9      716.77   32.93    0.922  0.33( 0.26) 0.79     698.2    2100.00
     10      702.93   33.69    0.908  0.33( 0.26) 0.80     701.8    1018.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
         (c) Copyright 1983-2015 Advanced Engineering Software (aes)
             Ver. 22.0  Release Date: 07/01/2015  License ID 1673

                          Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* Apple Valley 143 Acres - Proposed Condition                           *
* 100-Yr Rational Method - Line A up to Node 3013                       *
* Q3 9/21/22                                                            *
 ************************************************************************

  FILE NAME: LINEA_00.DAT
  TIME/DATE OF STUDY: 16:25 09/21/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.7000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.0800

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   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.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
 FLOW PROCESS FROM NODE   8000.00 TO NODE   8001.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   489.00
 ELEVATION DATA: UPSTREAM(FEET) =   2990.90  DOWNSTREAM(FEET) =   2987.50

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.776
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.846
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 B        2.55      0.75     0.100    56    9.78
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      8.65
 TOTAL AREA(ACRES) =      2.55   PEAK FLOW RATE(CFS) =      8.65

****************************************************************************
 FLOW PROCESS FROM NODE   8001.00 TO NODE   8002.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   2987.50  DOWNSTREAM(FEET) =   2986.70
 CHANNEL LENGTH THRU SUBAREA(FEET) =   706.00   CHANNEL SLOPE =  0.0011
 CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   3.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.00

        ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
            CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
            ALLOWABLE DEPTH).
            AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
            ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.

 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.845
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        6.45      0.75     0.100    56
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      19.60
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = ******
```

```
  AVERAGE FLOW DEPTH(FEET) =   0.00   TRAVEL TIME(MIN.) =   0.00
  Tc(MIN.) =    9.78
  SUBAREA AREA(ACRES) =     6.45       SUBAREA RUNOFF(CFS) =   21.89
  EFFECTIVE AREA(ACRES) =      9.00     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.75  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        9.0         PEAK FLOW RATE(CFS) =      30.54

         ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
             CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
             ALLOWABLE DEPTH).
             AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
             ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.


  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.00   FLOW VELOCITY(FEET/SEC.) = ******

  ==>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH

  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8002.00 =    1195.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   8002.00 TO NODE   8003.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2986.70  DOWNSTREAM(FEET) =  2979.30
  FLOW LENGTH(FEET) =   981.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.79
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      30.54
  PIPE TRAVEL TIME(MIN.) =   2.10    Tc(MIN.) =   11.88
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8003.00 =    2176.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   8003.00 TO NODE   8003.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.88
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.356
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        1.56      0.47     0.100    75
  COMMERCIAL                 B        9.42      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.71
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
```

```
  SUBAREA AREA(ACRES) =   10.98      SUBAREA RUNOFF(CFS) =   32.47
  EFFECTIVE AREA(ACRES) =     19.98   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.73  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       20.0       PEAK FLOW RATE(CFS) =      59.04

****************************************************************************
  FLOW PROCESS FROM NODE   8003.00 TO NODE   8004.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2979.30  DOWNSTREAM(FEET) =  2973.00
  FLOW LENGTH(FEET) =   943.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  29.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.76
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      59.04
  PIPE TRAVEL TIME(MIN.) =   1.79    Tc(MIN.) =   13.67
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8004.00 =    3119.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   8004.00 TO NODE   8004.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.67
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.041
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B       10.17      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   10.17      SUBAREA RUNOFF(CFS) =   27.15
  EFFECTIVE AREA(ACRES) =     30.15   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.73  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       30.1       PEAK FLOW RATE(CFS) =      80.54

****************************************************************************
  FLOW PROCESS FROM NODE   8004.00 TO NODE   8005.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2973.00  DOWNSTREAM(FEET) =  2956.00
  FLOW LENGTH(FEET) =   497.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.59
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      80.54
```

```
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   14.14
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8005.00 =    3616.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   8005.00 TO NODE   8005.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.14
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.970
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        4.82      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    4.82      SUBAREA RUNOFF(CFS) =   12.56
  EFFECTIVE AREA(ACRES) =     34.97   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       35.0       PEAK FLOW RATE(CFS) =      91.16

****************************************************************************
  FLOW PROCESS FROM NODE   8005.00 TO NODE   8005.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   8100.00 TO NODE   8101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   735.00
  ELEVATION DATA: UPSTREAM(FEET) =   2989.10  DOWNSTREAM(FEET) =   2972.90

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.136
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.033
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        2.72      0.75     0.100    56    9.14
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      9.69
  TOTAL AREA(ACRES) =      2.72   PEAK FLOW RATE(CFS) =      9.69

****************************************************************************
  FLOW PROCESS FROM NODE   8101.00 TO NODE   8005.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2972.90  DOWNSTREAM(FEET) =  2956.00
  FLOW LENGTH(FEET) =   150.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.39
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.69
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    9.29
  LONGEST FLOWPATH FROM NODE   8100.00 TO NODE   8005.00 =     885.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   8005.00 TO NODE   8005.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        9.69    9.29    3.986  0.75( 0.07) 0.10       2.7    8100.00
  LONGEST FLOWPATH FROM NODE   8100.00 TO NODE   8005.00 =     885.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       91.16   14.14    2.970  0.74( 0.07) 0.10      35.0    8000.00
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8005.00 =    3616.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       90.57    9.29    3.986  0.74( 0.07) 0.10      25.7    8100.00
      2       98.33   14.14    2.970  0.74( 0.07) 0.10      37.7    8000.00
    TOTAL AREA(ACRES) =        37.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       98.33  Tc(MIN.) =   14.142
  EFFECTIVE AREA(ACRES) =     37.69  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       37.7
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8005.00 =    3616.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   8005.00 TO NODE   8005.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
```

```
==========================================================================

**************************************************************************
  FLOW PROCESS FROM NODE   8005.00 TO NODE   8006.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2956.00  DOWNSTREAM(FEET) =  2955.00
  FLOW LENGTH(FEET) =   140.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  34.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.29
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      98.33
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   14.37
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8006.00 =    3756.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE   8006.00 TO NODE   8006.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   14.37
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.937
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        1.51      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.51      SUBAREA RUNOFF(CFS) =    3.89
  EFFECTIVE AREA(ACRES) =     39.20   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       39.2       PEAK FLOW RATE(CFS) =     101.03

**************************************************************************
  FLOW PROCESS FROM NODE   8006.00 TO NODE   8007.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2955.00  DOWNSTREAM(FEET) =  2945.00
  FLOW LENGTH(FEET) =   780.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.76
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     101.03
  PIPE TRAVEL TIME(MIN.) =   1.02    Tc(MIN.) =   15.39
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8007.00 =    4536.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   8007.00 TO NODE   8007.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.39
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.800
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        4.20      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    4.20      SUBAREA RUNOFF(CFS) =   10.30
  EFFECTIVE AREA(ACRES) =     43.40   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       43.4       PEAK FLOW RATE(CFS) =     106.48

****************************************************************************
  FLOW PROCESS FROM NODE   8007.00 TO NODE   8008.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2945.00  DOWNSTREAM(FEET) =  2932.00
  FLOW LENGTH(FEET) =   140.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  27.33
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     106.48
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   15.47
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8008.00 =    4676.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   8008.00 TO NODE   8008.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.47
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.789
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        1.52      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.52      SUBAREA RUNOFF(CFS) =    3.71
  EFFECTIVE AREA(ACRES) =     44.92   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       44.9       PEAK FLOW RATE(CFS) =     109.77
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   8008.00 TO NODE   8009.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2932.00  DOWNSTREAM(FEET) =  2925.00
  FLOW LENGTH(FEET) =   151.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.44
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     109.77
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   15.59
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8009.00 =    4827.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   8009.00 TO NODE   8009.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   8200.00 TO NODE   8201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   941.00
  ELEVATION DATA: UPSTREAM(FEET) =   2930.00  DOWNSTREAM(FEET) =   2920.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.669
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.398
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        4.83      0.47     0.100    75   11.67
  COMMERCIAL                 B        1.60      0.75     0.100    56   11.67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.54
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =     19.35
  TOTAL AREA(ACRES) =      6.43   PEAK FLOW RATE(CFS) =     19.35

****************************************************************************
  FLOW PROCESS FROM NODE   8201.00 TO NODE   8202.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =  2920.00  DOWNSTREAM(FEET) =  2918.00
  FLOW LENGTH(FEET) =   395.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.97
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.35
  PIPE TRAVEL TIME(MIN.) =   1.10    Tc(MIN.) =   12.77
  LONGEST FLOWPATH FROM NODE   8200.00 TO NODE   8202.00 =    1336.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   8202.00 TO NODE   8202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.77
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.190
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        4.64      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    4.64      SUBAREA RUNOFF(CFS) =   13.01
  EFFECTIVE AREA(ACRES) =     11.07   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.63  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       11.1       PEAK FLOW RATE(CFS) =      31.16

****************************************************************************
  FLOW PROCESS FROM NODE   8202.00 TO NODE   8009.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2918.00  DOWNSTREAM(FEET) =  2917.00
  FLOW LENGTH(FEET) =   368.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  27.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.31
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      31.16
  PIPE TRAVEL TIME(MIN.) =   1.16    Tc(MIN.) =   13.93
  LONGEST FLOWPATH FROM NODE   8200.00 TO NODE   8009.00 =    1704.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   8009.00 TO NODE   8009.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.93
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.002
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        1.49      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.49      SUBAREA RUNOFF(CFS) =    3.93
  EFFECTIVE AREA(ACRES) =     12.56   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.64  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       12.6       PEAK FLOW RATE(CFS) =      33.21

****************************************************************************
  FLOW PROCESS FROM NODE   8009.00 TO NODE   8009.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       33.21   13.93    3.002  0.64( 0.06) 0.10      12.6    8200.00
  LONGEST FLOWPATH FROM NODE   8200.00 TO NODE   8009.00 =    1704.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      105.23   10.76    3.597  0.74( 0.07) 0.10      32.9    8100.00
      2      109.77   15.59    2.774  0.74( 0.07) 0.10      44.9    8000.00
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8009.00 =    4827.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      136.07   10.76    3.597  0.72( 0.07) 0.10      42.6    8100.00
      2      141.41   13.93    3.002  0.72( 0.07) 0.10      53.4    8200.00
      3      140.40   15.59    2.774  0.72( 0.07) 0.10      57.5    8000.00
    TOTAL AREA(ACRES) =       57.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      141.41  Tc(MIN.) =   13.927
  EFFECTIVE AREA(ACRES) =     53.35  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.72  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       57.5
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8009.00 =    4827.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   8009.00 TO NODE   8009.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   8009.00 TO NODE   8010.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2917.00  DOWNSTREAM(FEET) =  2915.00
  FLOW LENGTH(FEET) =   718.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  63.0 INCH PIPE IS  49.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.81
  ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     141.41
  PIPE TRAVEL TIME(MIN.) =   1.53    Tc(MIN.) =   15.46
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8010.00 =    5545.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   8010.00 TO NODE   8010.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.46
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.791
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.37      0.98     0.100    32
  COMMERCIAL                 B        2.61      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.83
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    3.98      SUBAREA RUNOFF(CFS) =    9.70
  EFFECTIVE AREA(ACRES) =     57.33   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.72  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       61.5       PEAK FLOW RATE(CFS) =     141.41
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   8010.00 TO NODE   8011.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2915.00  DOWNSTREAM(FEET) =  2913.00
  FLOW LENGTH(FEET) =   563.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  47.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.54
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     141.41
  PIPE TRAVEL TIME(MIN.) =   1.10    Tc(MIN.) =   16.56
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8011.00 =    6108.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   8011.00 TO NODE   8011.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.56
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.660
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        1.68      0.75     0.100    56
  COMMERCIAL                 A        3.72      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.90
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    5.40      SUBAREA RUNOFF(CFS) =   12.49
  EFFECTIVE AREA(ACRES) =     62.73   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       66.9       PEAK FLOW RATE(CFS) =     145.98

****************************************************************************
  FLOW PROCESS FROM NODE   8011.00 TO NODE   8012.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2913.00  DOWNSTREAM(FEET) =  2904.00
  FLOW LENGTH(FEET) =   671.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.26
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     145.98
  PIPE TRAVEL TIME(MIN.) =   0.78    Tc(MIN.) =   17.34
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8012.00 =    6779.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   8012.00 TO NODE   8012.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.34
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.575
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        1.08      0.75     0.100    56
  COMMERCIAL                 D        3.22      0.47     0.100    75
  COMMERCIAL                 A        4.78      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.77
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    9.07      SUBAREA RUNOFF(CFS) =   20.39
```

```
  EFFECTIVE AREA(ACRES) =     71.80   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       75.9       PEAK FLOW RATE(CFS) =     161.59

****************************************************************************
  FLOW PROCESS FROM NODE   8012.00 TO NODE   8012.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   8400.00 TO NODE   8012.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    47.00
  ELEVATION DATA: UPSTREAM(FEET) =   2912.00  DOWNSTREAM(FEET) =   2904.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  6.150
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.84      0.98     0.100    32    5.00
  COMMERCIAL                 D        1.97      0.47     0.100    75    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.62
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =     15.40
  TOTAL AREA(ACRES) =      2.81   PEAK FLOW RATE(CFS) =     15.40

****************************************************************************
  FLOW PROCESS FROM NODE   8012.00 TO NODE   8012.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       15.40    5.00    6.150  0.62( 0.06) 0.10       2.8    8400.00
  LONGEST FLOWPATH FROM NODE   8400.00 TO NODE   8012.00 =      47.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      158.78   14.18    2.964  0.75( 0.07) 0.10      61.1    8100.00
      2      161.59   17.34    2.575  0.74( 0.07) 0.10      71.8    8200.00
      3      159.95   19.01    2.415  0.74( 0.07) 0.10      75.9    8000.00
```

```
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8012.00 =    6779.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      133.09    5.00    6.150  0.73( 0.07) 0.10      24.3    8400.00
      2      166.12   14.18    2.964  0.74( 0.07) 0.10      63.9    8100.00
      3      167.94   17.34    2.575  0.74( 0.07) 0.10      74.6    8200.00
      4      165.90   19.01    2.415  0.74( 0.07) 0.10      78.7    8000.00
    TOTAL AREA(ACRES) =        78.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      167.94  Tc(MIN.) =   17.343
  EFFECTIVE AREA(ACRES) =     74.61  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       78.7
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   8012.00 =    6779.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   8012.00 TO NODE   8012.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   8012.00 TO NODE   3013.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2904.00  DOWNSTREAM(FEET) =  2903.00
  FLOW LENGTH(FEET) =    65.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  39.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.33
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     167.94
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   17.41
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   3013.00 =    6844.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       78.7  TC(MIN.) =     17.41
  EFFECTIVE AREA(ACRES) =     74.61  AREA-AVERAGED Fm(INCH/HR)=  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =     167.94

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      133.09    5.07    6.087  0.73( 0.07) 0.10      24.3    8400.00
      2      166.12   14.26    2.954  0.74( 0.07) 0.10      63.9    8100.00
```

```
      3      167.94   17.41    2.568  0.74( 0.07) 0.10      74.6    8200.00
      4      165.90   19.08    2.409  0.74( 0.07) 0.10      78.7    8000.00
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        (c) Copyright 1983-2015 Advanced Engineering Software (aes)
            Ver. 22.0  Release Date: 07/01/2015  License ID 1673

                          Analysis prepared by:



 ************************* DESCRIPTION OF STUDY *************************
* Apple Valley 143 Acres - Proposed Condition                            *
* 100-Yr Rational Method - Line B up to Node 3012                        *
* Q3 9/21/22                                                             *
 ************************************************************************

  FILE NAME: LINEB_00.DAT
  TIME/DATE OF STUDY: 16:29 09/21/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.7000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.0800

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150
  2   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.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
 FLOW PROCESS FROM NODE   9000.00 TO NODE   9001.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   964.00
 ELEVATION DATA: UPSTREAM(FEET) =   2966.80  DOWNSTREAM(FEET) =   2963.80

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.062
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.842
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 B        7.77      0.75     0.100    56   15.06
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =     19.35
 TOTAL AREA(ACRES) =      7.77   PEAK FLOW RATE(CFS) =     19.35

****************************************************************************
 FLOW PROCESS FROM NODE   9001.00 TO NODE   9002.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  2963.80  DOWNSTREAM(FEET) =  2955.00
 FLOW LENGTH(FEET) =   954.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.46
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      19.35
 PIPE TRAVEL TIME(MIN.) =   2.13    Tc(MIN.) =   17.19
 LONGEST FLOWPATH FROM NODE   9000.00 TO NODE   9002.00 =    1918.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   9002.00 TO NODE   9002.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   17.19
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.590
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 B        6.01      0.75     0.100    56
```

```
  COMMERCIAL                  D        6.11      0.47     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.61
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   12.12      SUBAREA RUNOFF(CFS) =   27.59
  EFFECTIVE AREA(ACRES) =     19.89   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.66  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       19.9       PEAK FLOW RATE(CFS) =      45.18

****************************************************************************
  FLOW PROCESS FROM NODE   9002.00 TO NODE   9003.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2955.00  DOWNSTREAM(FEET) =  2935.00
  FLOW LENGTH(FEET) =  1092.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.06
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      45.18
  PIPE TRAVEL TIME(MIN.) =   1.51    Tc(MIN.) =   18.70
  LONGEST FLOWPATH FROM NODE   9000.00 TO NODE   9003.00 =    3010.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   9003.00 TO NODE   9003.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.70
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.442
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  D        8.58      0.47     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.47
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    8.58      SUBAREA RUNOFF(CFS) =   18.50
  EFFECTIVE AREA(ACRES) =     28.47   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       28.5       PEAK FLOW RATE(CFS) =      61.03

****************************************************************************
  FLOW PROCESS FROM NODE   9003.00 TO NODE   9003.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   9100.00 TO NODE   9101.00 IS CODE =  21
----------------------------------------------------------------------------
```

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   819.00
  ELEVATION DATA: UPSTREAM(FEET) =   2966.80  DOWNSTREAM(FEET) =   2948.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.463
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.935
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        4.72      0.75     0.100    56    9.46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =     16.40
  TOTAL AREA(ACRES) =      4.72   PEAK FLOW RATE(CFS) =     16.40

****************************************************************************
  FLOW PROCESS FROM NODE   9101.00 TO NODE   9102.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2948.00  DOWNSTREAM(FEET) =  2945.00
  FLOW LENGTH(FEET) =   804.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.12
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.40
  PIPE TRAVEL TIME(MIN.) =   2.62    Tc(MIN.) =   12.08
  LONGEST FLOWPATH FROM NODE   9100.00 TO NODE   9102.00 =    1623.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   9102.00 TO NODE   9102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.08
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.316
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        3.99      0.75     0.100    56
  COMMERCIAL                 D        5.39      0.47     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.59
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    9.39      SUBAREA RUNOFF(CFS) =   27.51
  EFFECTIVE AREA(ACRES) =     14.10   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.64  AREA-AVERAGED Ap =  0.10
```

```
  TOTAL AREA(ACRES) =       14.1       PEAK FLOW RATE(CFS) =      41.28

****************************************************************************
  FLOW PROCESS FROM NODE   9102.00 TO NODE   9003.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2945.00  DOWNSTREAM(FEET) =  2935.00
  FLOW LENGTH(FEET) =   580.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.59
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      41.28
  PIPE TRAVEL TIME(MIN.) =   0.83    Tc(MIN.) =   12.92
  LONGEST FLOWPATH FROM NODE   9100.00 TO NODE   9003.00 =    2203.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   9003.00 TO NODE   9003.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.92
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.165
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        5.09      0.47     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.47
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    5.09      SUBAREA RUNOFF(CFS) =   14.28
  EFFECTIVE AREA(ACRES) =     19.19   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       19.2       PEAK FLOW RATE(CFS) =      53.64

****************************************************************************
  FLOW PROCESS FROM NODE   9003.00 TO NODE   9003.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       53.64   12.92    3.165  0.60( 0.06) 0.10      19.2    9100.00
  LONGEST FLOWPATH FROM NODE   9100.00 TO NODE   9003.00 =    2203.00 FEET.

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

```
     1       61.03   18.70    2.442  0.60( 0.06) 0.10      28.5    9000.00
  LONGEST FLOWPATH FROM NODE   9000.00 TO NODE   9003.00 =    3010.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      108.57   12.92    3.165  0.60( 0.06) 0.10      38.9    9100.00
      2      102.19   18.70    2.442  0.60( 0.06) 0.10      47.7    9000.00
    TOTAL AREA(ACRES) =        47.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      108.57  Tc(MIN.) =   12.916
  EFFECTIVE AREA(ACRES) =     38.85  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       47.7
  LONGEST FLOWPATH FROM NODE   9000.00 TO NODE   9003.00 =    3010.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   9003.00 TO NODE   9003.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   9003.00 TO NODE   9004.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2935.00  DOWNSTREAM(FEET) =  2918.00
  FLOW LENGTH(FEET) =   255.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  24.43
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     108.57
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   13.09
  LONGEST FLOWPATH FROM NODE   9000.00 TO NODE   9004.00 =    3265.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   9004.00 TO NODE   9004.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.09
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.135
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        6.56      0.47     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.47
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    6.56      SUBAREA RUNOFF(CFS) =   18.23
  EFFECTIVE AREA(ACRES) =     45.41   AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.58  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       54.2       PEAK FLOW RATE(CFS) =     125.77

****************************************************************************
  FLOW PROCESS FROM NODE   9004.00 TO NODE   9004.50 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2918.00  DOWNSTREAM(FEET) =   2917.99
  CHANNEL LENGTH THRU SUBAREA(FEET) =   291.60   CHANNEL SLOPE =  0.0000
  NOTE: CHANNEL SLOPE OF .001 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =     125.77
  FLOW VELOCITY(FEET/SEC) =   1.61 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.02   Tc(MIN.) =   16.11
  LONGEST FLOWPATH FROM NODE   9000.00 TO NODE   9004.50 =    3556.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   9004.50 TO NODE   9004.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.11
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.711
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                D        7.86      0.47     0.850    75
  PUBLIC PARK                A        0.17      0.98     0.850    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.48
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    8.02      SUBAREA RUNOFF(CFS) =   16.62
  EFFECTIVE AREA(ACRES) =     53.43   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.52  AREA-AVERAGED Ap =  0.21
  TOTAL AREA(ACRES) =       62.2       PEAK FLOW RATE(CFS) =     125.77
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   9004.50 TO NODE   9004.50 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   8300.00 TO NODE   9004.50 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    87.00
  ELEVATION DATA: UPSTREAM(FEET) =   2935.00  DOWNSTREAM(FEET) =   2918.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  6.150
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 D        1.21      0.47     0.100    75    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.47
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      6.65
  TOTAL AREA(ACRES) =      1.21   PEAK FLOW RATE(CFS) =      6.65

****************************************************************************
  FLOW PROCESS FROM NODE   9004.50 TO NODE   9004.50 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        6.65    5.00    6.150  0.47( 0.05) 0.10       1.2    8300.00
  LONGEST FLOWPATH FROM NODE   8300.00 TO NODE   9004.50 =      87.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      125.77   16.11    2.711  0.52( 0.11) 0.21      53.4    9100.00
      2      116.39   21.98    2.181  0.53( 0.10) 0.20      62.2    9000.00
  LONGEST FLOWPATH FROM NODE   9000.00 TO NODE   9004.50 =    3556.60 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       97.29    5.00    6.150  0.52( 0.11) 0.20      17.8    8300.00
      2      128.67   16.11    2.711  0.52( 0.11) 0.21      54.6    9100.00
      3      118.72   21.98    2.181  0.53( 0.10) 0.19      63.5    9000.00
    TOTAL AREA(ACRES) =        63.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      128.67  Tc(MIN.) =   16.111
  EFFECTIVE AREA(ACRES) =     54.64  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.52  AREA-AVERAGED Ap =  0.21
  TOTAL AREA(ACRES) =       63.5
  LONGEST FLOWPATH FROM NODE   9000.00 TO NODE   9004.50 =    3556.60 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   9004.50 TO NODE   9004.50 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   9004.50 TO NODE   3100.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2918.00  DOWNSTREAM(FEET) =   2917.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    41.34   CHANNEL SLOPE =  0.0242
  CHANNEL FLOW THRU SUBAREA(CFS) =     128.67
  FLOW VELOCITY(FEET/SEC) =   7.97 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.09   Tc(MIN.) =   16.20
  LONGEST FLOWPATH FROM NODE   9000.00 TO NODE   3100.00 =    3597.94 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3100.00 TO NODE   3012.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2917.00  DOWNSTREAM(FEET) =  2915.00
  FLOW LENGTH(FEET) =   101.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.89
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     128.67
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   16.30
  LONGEST FLOWPATH FROM NODE   9000.00 TO NODE   3012.00 =    3698.94 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       63.5  TC(MIN.) =     16.30
  EFFECTIVE AREA(ACRES) =     54.64  AREA-AVERAGED Fm(INCH/HR)=  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.52  AREA-AVERAGED Ap = 0.210
  PEAK FLOW RATE(CFS)   =     128.67

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       97.29    5.21    5.978  0.52( 0.11) 0.20      17.8    8300.00
      2      128.67   16.30    2.689  0.52( 0.11) 0.21      54.6    9100.00
      3      118.72   22.17    2.168  0.53( 0.10) 0.19      63.5    9000.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```



```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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            Ver. 22.0  Release Date: 07/01/2015  License ID 1673

                          Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* Apple Valley 143 Acres - Proposed Condition 2                         *
* 100-Yr Rational Method - Line C up to Node 1023.5                     *
* Q3 9/21/22                                                            *
 ************************************************************************

  FILE NAME: LINEC_00.DAT
  TIME/DATE OF STUDY: 17:18 09/21/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

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

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.7000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.0800

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

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

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

```
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE   2002.00 TO NODE   2002.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   13.34   RAINFALL INTENSITY(INCH/HR) =  3.09
  EFFECTIVE AREA(ACRES) =    13.30
  TOTAL AREA(ACRES) =    13.30        PEAK FLOW RATE(CFS) =     33.53
  AREA-AVERAGED Fm(INCH/HR) =   0.30  AREA-AVERAGED Fp(INCH/HR) =   0.39
  AREA-AVERAGED Ap =  0.77
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE   2002.00 TO NODE   2003.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3002.40  DOWNSTREAM(FEET) =   2990.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   556.00   CHANNEL SLOPE =  0.0218
  CHANNEL FLOW THRU SUBAREA(CFS) =      33.53
  FLOW VELOCITY(FEET/SEC) =   5.10 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.82   Tc(MIN.) =   15.16
  LONGEST FLOWPATH FROM NODE   2002.00 TO NODE   2003.00 =     556.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2003.00 TO NODE   2003.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.16
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.829
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.75      0.75     0.100    56
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        5.21      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.35
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.887
  SUBAREA AREA(ACRES) =    5.96      SUBAREA RUNOFF(CFS) =   13.51
  EFFECTIVE AREA(ACRES) =     19.26   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  0.81
  TOTAL AREA(ACRES) =       19.3       PEAK FLOW RATE(CFS) =      43.78

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

```
  FLOW PROCESS FROM NODE   2003.00 TO NODE   3006.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2990.30  DOWNSTREAM(FEET) =  2982.00
  FLOW LENGTH(FEET) =   650.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.49
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      43.78
  PIPE TRAVEL TIME(MIN.) =   1.03    Tc(MIN.) =   16.19
  LONGEST FLOWPATH FROM NODE   2002.00 TO NODE   3006.00 =    1206.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3006.00 TO NODE   3006.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3005.00 TO NODE   3005.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   32.03   RAINFALL INTENSITY(INCH/HR) =  1.68
  EFFECTIVE AREA(ACRES) =    33.80
  TOTAL AREA(ACRES) =    33.80        PEAK FLOW RATE(CFS) =     39.06
  AREA-AVERAGED Fm(INCH/HR) =   0.39  AREA-AVERAGED Fp(INCH/HR) =   0.45
  AREA-AVERAGED Ap =  0.86
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE   3005.00 TO NODE   3005.50 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3024.30  DOWNSTREAM(FEET) =   2997.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   974.00   CHANNEL SLOPE =  0.0279
  CHANNEL FLOW THRU SUBAREA(CFS) =      39.06
  FLOW VELOCITY(FEET/SEC) =   6.03 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.69   Tc(MIN.) =   34.72
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3005.50 =    2180.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3005.50 TO NODE   3005.50 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =   34.72
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.584
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        2.14      0.75     0.100    56
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B       13.07      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.35
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.873
  SUBAREA AREA(ACRES) =   15.21      SUBAREA RUNOFF(CFS) =   17.49
  EFFECTIVE AREA(ACRES) =     49.01   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =       49.0       PEAK FLOW RATE(CFS) =      53.90

********************************************************************************
  FLOW PROCESS FROM NODE   3005.50 TO NODE   3006.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2997.10  DOWNSTREAM(FEET) =  2982.00
  FLOW LENGTH(FEET) =    38.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  40.88
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      53.90
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   34.74
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3006.00 =    2218.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE   3006.00 TO NODE   3006.00 IS CODE =  11
--------------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
================================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       53.90   34.74    1.583  0.42( 0.36) 0.86      49.0    3005.00
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3006.00 =    2218.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       43.78   16.19    2.702  0.38( 0.30) 0.81      19.3    2002.00
  LONGEST FLOWPATH FROM NODE   2002.00 TO NODE   3006.00 =    1206.00 FEET.
```

```
  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       91.91   16.19    2.702  0.40( 0.34) 0.84      42.1    2002.00
      2       77.26   34.74    1.583  0.41( 0.35) 0.85      68.3    3005.00
    TOTAL AREA(ACRES) =        68.3

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       91.91  Tc(MIN.) =   16.192
  EFFECTIVE AREA(ACRES) =     42.10  AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.41  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =       68.3
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3006.00 =    2218.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3006.00 TO NODE   3006.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3006.00 TO NODE   3007.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2982.00  DOWNSTREAM(FEET) =  2980.00
  FLOW LENGTH(FEET) =   276.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  33.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.30
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      91.91
  PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =   16.64
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3007.00 =    2494.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3007.00 TO NODE   3007.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   4002.00 TO NODE   4002.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   21.92   RAINFALL INTENSITY(INCH/HR) =  2.19
  EFFECTIVE AREA(ACRES) =    10.90
  TOTAL AREA(ACRES) =    10.90        PEAK FLOW RATE(CFS) =     18.69
```

```
  AREA-AVERAGED Fm(INCH/HR) =   0.32  AREA-AVERAGED Fp(INCH/HR) =   0.43
  AREA-AVERAGED Ap =  0.74
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE   4002.00 TO NODE   4002.50 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3012.20  DOWNSTREAM(FEET) =   2997.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   543.00   CHANNEL SLOPE =  0.0273
  CHANNEL FLOW THRU SUBAREA(CFS) =      18.69
  FLOW VELOCITY(FEET/SEC) =   4.86 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.86   Tc(MIN.) =   23.78
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   4002.50 =    3037.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4002.50 TO NODE   4002.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   23.78
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.064
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        1.90      0.75     0.100    56
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        4.32      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.36
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.725
  SUBAREA AREA(ACRES) =    6.22      SUBAREA RUNOFF(CFS) =   10.09
  EFFECTIVE AREA(ACRES) =     17.12   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.41  AREA-AVERAGED Ap =  0.73
  TOTAL AREA(ACRES) =       17.1       PEAK FLOW RATE(CFS) =      27.22

****************************************************************************
  FLOW PROCESS FROM NODE   4002.50 TO NODE   3007.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2997.40  DOWNSTREAM(FEET) =  2980.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  36.16
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =      27.22
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   23.80
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3007.00 =    3077.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3007.00 TO NODE   3007.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       27.22   23.80    2.063  0.41( 0.30) 0.73      17.1    3005.00
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3007.00 =    3077.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       91.91   16.64    2.651  0.40( 0.34) 0.84      42.1    2002.00
      2       77.26   35.21    1.569  0.41( 0.35) 0.85      68.3    3005.00
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3007.00 =    2494.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      117.27   16.64    2.651  0.40( 0.33) 0.81      54.1    2002.00
      2      113.47   23.80    2.063  0.40( 0.33) 0.82      69.3    3005.00
      3       96.86   35.21    1.569  0.41( 0.34) 0.83      85.4    3005.00
    TOTAL AREA(ACRES) =        85.4

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      117.27  Tc(MIN.) =   16.638
  EFFECTIVE AREA(ACRES) =     54.07  AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.82
  TOTAL AREA(ACRES) =       85.4
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3007.00 =    3077.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3007.00 TO NODE   3007.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3007.00 TO NODE   3008.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =  2980.00  DOWNSTREAM(FEET) =  2979.00
  FLOW LENGTH(FEET) =   374.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  44.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.56
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     117.27
  PIPE TRAVEL TIME(MIN.) =   0.82    Tc(MIN.) =   17.46
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3008.00 =    3451.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3008.00 TO NODE   3008.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5800.00 TO NODE   5800.50 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   428.00
  ELEVATION DATA: UPSTREAM(FEET) =   3017.20  DOWNSTREAM(FEET) =   3003.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.781
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.969
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        1.84      0.75     0.100    56    6.78
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.45      0.34     1.000    82   11.71
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.46
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.277
  SUBAREA RUNOFF(CFS) =      9.98
  TOTAL AREA(ACRES) =      2.29   PEAK FLOW RATE(CFS) =      9.98

****************************************************************************
  FLOW PROCESS FROM NODE   5800.50 TO NODE   3008.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  3003.00  DOWNSTREAM(FEET) =  2979.00
  FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  32.17
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =       9.98
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    6.80
  LONGEST FLOWPATH FROM NODE   5800.00 TO NODE   3008.00 =     463.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3008.00 TO NODE   3008.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        9.98    6.80    4.959  0.46( 0.13) 0.28       2.3    5800.00
  LONGEST FLOWPATH FROM NODE   5800.00 TO NODE   3008.00 =     463.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      117.27   17.46    2.562  0.40( 0.33) 0.81      54.1    2002.00
      2      113.47   24.65    2.013  0.40( 0.33) 0.82      69.3    3005.00
      3       96.86   36.08    1.542  0.41( 0.34) 0.83      85.4    3005.00
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3008.00 =    3451.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      104.58    6.80    4.959  0.40( 0.31) 0.76      23.3    5800.00
      2      122.29   17.46    2.562  0.40( 0.32) 0.79      56.4    2002.00
      3      117.37   24.65    2.013  0.40( 0.32) 0.80      71.6    3005.00
      4       99.78   36.08    1.542  0.41( 0.33) 0.81      87.7    3005.00
    TOTAL AREA(ACRES) =        87.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      122.29  Tc(MIN.) =   17.463
  EFFECTIVE AREA(ACRES) =     56.36  AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.79
  TOTAL AREA(ACRES) =       87.7
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3008.00 =    3451.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3008.00 TO NODE   3008.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3008.00 TO NODE   3009.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2979.00  DOWNSTREAM(FEET) =  2972.00
  FLOW LENGTH(FEET) =   621.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  36.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.91
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     122.29
  PIPE TRAVEL TIME(MIN.) =   0.80    Tc(MIN.) =   18.26
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3009.00 =    4072.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3009.00 TO NODE   3009.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5019.00 TO NODE   5019.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   42.72   RAINFALL INTENSITY(INCH/HR) =  1.37
  EFFECTIVE AREA(ACRES) =   858.79
  TOTAL AREA(ACRES) =   997.00        PEAK FLOW RATE(CFS) =   1019.00
  AREA-AVERAGED Fm(INCH/HR) =   0.28  AREA-AVERAGED Fp(INCH/HR) =   0.28
  AREA-AVERAGED Ap =  1.00
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE   5019.00 TO NODE   5019.50 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2988.80  DOWNSTREAM(FEET) =   2978.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   199.00   CHANNEL SLOPE =  0.0543
  CHANNEL FLOW THRU SUBAREA(CFS) =    1019.00
  FLOW VELOCITY(FEET/SEC) =  22.97 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.14   Tc(MIN.) =   42.86
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   5019.50 =    4271.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5019.50 TO NODE   5019.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   42.86
```

```
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.367
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.82      0.75     0.100    56
  NATURAL DESERT COVER
  "DESERT BRUSH"   ( 0.0%)   B        1.67      0.31     1.000    84
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.704
  SUBAREA AREA(ACRES) =    2.49      SUBAREA RUNOFF(CFS) =    2.54
  EFFECTIVE AREA(ACRES) =    861.28   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      999.5       PEAK FLOW RATE(CFS) =    1019.00
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5019.50 TO NODE   3009.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2978.00  DOWNSTREAM(FEET) =  2972.00
  FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  56.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  42.92
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    1019.00
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   42.90
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3009.00 =    4361.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3009.00 TO NODE   3009.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1019.00   42.90    1.366  0.28( 0.28) 1.00     861.3    3005.00
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3009.00 =    4361.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      104.58    7.61    4.581  0.40( 0.31) 0.76      23.3    5800.00
      2      122.29   18.26    2.483  0.40( 0.32) 0.79      56.4    2002.00
      3      117.37   25.45    1.968  0.40( 0.32) 0.80      71.6    3005.00
      4       99.78   36.92    1.517  0.41( 0.33) 0.81      87.7    3005.00
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3009.00 =    4072.00 FEET.
```

```
  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      820.95    7.61    4.581  0.29( 0.28) 0.97     176.2    5800.00
      2     1002.46   18.26    2.483  0.29( 0.29) 0.97     423.0    2002.00
      3     1057.37   25.45    1.968  0.29( 0.29) 0.97     582.6    3005.00
      4     1098.96   36.92    1.517  0.29( 0.29) 0.98     829.0    3005.00
      5     1106.06   42.90    1.366  0.29( 0.28) 0.98     949.0    3005.00
    TOTAL AREA(ACRES) =      1087.2

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     1106.06  Tc(MIN.) =   42.899
  EFFECTIVE AREA(ACRES) =    948.96  AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =     1087.2
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3009.00 =    4361.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3009.00 TO NODE   3009.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3009.00 TO NODE   3010.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2972.00  DOWNSTREAM(FEET) =  2952.00
  FLOW LENGTH(FEET) =   835.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  90.0 INCH PIPE IS  70.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  29.85
  ESTIMATED PIPE DIAMETER(INCH) =  90.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    1106.06
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   43.37
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3010.00 =    5196.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3010.00 TO NODE   3010.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   6009.00 TO NODE   6009.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
```

```
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   34.02   RAINFALL INTENSITY(INCH/HR) =  1.61
  EFFECTIVE AREA(ACRES) =    78.36
  TOTAL AREA(ACRES) =    92.50        PEAK FLOW RATE(CFS) =     89.47
  AREA-AVERAGED Fm(INCH/HR) =   0.35  AREA-AVERAGED Fp(INCH/HR) =   0.37
  AREA-AVERAGED Ap =  0.95
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE   6009.00 TO NODE   6009.50 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2973.40  DOWNSTREAM(FEET) =   2960.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    49.00   CHANNEL SLOPE =  0.2735
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      89.47
  FLOW VELOCITY(FEET/SEC) =  14.52 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.06   Tc(MIN.) =   34.08
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   6009.50 =    5245.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   6009.50 TO NODE   6009.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   34.08
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.605
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.32      0.75     0.100    56
  COMMERCIAL                 D        0.46      0.47     0.100    75
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.78      0.34     1.000    82
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        1.40      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.763
  SUBAREA AREA(ACRES) =    2.96      SUBAREA RUNOFF(CFS) =    3.77
  EFFECTIVE AREA(ACRES) =     81.32   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.94
  TOTAL AREA(ACRES) =       95.5       PEAK FLOW RATE(CFS) =      92.15

****************************************************************************
  FLOW PROCESS FROM NODE   6009.50 TO NODE   3010.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2960.00  DOWNSTREAM(FEET) =  2952.00
  FLOW LENGTH(FEET) =    47.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  34.28
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      92.15
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   34.10
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3010.00 =    5292.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3010.00 TO NODE   3010.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       92.15   34.10    1.604  0.37( 0.35) 0.94      81.3    3005.00
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3010.00 =    5292.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      820.95    8.12    4.381  0.29( 0.28) 0.97     176.2    5800.00
      2     1002.46   18.74    2.439  0.29( 0.29) 0.97     423.0    2002.00
      3     1057.37   25.93    1.943  0.29( 0.29) 0.97     582.6    3005.00
      4     1098.96   37.39    1.504  0.29( 0.29) 0.98     829.0    3005.00
      5     1106.06   43.37    1.356  0.29( 0.28) 0.98     949.0    3005.00
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3010.00 =    5196.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      891.29    8.12    4.381  0.30( 0.29) 0.97     195.6    5800.00
      2     1086.70   18.74    2.439  0.30( 0.29) 0.97     467.7    2002.00
      3     1146.32   25.93    1.943  0.30( 0.29) 0.97     644.4    3005.00
      4     1179.17   34.10    1.604  0.30( 0.29) 0.97     839.6    3005.00
      5     1183.77   37.39    1.504  0.30( 0.29) 0.98     910.3    3005.00
      6     1180.02   43.37    1.356  0.30( 0.29) 0.98    1030.3    3005.00
    TOTAL AREA(ACRES) =      1182.6

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     1183.77  Tc(MIN.) =   37.390
  EFFECTIVE AREA(ACRES) =    910.31  AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =     1182.6
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3010.00 =    5292.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   3010.00 TO NODE   3010.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3010.00 TO NODE   3011.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2952.00  DOWNSTREAM(FEET) =  2943.00
  FLOW LENGTH(FEET) =   951.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 108.0 INCH PIPE IS  88.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.22
  ESTIMATED PIPE DIAMETER(INCH) = 108.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    1183.77
  PIPE TRAVEL TIME(MIN.) =   0.75    Tc(MIN.) =   38.14
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3011.00 =    6243.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3011.00 TO NODE   3011.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   7007.00 TO NODE   7007.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   25.43   RAINFALL INTENSITY(INCH/HR) =  1.97
  EFFECTIVE AREA(ACRES) =    72.70
  TOTAL AREA(ACRES) =   131.90        PEAK FLOW RATE(CFS) =    108.09
  AREA-AVERAGED Fm(INCH/HR) =   0.35  AREA-AVERAGED Fp(INCH/HR) =   0.37
  AREA-AVERAGED Ap =  0.94
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE   7007.00 TO NODE   7007.50 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2948.60  DOWNSTREAM(FEET) =   2945.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    52.00   CHANNEL SLOPE =  0.0692
```

```
  CHANNEL FLOW THRU SUBAREA(CFS) =     108.09
  FLOW VELOCITY(FEET/SEC) =  12.78 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.07   Tc(MIN.) =   25.50
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   7007.50 =    6295.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7007.50 TO NODE   7007.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   25.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.966
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        1.43      0.47     0.100    75
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        1.33      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.534
  SUBAREA AREA(ACRES) =    2.76      SUBAREA RUNOFF(CFS) =    4.61
  EFFECTIVE AREA(ACRES) =     75.46   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.93
  TOTAL AREA(ACRES) =      134.7       PEAK FLOW RATE(CFS) =     110.48

****************************************************************************
  FLOW PROCESS FROM NODE   7007.50 TO NODE   3011.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2975.00  DOWNSTREAM(FEET) =  2943.00
  FLOW LENGTH(FEET) =   450.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  25.73
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     110.48
  PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =   25.79
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3011.00 =    6745.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3011.00 TO NODE   3011.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      110.48   25.79    1.950  0.37( 0.34) 0.93      75.5    3005.00
```

```
 LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3011.00 =    6745.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      891.29    8.90    4.107  0.30( 0.29) 0.97     195.6    5800.00
     2     1086.70   19.49    2.373  0.30( 0.29) 0.97     467.7    2002.00
     3     1146.32   26.68    1.905  0.30( 0.29) 0.97     644.4    3005.00
     4     1179.17   34.85    1.580  0.30( 0.29) 0.97     839.6    3005.00
     5     1183.77   38.14    1.483  0.30( 0.29) 0.98     910.3    3005.00
     6     1180.02   44.11    1.339  0.30( 0.29) 0.98    1030.3    3005.00
 LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3011.00 =    6243.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      980.46    8.90    4.107  0.31( 0.30) 0.96     221.6    5800.00
     2     1192.09   19.49    2.373  0.31( 0.30) 0.96     524.8    2002.00
     3     1249.45   25.79    1.950  0.31( 0.30) 0.97     698.1    3005.00
     4     1253.68   26.68    1.905  0.31( 0.30) 0.97     719.9    3005.00
     5     1264.25   34.85    1.580  0.30( 0.29) 0.97     915.0    3005.00
     6     1262.22   38.14    1.483  0.30( 0.29) 0.97     985.8    3005.00
     7     1248.61   44.11    1.339  0.30( 0.29) 0.98    1105.7    3005.00
   TOTAL AREA(ACRES) =      1317.3

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     1264.25  Tc(MIN.) =   34.846
 EFFECTIVE AREA(ACRES) =    915.02  AREA-AVERAGED Fm(INCH/HR) =  0.29
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.97
 TOTAL AREA(ACRES) =     1317.3
 LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3011.00 =    6745.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   3011.00 TO NODE   3011.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE   3011.00 TO NODE   3012.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  2943.00  DOWNSTREAM(FEET) =  2915.00
 FLOW LENGTH(FEET) =   967.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  90.0 INCH PIPE IS  73.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  32.86
 ESTIMATED PIPE DIAMETER(INCH) =  90.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    1264.25
```

```
  PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =   35.34
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3012.00 =    7712.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3012.00 TO NODE   3012.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3012.00 TO NODE   3012.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   16.30   RAINFALL INTENSITY(INCH/HR) =  2.69
  EFFECTIVE AREA(ACRES) =    54.64
  TOTAL AREA(ACRES) =    63.50        PEAK FLOW RATE(CFS) =    128.67
  AREA-AVERAGED Fm(INCH/HR) =   0.11  AREA-AVERAGED Fp(INCH/HR) =   0.52
  AREA-AVERAGED Ap =  0.21
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE   3012.00 TO NODE   3012.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      128.67   16.30    2.689  0.52( 0.11) 0.21      54.6    3005.00
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3012.00 =    7712.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      980.46    9.42    3.948  0.31( 0.30) 0.96     221.6    5800.00
      2     1192.09   19.98    2.332  0.31( 0.30) 0.96     524.8    2002.00
      3     1249.45   26.28    1.925  0.31( 0.30) 0.97     698.1    3005.00
      4     1253.68   27.17    1.881  0.31( 0.30) 0.97     719.9    3005.00
      5     1264.25   35.34    1.564  0.30( 0.29) 0.97     915.0    3005.00
      6     1262.22   38.63    1.470  0.30( 0.29) 0.97     985.8    3005.00
      7     1248.61   44.60    1.329  0.30( 0.29) 0.98    1105.7    3005.00
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3012.00 =    7712.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
```

```
      1     1091.07    9.42    3.948  0.31( 0.27) 0.87     253.2    5800.00
      2     1246.99   16.30    2.689  0.31( 0.27) 0.88     473.7    3005.00
      3     1302.93   19.98    2.332  0.31( 0.28) 0.89     579.4    2002.00
      4     1340.00   26.28    1.925  0.31( 0.28) 0.91     752.7    3005.00
      5     1342.03   27.17    1.881  0.31( 0.28) 0.91     774.5    3005.00
      6     1336.83   35.34    1.564  0.31( 0.28) 0.93     969.7    3005.00
      7     1330.09   38.63    1.470  0.31( 0.28) 0.93    1040.4    3005.00
      8     1309.46   44.60    1.329  0.30( 0.28) 0.94    1160.4    3005.00
    TOTAL AREA(ACRES) =      1380.8

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     1342.03  Tc(MIN.) =   27.166
  EFFECTIVE AREA(ACRES) =    774.52  AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.31  AREA-AVERAGED Ap =  0.91
  TOTAL AREA(ACRES) =     1380.8
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3012.00 =    7712.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3012.00 TO NODE   3012.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3012.00 TO NODE   3013.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2915.00  DOWNSTREAM(FEET) =  2903.00
  FLOW LENGTH(FEET) =   674.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 102.0 INCH PIPE IS  80.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  27.99
  ESTIMATED PIPE DIAMETER(INCH) = 102.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    1342.03
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   27.57
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3013.00 =    8386.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3013.00 TO NODE   3013.00 IS CODE = 15.1
----------------------------------------------------------------------------
  >>>>>DEFINE MEMORY BANK # 1 <<<<<
============================================================================
  PEAK FLOWRATE TABLE FILE NAME: LineA_00.DNA
  MEMORY BANK #  1 DEFINED AS FOLLOWS:
   STREAM       Q      Tc      Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS) (MIN.)  (INCH/HR)          (ACRES)    NODE
      1      133.09    5.07  0.73( 0.07) 0.10      24.3    8400.00
      2      166.12   14.26  0.74( 0.07) 0.10      63.9    8100.00
      3      167.94   17.41  0.74( 0.07) 0.10      74.6    8200.00
```

```
     4      165.90   19.08  0.74( 0.07) 0.10      78.7    8000.00
    TOTAL AREA(ACRES) =       78.7

****************************************************************************
  FLOW PROCESS FROM NODE   3013.00 TO NODE   3013.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1091.07    9.84    3.830  0.31( 0.27) 0.87     253.2    5800.00
      2     1246.99   16.70    2.643  0.31( 0.27) 0.88     473.7    3005.00
      3     1302.93   20.39    2.299  0.31( 0.28) 0.89     579.4    2002.00
      4     1340.00   26.68    1.905  0.31( 0.28) 0.91     752.7    3005.00
      5     1342.03   27.57    1.861  0.31( 0.28) 0.91     774.5    3005.00
      6     1336.83   35.74    1.552  0.31( 0.28) 0.93     969.7    3005.00
      7     1330.09   39.03    1.459  0.31( 0.28) 0.93    1040.4    3005.00
      8     1309.46   45.01    1.321  0.30( 0.28) 0.94    1160.4    3005.00
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3013.00 =    8386.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      133.09    5.07    6.087  0.73( 0.07) 0.10      24.3    8400.00
      2      166.12   14.26    2.954  0.74( 0.07) 0.10      63.9    8100.00
      3      167.94   17.41    2.568  0.74( 0.07) 0.10      74.6    8200.00
      4      165.90   19.08    2.409  0.74( 0.07) 0.10      78.7    8000.00
  LONGEST FLOWPATH FROM NODE   8000.00 TO NODE   3013.00 =    6844.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1053.05    5.07    6.087  0.32( 0.24) 0.75     155.0    8400.00
      2     1241.29    9.84    3.830  0.32( 0.24) 0.75     298.0    5800.00
      3     1357.52   14.26    2.954  0.32( 0.25) 0.77     459.0    8100.00
      4     1414.52   16.70    2.643  0.32( 0.25) 0.77     545.9    3005.00
      5     1425.70   17.41    2.568  0.32( 0.25) 0.78     568.7    8200.00
      6     1448.95   19.08    2.409  0.32( 0.25) 0.79     620.6    8000.00
      7     1461.07   20.39    2.299  0.32( 0.25) 0.80     658.2    2002.00
      8     1470.09   26.68    1.905  0.31( 0.26) 0.83     831.5    3005.00
      9     1469.05   27.57    1.861  0.31( 0.26) 0.84     853.3    3005.00
     10     1441.88   35.74    1.552  0.31( 0.27) 0.87    1048.4    3005.00
     11     1428.54   39.03    1.459  0.31( 0.27) 0.87    1119.1    3005.00
     12     1398.07   45.01    1.321  0.31( 0.27) 0.89    1239.1    3005.00
    TOTAL AREA(ACRES) =      1459.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     1470.09  Tc(MIN.) =   26.681
```

```
  EFFECTIVE AREA(ACRES) =    831.47  AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.32  AREA-AVERAGED Ap =  0.77
  TOTAL AREA(ACRES) =     1459.5
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3013.00 =    8386.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3013.00 TO NODE   3013.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3013.00 TO NODE   3014.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2903.00  DOWNSTREAM(FEET) =  2900.00
  FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  93.0 INCH PIPE IS  70.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  38.08
  ESTIMATED PIPE DIAMETER(INCH) =  93.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    1470.09
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   26.72
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3014.00 =    8466.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3014.00 TO NODE   3014.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   2200.00 TO NODE   2201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   802.00
  ELEVATION DATA: UPSTREAM(FEET) =   2990.30  DOWNSTREAM(FEET) =   2970.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.202
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.012
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.54      0.75     0.100    56    9.20
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
```

```
  SUBAREA RUNOFF(CFS) =      1.91
  TOTAL AREA(ACRES) =      0.54   PEAK FLOW RATE(CFS) =      1.91

****************************************************************************
  FLOW PROCESS FROM NODE   2201.00 TO NODE   2202.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2970.00  DOWNSTREAM(FEET) =   2935.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1381.00   CHANNEL SLOPE =  0.0253
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.020   MAXIMUM DEPTH(FEET) =   0.00

         ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
             CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
             ALLOWABLE DEPTH).
             AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
             ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.

  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.993
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.95      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.59
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 358.81
  AVERAGE FLOW DEPTH(FEET) =   0.00   TRAVEL TIME(MIN.) =   0.06
  Tc(MIN.) =    9.27
  SUBAREA AREA(ACRES) =     0.95       SUBAREA RUNOFF(CFS) =    3.35
  EFFECTIVE AREA(ACRES) =      1.49     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.75  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.5         PEAK FLOW RATE(CFS) =       5.25

         ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
             CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
             ALLOWABLE DEPTH).
             AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
             ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.


  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.00   FLOW VELOCITY(FEET/SEC.) = 525.33

  ==>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH

  LONGEST FLOWPATH FROM NODE   2200.00 TO NODE   2202.00 =    2183.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   2202.00 TO NODE   2203.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2935.00  DOWNSTREAM(FEET) =   2920.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   947.00   CHANNEL SLOPE =  0.0158
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.020   MAXIMUM DEPTH(FEET) =   0.00

        ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
            CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
            ALLOWABLE DEPTH).
            AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
            ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.

  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.986
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.26      0.75     0.100    56
  COMMERCIAL                 D        0.71      0.47     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.54
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.97
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 696.92
  AVERAGE FLOW DEPTH(FEET) =   0.00   TRAVEL TIME(MIN.) =   0.02
  Tc(MIN.) =    9.29
  SUBAREA AREA(ACRES) =     0.97       SUBAREA RUNOFF(CFS) =    3.43
  EFFECTIVE AREA(ACRES) =      2.46     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.67  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        2.5         PEAK FLOW RATE(CFS) =       8.68

        ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
            CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
            ALLOWABLE DEPTH).
            AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
            ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.


  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.00   FLOW VELOCITY(FEET/SEC.) = 867.59

  ==>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH

  LONGEST FLOWPATH FROM NODE   2200.00 TO NODE   2203.00 =    3130.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2203.00 TO NODE   2204.00 IS CODE =  51
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2920.00  DOWNSTREAM(FEET) =   2908.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1103.00   CHANNEL SLOPE =  0.0106
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.020   MAXIMUM DEPTH(FEET) =   0.00

         ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
             CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
             ALLOWABLE DEPTH).
             AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
             ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.

  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.981
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 D        1.05      0.47     0.100    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.47
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.54
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = ******
  AVERAGE FLOW DEPTH(FEET) =   0.00   TRAVEL TIME(MIN.) =   0.02
  Tc(MIN.) =    9.31
  SUBAREA AREA(ACRES) =     1.05       SUBAREA RUNOFF(CFS) =    3.72
  EFFECTIVE AREA(ACRES) =      3.51     AREA-AVERAGED Fm(INCH/HR) =   0.06
  AREA-AVERAGED Fp(INCH/HR) =   0.61  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        3.5         PEAK FLOW RATE(CFS) =      12.38

         ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
             CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
             ALLOWABLE DEPTH).
             AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
             ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.


  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.00   FLOW VELOCITY(FEET/SEC.) = ******

  ==>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH

  LONGEST FLOWPATH FROM NODE   2200.00 TO NODE   2204.00 =    4233.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2204.00 TO NODE   3014.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2908.30  DOWNSTREAM(FEET) =  2900.00
  FLOW LENGTH(FEET) =    94.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.33
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.38
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    9.40
  LONGEST FLOWPATH FROM NODE   2200.00 TO NODE   3014.00 =    4327.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3014.00 TO NODE   3014.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
================================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       12.38    9.40    3.953  0.61( 0.06) 0.10       3.5    2200.00
  LONGEST FLOWPATH FROM NODE   2200.00 TO NODE   3014.00 =    4327.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1053.05    5.11    6.055  0.32( 0.24) 0.75     155.0    8400.00
      2     1241.29    9.87    3.820  0.32( 0.24) 0.75     298.0    5800.00
      3     1357.52   14.29    2.948  0.32( 0.25) 0.77     459.0    8100.00
      4     1414.52   16.74    2.639  0.32( 0.25) 0.77     545.9    3005.00
      5     1425.70   17.45    2.564  0.32( 0.25) 0.78     568.7    8200.00
      6     1448.95   19.11    2.405  0.32( 0.25) 0.79     620.6    8000.00
      7     1461.07   20.42    2.297  0.32( 0.25) 0.80     658.2    2002.00
      8     1470.09   26.72    1.903  0.31( 0.26) 0.83     831.5    3005.00
      9     1469.05   27.60    1.860  0.31( 0.26) 0.84     853.3    3005.00
     10     1441.88   35.77    1.551  0.31( 0.27) 0.87    1048.4    3005.00
     11     1428.54   39.06    1.458  0.31( 0.27) 0.87    1119.1    3005.00
     12     1398.07   45.04    1.320  0.31( 0.27) 0.89    1239.1    3005.00
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3014.00 =    8466.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1063.42    5.11    6.055  0.32( 0.24) 0.74     156.9    8400.00
      2     1235.09    9.40    3.953  0.32( 0.24) 0.74     287.4    2200.00
      3     1253.25    9.87    3.820  0.32( 0.24) 0.74     301.5    5800.00
      4     1366.71   14.29    2.948  0.32( 0.24) 0.76     462.5    8100.00
      5     1422.72   16.74    2.639  0.32( 0.25) 0.77     549.4    3005.00
      6     1433.67   17.45    2.564  0.32( 0.25) 0.77     572.2    8200.00
      7     1456.41   19.11    2.405  0.32( 0.25) 0.78     624.1    8000.00
```

```
      8     1468.18   20.42    2.297  0.32( 0.25) 0.79     661.7    2002.00
      9     1475.95   26.72    1.903  0.32( 0.26) 0.83     835.0    3005.00
     10     1474.78   27.60    1.860  0.31( 0.26) 0.84     856.8    3005.00
     11     1446.62   35.77    1.551  0.31( 0.27) 0.86    1051.9    3005.00
     12     1432.98   39.06    1.458  0.31( 0.27) 0.87    1122.7    3005.00
     13     1402.08   45.04    1.320  0.31( 0.27) 0.88    1242.6    3005.00
    TOTAL AREA(ACRES) =      1463.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     1475.95  Tc(MIN.) =   26.716
  EFFECTIVE AREA(ACRES) =    834.98  AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.32  AREA-AVERAGED Ap =  0.83
  TOTAL AREA(ACRES) =     1463.0
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   3014.00 =    8466.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3014.00 TO NODE   3014.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3014.00 TO NODE   1023.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2900.00  DOWNSTREAM(FEET) =  2898.00
  FLOW LENGTH(FEET) =   285.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 126.0 INCH PIPE IS  99.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.22
  ESTIMATED PIPE DIAMETER(INCH) = 126.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    1475.95
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   26.95
  LONGEST FLOWPATH FROM NODE   3005.00 TO NODE   1023.50 =    8751.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     1463.0  TC(MIN.) =     26.95
  EFFECTIVE AREA(ACRES) =    834.98  AREA-AVERAGED Fm(INCH/HR)=  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.32  AREA-AVERAGED Ap = 0.831
  PEAK FLOW RATE(CFS)   =    1475.95

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1063.42    5.36    5.854  0.32( 0.24) 0.74     156.9    8400.00
      2     1235.09    9.65    3.882  0.32( 0.24) 0.74     287.4    2200.00
      3     1253.25   10.12    3.755  0.32( 0.24) 0.74     301.5    5800.00
      4     1366.71   14.53    2.915  0.32( 0.24) 0.76     462.5    8100.00
      5     1422.72   16.98    2.614  0.32( 0.25) 0.77     549.4    3005.00
```

6	1433.67	17.68	2.540	0.32(0.25)	0.77	572.2	8200.00
7	1456.41	19.35	2.385	0.32(0.25)	0.78	624.1	8000.00
8	1468.18	20.66	2.278	0.32(0.25)	0.79	661.7	2002.00
9	1475.95	26.95	1.891	0.32(0.26)	0.83	835.0	3005.00
10	1474.78	27.84	1.849	0.31(0.26)	0.84	856.8	3005.00
11	1446.62	36.01	1.544	0.31(0.27)	0.86	1051.9	3005.00
12	1432.98	39.30	1.452	0.31(0.27)	0.87	1122.7	3005.00
13	1402.08	45.28	1.315	0.31(0.27)	0.88	1242.6	3005.00

END OF RATIONAL METHOD ANALYSIS

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        (c) Copyright 1983-2015 Advanced Engineering Software (aes)
            Ver. 22.0  Release Date: 07/01/2015  License ID 1673

                          Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* Apple Valley 143 Acres - Proposed Condition Node 1025                  *
* 100-Yr Rational Method                                                 *
* Q3 9/21/22                                                             *
 ************************************************************************

  FILE NAME: 00P1025T.DAT
  TIME/DATE OF STUDY: 17:44 09/21/2022
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.7000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.0800

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   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.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
FLOW PROCESS FROM NODE   2100.00 TO NODE   2101.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   859.00
ELEVATION DATA: UPSTREAM(FEET) =   3000.00  DOWNSTREAM(FEET) =   2980.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.618
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.890
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
COMMERCIAL                 B        0.06      0.75     0.100    56    9.62
NATURAL DESERT COVER
"DESERT BRUSH"   (30.0%)   B        1.81      0.34     1.000    82   16.61
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.35
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.970
SUBAREA RUNOFF(CFS) =      5.98
TOTAL AREA(ACRES) =      1.87   PEAK FLOW RATE(CFS) =      5.98

****************************************************************************
FLOW PROCESS FROM NODE   2101.00 TO NODE   2102.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   2980.00  DOWNSTREAM(FEET) =   2961.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   887.00   CHANNEL SLOPE =  0.0214
CHANNEL FLOW THRU SUBAREA(CFS) =       5.98
FLOW VELOCITY(FEET/SEC) =   3.22 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   4.59   Tc(MIN.) =   14.21
LONGEST FLOWPATH FROM NODE   2100.00 TO NODE   2102.00 =    1746.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   2102.00 TO NODE   2102.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   14.21
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.961
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL DESERT COVER
```

```
  "DESERT BRUSH"   (30.0%)   B        3.99      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.99      SUBAREA RUNOFF(CFS) =    9.40
  EFFECTIVE AREA(ACRES) =      5.86   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =        5.9       PEAK FLOW RATE(CFS) =      13.82

****************************************************************************
  FLOW PROCESS FROM NODE   2102.00 TO NODE   2104.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2961.00  DOWNSTREAM(FEET) =   2934.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1364.00   CHANNEL SLOPE =  0.0197
  CHANNEL FLOW THRU SUBAREA(CFS) =      13.82
  FLOW VELOCITY(FEET/SEC) =   3.81 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.96   Tc(MIN.) =   20.17
  LONGEST FLOWPATH FROM NODE   2100.00 TO NODE   2104.00 =    3110.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2014.00 TO NODE   2014.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.17
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.317
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        5.48      0.34     1.000    82
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.34
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.48      SUBAREA RUNOFF(CFS) =    9.73
  EFFECTIVE AREA(ACRES) =     11.34   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       11.3       PEAK FLOW RATE(CFS) =      20.15

****************************************************************************
  FLOW PROCESS FROM NODE   2104.00 TO NODE   1019.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2934.10  DOWNSTREAM(FEET) =   2920.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   221.00   CHANNEL SLOPE =  0.0602
  CHANNEL FLOW THRU SUBAREA(CFS) =      20.15
  FLOW VELOCITY(FEET/SEC) =   7.37 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
  TRAVEL TIME(MIN.) =   0.50   Tc(MIN.) =   20.67
  LONGEST FLOWPATH FROM NODE   2100.00 TO NODE   1019.00 =    3331.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1019.00 TO NODE   1019.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.67
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.278
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   B        0.07      0.34     1.000    82
  NATURAL DESERT COVER
  "DESERT BRUSH"   (30.0%)   D        0.21      0.18     1.000    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.22
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.28      SUBAREA RUNOFF(CFS) =    0.52
  EFFECTIVE AREA(ACRES) =     11.62   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       11.6       PEAK FLOW RATE(CFS) =      20.27

****************************************************************************
  FLOW PROCESS FROM NODE   1019.00 TO NODE   1019.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1018.00 TO NODE   1018.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   28.46   RAINFALL INTENSITY(INCH/HR) =  1.82
  EFFECTIVE AREA(ACRES) =   187.65
  TOTAL AREA(ACRES) =   424.00        PEAK FLOW RATE(CFS) =    271.56
  AREA-AVERAGED Fm(INCH/HR) =   0.36  AREA-AVERAGED Fp(INCH/HR) =   0.37
  AREA-AVERAGED Ap =  0.98
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE   1018.00 TO NODE   1019.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   2922.40  DOWNSTREAM(FEET) =   2920.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   218.70   CHANNEL SLOPE =  0.0073
  CHANNEL FLOW THRU SUBAREA(CFS) =     271.56
  FLOW VELOCITY(FEET/SEC) =   5.52 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.66   Tc(MIN.) =   29.12
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1019.00 =    3549.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1019.00 TO NODE   1019.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   29.12
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.791
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  USER-DEFINED               -        0.98      0.44     1.000     -
  NATURAL DESERT COVER
  "DESERT BRUSH"   ( 0.0%)   B        0.90      0.31     1.000    84
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.38
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.88      SUBAREA RUNOFF(CFS) =    2.39
  EFFECTIVE AREA(ACRES) =    189.53   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      425.9       PEAK FLOW RATE(CFS) =     271.56
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1019.00 TO NODE   1019.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      271.56   29.12    1.791  0.37( 0.36) 0.98     189.5    1018.00
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1019.00 =    3549.70 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       20.27   20.67    2.278  0.34( 0.34) 1.00      11.6    2100.00
  LONGEST FLOWPATH FROM NODE   2100.00 TO NODE   1019.00 =    3331.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      278.55   20.67    2.278  0.37( 0.36) 0.98     146.1    2100.00
```

```
      2      286.74   29.12    1.791  0.37( 0.36) 0.98     201.1    1018.00
    TOTAL AREA(ACRES) =       437.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      286.74  Tc(MIN.) =   29.125
  EFFECTIVE AREA(ACRES) =    201.15  AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      437.5
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1019.00 =    3549.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1019.00 TO NODE   1019.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1019.00 TO NODE   1019.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2920.80  DOWNSTREAM(FEET) =  2920.50
  FLOW LENGTH(FEET) =    47.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  53.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.84
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     286.74
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   29.19
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1019.50 =    3596.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1019.50 TO NODE   1019.50 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1400.00 TO NODE   1401.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   380.00
  ELEVATION DATA: UPSTREAM(FEET) =   2925.10  DOWNSTREAM(FEET) =   2921.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.094
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.389
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
```

```
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  A        0.19      0.98     0.100    32    8.09
  USER-DEFINED                -        0.10      0.44     1.000     -   13.98
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.52
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.415
  SUBAREA RUNOFF(CFS) =      1.13
  TOTAL AREA(ACRES) =      0.30   PEAK FLOW RATE(CFS) =      1.13

****************************************************************************
  FLOW PROCESS FROM NODE   1401.00 TO NODE   1019.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2921.00  DOWNSTREAM(FEET) =  2920.50
  FLOW LENGTH(FEET) =    58.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.55
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.13
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =    8.37
  LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1019.50 =     438.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1019.50 TO NODE   1019.50 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        1.13    8.37    4.289  0.52( 0.22) 0.41       0.3    1400.00
  LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1019.50 =     438.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      278.55   20.73    2.273  0.37( 0.36) 0.98     146.1    2100.00
      2      286.74   29.19    1.789  0.37( 0.36) 0.98     201.1    1018.00
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1019.50 =    3596.70 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      232.13    8.37    4.289  0.37( 0.36) 0.98      59.3    1400.00
      2      279.12   20.73    2.273  0.37( 0.36) 0.98     146.4    2100.00
      3      287.18   29.19    1.789  0.37( 0.36) 0.98     201.4    1018.00
```

```
    TOTAL AREA(ACRES) =       437.8

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      287.18  Tc(MIN.) =   29.186
  EFFECTIVE AREA(ACRES) =    201.45  AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      437.8
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1019.50 =    3596.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1019.50 TO NODE   1019.50 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1019.50 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) =  2920.50  DOWNSTREAM(FEET) =  2920.00
  FLOW LENGTH(FEET) =    89.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  56.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.12
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     287.18
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   29.31
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1021.00 =    3685.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1021.00 TO NODE   1021.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1500.00 TO NODE   1021.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   452.48
  ELEVATION DATA: UPSTREAM(FEET) =   2925.30  DOWNSTREAM(FEET) =   2920.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.538
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.228
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL               A        0.24      0.98     0.100    32    8.54
  USER-DEFINED             -        1.11      0.44     1.000     -   14.75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.839
  SUBAREA RUNOFF(CFS) =      4.68
  TOTAL AREA(ACRES) =      1.35   PEAK FLOW RATE(CFS) =      4.68

****************************************************************************
  FLOW PROCESS FROM NODE   1021.00 TO NODE   1021.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        4.68    8.54    4.228  0.45( 0.38) 0.84       1.4    1500.00
  LONGEST FLOWPATH FROM NODE   1500.00 TO NODE   1021.00 =     452.48 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      232.13    8.50    4.243  0.37( 0.36) 0.98      59.3    1400.00
      2      279.12   20.85    2.263  0.37( 0.36) 0.98     146.4    2100.00
      3      287.18   29.31    1.783  0.37( 0.36) 0.98     201.4    1018.00
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1021.00 =    3685.70 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      236.80    8.50    4.243  0.37( 0.36) 0.98      60.6    1400.00
      2      236.97    8.54    4.228  0.37( 0.36) 0.98      60.9    1500.00
      3      281.41   20.85    2.263  0.37( 0.36) 0.98     147.8    2100.00
      4      288.88   29.31    1.783  0.37( 0.36) 0.98     202.8    1018.00
    TOTAL AREA(ACRES) =       439.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      288.88  Tc(MIN.) =   29.308
  EFFECTIVE AREA(ACRES) =    202.80  AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      439.1
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1021.00 =    3685.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1021.00 TO NODE   1021.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1021.00 TO NODE   1022.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2920.00  DOWNSTREAM(FEET) =   2916.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   562.17   CHANNEL SLOPE =  0.0071
  CHANNEL FLOW THRU SUBAREA(CFS) =     288.88
  FLOW VELOCITY(FEET/SEC) =   5.55 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.69   Tc(MIN.) =   31.00
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1022.00 =    4247.87 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1021.00 TO NODE   1022.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   31.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.715
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.44      0.98     0.100    32
  USER-DEFINED               -        3.08      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.886
  SUBAREA AREA(ACRES) =    3.52      SUBAREA RUNOFF(CFS) =    4.18
  EFFECTIVE AREA(ACRES) =    206.32   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      442.7       PEAK FLOW RATE(CFS) =     288.88
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1022.00 TO NODE   1023.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2916.00  DOWNSTREAM(FEET) =   2906.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   911.00   CHANNEL SLOPE =  0.0108
  CHANNEL FLOW THRU SUBAREA(CFS) =     288.88
  FLOW VELOCITY(FEET/SEC) =   6.82 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.23   Tc(MIN.) =   33.22
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1023.00 =    5158.87 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1022.00 TO NODE   1023.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==========================================================================
  MAINLINE Tc(MIN.) =   33.22
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.634
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.35      0.98     0.100    32
  USER-DEFINED               -        8.42      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.964
  SUBAREA AREA(ACRES) =    8.77      SUBAREA RUNOFF(CFS) =    9.53
  EFFECTIVE AREA(ACRES) =    215.09   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      451.4       PEAK FLOW RATE(CFS) =     288.88
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

**************************************************************************
  FLOW PROCESS FROM NODE   1023.00 TO NODE   1023.50 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2906.20  DOWNSTREAM(FEET) =   2898.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   531.74   CHANNEL SLOPE =  0.0154
  CHANNEL FLOW THRU SUBAREA(CFS) =     288.88
  FLOW VELOCITY(FEET/SEC) =   8.17 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.08   Tc(MIN.) =   34.31
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1023.50 =    5690.61 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE   1023.50 TO NODE   1023.50 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   34.31
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.597
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.66      0.98     0.100    32
  USER-DEFINED               -        4.89      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.893
  SUBAREA AREA(ACRES) =    5.54      SUBAREA RUNOFF(CFS) =    5.98
  EFFECTIVE AREA(ACRES) =    220.63   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      457.0       PEAK FLOW RATE(CFS) =     288.88
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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

```
  FLOW PROCESS FROM NODE   1023.50 TO NODE   1023.50 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1023.50 TO NODE   1023.50 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   26.95   RAINFALL INTENSITY(INCH/HR) =  1.89
  EFFECTIVE AREA(ACRES) =   834.98
  TOTAL AREA(ACRES) =  1463.00        PEAK FLOW RATE(CFS) =   1475.95
  AREA-AVERAGED Fm(INCH/HR) =   0.27  AREA-AVERAGED Fp(INCH/HR) =   0.32
  AREA-AVERAGED Ap =  0.83
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE   1023.50 TO NODE   1023.50 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1475.95   26.95    1.891  0.32( 0.27) 0.83     835.0    1018.00
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1023.50 =    5690.61 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      236.80   13.82    3.019  0.39( 0.37) 0.96      78.4    1400.00
      2      236.97   13.86    3.013  0.39( 0.37) 0.96      78.8    1500.00
      3      281.41   25.89    1.945  0.38( 0.37) 0.97     165.6    2100.00
      4      288.88   34.31    1.597  0.37( 0.37) 0.98     220.6    1018.00
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1023.50 =    5690.61 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1518.49   13.82    3.019  0.33( 0.28) 0.85     506.5    1400.00
      2     1519.55   13.86    3.013  0.33( 0.28) 0.85     508.1    1500.00
      3     1746.31   25.89    1.945  0.33( 0.28) 0.86     967.7    2100.00
      4     1758.30   26.95    1.891  0.33( 0.28) 0.86    1007.5    1018.00
      5     1497.86   34.31    1.597  0.33( 0.29) 0.86    1055.6    1018.00
    TOTAL AREA(ACRES) =      1920.0
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     1758.30  Tc(MIN.) =   26.950
  EFFECTIVE AREA(ACRES) =   1007.50  AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.33  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =     1920.0
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1023.50 =    5690.61 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1023.50 TO NODE   1023.50 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1023.50 TO NODE   1024.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2898.00  DOWNSTREAM(FEET) =   2896.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   565.00   CHANNEL SLOPE =  0.0028
  CHANNEL FLOW THRU SUBAREA(CFS) =    1758.30
  FLOW VELOCITY(FEET/SEC) =   6.28 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.50   Tc(MIN.) =   28.45
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1024.00 =    6255.61 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1024.00 TO NODE   1024.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   28.45
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.821
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.48      0.98     0.100    32
  USER-DEFINED               -        3.49      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.891
  SUBAREA AREA(ACRES) =    3.97      SUBAREA RUNOFF(CFS) =    5.09
  EFFECTIVE AREA(ACRES) =   1011.47   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.33  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =     1924.0       PEAK FLOW RATE(CFS) =    1758.30
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1024.00 TO NODE   1024.00 IS CODE = 15.1
----------------------------------------------------------------------------
  >>>>>DEFINE MEMORY BANK # 1 <<<<<
```

```
==========================================================================
  PEAK FLOWRATE TABLE FILE NAME: 00p1025l.DNA
  MEMORY BANK #  1 DEFINED AS FOLLOWS:
   STREAM       Q      Tc      Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS) (MIN.)  (INCH/HR)          (ACRES)    NODE
      1       20.29   25.03  0.34( 0.30) 0.88      13.3    6010.00
    TOTAL AREA(ACRES) =       13.3

**************************************************************************
  FLOW PROCESS FROM NODE   1024.00 TO NODE   1024.00 IS CODE =  11
--------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
==========================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1     1518.49   15.39    2.799  0.33( 0.28) 0.85     510.5    1400.00
      2     1519.55   15.43    2.794  0.33( 0.28) 0.85     512.1    1500.00
      3     1746.31   27.39    1.870  0.33( 0.28) 0.86     971.7    2100.00
      4     1758.30   28.45    1.821  0.33( 0.28) 0.86    1011.5    1018.00
      5     1497.86   35.89    1.548  0.33( 0.29) 0.86    1059.6    1018.00
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1024.00 =    6255.61 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       20.29   25.03    1.992  0.34( 0.30) 0.88      13.3    6010.00
  LONGEST FLOWPATH FROM NODE   6010.00 TO NODE   1024.00 =    2671.32 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1     1536.92   15.39    2.799  0.33( 0.28) 0.85     518.7    1400.00
      2     1537.99   15.43    2.794  0.33( 0.28) 0.85     520.3    1500.00
      3     1721.80   25.03    1.992  0.33( 0.28) 0.86     894.2    6010.00
      4     1765.13   27.39    1.870  0.33( 0.28) 0.86     985.0    2100.00
      5     1776.54   28.45    1.821  0.33( 0.28) 0.86    1024.8    1018.00
      6     1512.83   35.89    1.548  0.33( 0.29) 0.86    1072.9    1018.00
    TOTAL AREA(ACRES) =      1937.3

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     1776.54  Tc(MIN.) =   28.449
  EFFECTIVE AREA(ACRES) =   1024.79  AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.33  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =     1937.3
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1024.00 =    6255.61 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE   1024.00 TO NODE   1024.00 IS CODE =  12
```

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

****************************************************************************
  FLOW PROCESS FROM NODE   1024.00 TO NODE   1025.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2896.40  DOWNSTREAM(FEET) =   2894.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   491.09   CHANNEL SLOPE =  0.0045
  CHANNEL FLOW THRU SUBAREA(CFS) =    1776.54
  FLOW VELOCITY(FEET/SEC) =   7.93 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.03   Tc(MIN.) =   29.48
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1025.00 =    6746.69 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1025.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   29.48
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.776
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.51      0.98     0.100    32
  USER-DEFINED               -        0.88      0.44     1.000     -
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.47
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.670
  SUBAREA AREA(ACRES) =    1.39      SUBAREA RUNOFF(CFS) =    1.83
  EFFECTIVE AREA(ACRES) =   1026.18   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.33  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =     1938.7       PEAK FLOW RATE(CFS) =    1776.54
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1025.00 IS CODE = 15.1
----------------------------------------------------------------------------
  >>>>>DEFINE MEMORY BANK # 1 <<<<<
============================================================================
  PEAK FLOWRATE TABLE FILE NAME: 00p1025l.DNA
  MEMORY BANK #  1 DEFINED AS FOLLOWS:
   STREAM       Q      Tc      Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS) (MIN.)  (INCH/HR)         (ACRES)    NODE
      1       20.29   25.03  0.34( 0.30) 0.88      13.3    6010.00
    TOTAL AREA(ACRES) =       13.3

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

```
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1025.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1536.92   16.47    2.669  0.33( 0.28) 0.85     520.1    1400.00
      2     1537.99   16.51    2.665  0.33( 0.28) 0.85     521.7    1500.00
      3     1721.80   26.07    1.935  0.33( 0.28) 0.85     895.6    6010.00
      4     1765.13   28.43    1.822  0.33( 0.28) 0.86     986.4    2100.00
      5     1776.54   29.48    1.776  0.33( 0.28) 0.86    1026.2    1018.00
      6     1512.83   36.98    1.516  0.33( 0.29) 0.86    1074.3    1018.00
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1025.00 =    6746.69 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       20.29   25.03    1.992  0.34( 0.30) 0.88      13.3    6010.00
  LONGEST FLOWPATH FROM NODE   6010.00 TO NODE   1025.00 =    2671.32 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1555.62   16.47    2.669  0.33( 0.28) 0.85     528.8    1400.00
      2     1556.69   16.51    2.665  0.33( 0.28) 0.85     530.4    1500.00
      3     1722.03   25.03    1.992  0.33( 0.28) 0.85     868.1    6010.00
      4     1741.42   26.07    1.935  0.33( 0.28) 0.86     908.9    6010.00
      5     1783.39   28.43    1.822  0.33( 0.28) 0.86     999.7    2100.00
      6     1794.24   29.48    1.776  0.33( 0.28) 0.86    1039.5    1018.00
      7     1527.41   36.98    1.516  0.33( 0.29) 0.86    1087.6    1018.00
    TOTAL AREA(ACRES) =      1952.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     1794.24  Tc(MIN.) =   29.482
  EFFECTIVE AREA(ACRES) =   1039.49  AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.33  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =     1952.0
  LONGEST FLOWPATH FROM NODE   1018.00 TO NODE   1025.00 =    6746.69 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1025.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     1952.0  TC(MIN.) =     29.48
  EFFECTIVE AREA(ACRES) =   1039.49  AREA-AVERAGED Fm(INCH/HR)=  0.28
```

AREA-AVERAGED Fp(INCH/HR) = 0.33 AREA-AVERAGED Ap = 0.856
PEAK FLOW RATE(CFS) = 1794.24

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	1555.62	16.47	2.669	0.33(0.28)	0.85	528.8	1400.00
2	1556.69	16.51	2.665	0.33(0.28)	0.85	530.4	1500.00
3	1722.03	25.03	1.992	0.33(0.28)	0.85	868.1	6010.00
4	1741.42	26.07	1.935	0.33(0.28)	0.86	908.9	6010.00
5	1783.39	28.43	1.822	0.33(0.28)	0.86	999.7	2100.00
6	1794.24	29.48	1.776	0.33(0.28)	0.86	1039.5	1018.00
7	1527.41	36.98	1.516	0.33(0.29)	0.86	1087.6	1018.00

END OF RATIONAL METHOD ANALYSIS

Appendix I

UH Calculations

- **Soil Loss Parameters**
- **Existing UH (10-, 100-year)**
- **Proposed (Mitigated) UH (10-, 100-year)**

SINGLE AREA UNIT HYDROGRAPH - EXISTING CONDITION

Node	Subarea	Area (acres)	Soil Type	Land Use	Curve Number CN			Low Loss Fraction (1-Y)					A_p	F_p	Maximum Loss Rate (F_m)			
								Storm Event (Year)										
								EV		HC								
								100	10	2	25	100			Storm Event (Year)			
					AMC			P24 (Inches)							EV			HC
					II	I	III	3.52	2.17	1.34	2.69	3.52			> 5	5	2	All
3013	EX	3.4559	A	Commercial	32	17	52	3.00	3.02	3.08	2.86	3.14	0.10	0.40	0.10	0.17	0.21	0.14
3013	EX	11.513	B	Commercial	56	36	76	9.67	9.34	8.95	9.53	10.81	0.10	0.30	0.35	0.58	0.69	0.35
3013	EX	28.537	D	Commercial	75	57	91	24.32	23.07	21.53	24.30	27.76	0.10	0.20	0.86	1.43	1.71	0.57
1025	EX	733.98	A	Desert Brush Poor	63	43	81	11.14	6.13	78.83	84.81	365.80	1.00	0.40	220.19	366.99	440.39	293.59
1025	EX	364.58	B	Desert Brush Poor	77	59	92	53.42	14.18	0.03	116.84	277.09	1.00	0.30	109.37	182.29	218.75	109.37
1025	EX	809.3	D	Desert Brush Poor	88	75	98	299.67	171.61	66.43	464.96	745.20	1.00	0.20	242.79	404.65	485.58	161.86
		0	B	Barren	86	72	97	0.00	0.00	0.00	0.00	0.00	1.00	0.30	0.00	0.00	0.00	0.00
		0	B	Open Brush	77	59	92	0.00	0.00	0.00	0.00	0.00	1.00	0.30	0.00	0.00	0.00	0.00
		0	B	Open Brush	77	59	92	0.00	0.00	0.00	0.00	0.00	1.00	0.30	0.00	0.00	0.00	0.00
		1951.4						0.794	0.883	0.908	0.640	0.267			0.294	0.490	0.588	0.290

SINGLE AREA UNIT HYDROGRAPH - PROPOSED LINE A

Node	Subarea	Area (acres)	Soil Type	Land Use	Curve Number CN			Low Loss Fraction (1-Y)					A_p	F_p	Maximum Loss Rate (F_m)			
								Storm Event (Year)										
								EV		HC								
								100	10	2	25	100			Storm Event (Year)			
					AMC			P24 (Inches)							EV			HC
					II	I	III	3.52	2.17	1.34	2.69	3.52			> 5	5	2	All
3013	Line A	10.721	A	Commercial	32	17	52	9.31	9.36	9.55	8.87	9.73	0.10	0.40	0.32	0.54	0.64	0.43
3013	Line A	55.923	B	Commercial	56	36	76	46.99	45.37	43.49	46.31	52.50	0.10	0.30	1.68	2.80	3.36	1.68
3013	Line A	11.547	D	Commercial	75	57	91	9.84	9.33	8.71	9.83	11.23	0.10	0.20	0.35	0.58	0.69	0.23
		0	D	Desert Brush Gooc	84	69	96	0.00	0.00	0.00	0.00	0.00	1.00	0.20	0.00	0.00	0.00	0.00
		0	B	Barren	86	72	97	0.00	0.00	0.00	0.00	0.00	1.00	0.30	0.00	0.00	0.00	0.00
		0	B	Barren	86	72	97	0.00	0.00	0.00	0.00	0.00	1.00	0.30	0.00	0.00	0.00	0.00
		0	B	Barren	86	72	97	0.00	0.00	0.00	0.00	0.00	1.00	0.30	0.00	0.00	0.00	0.00
		0	B	Open Brush	66	46	84	0.00	0.00	0.00	0.00	0.00	1.00	0.30	0.00	0.00	0.00	0.00
		0	B	Open Brush	66	46	84	0.00	0.00	0.00	0.00	0.00	1.00	0.30	0.00	0.00	0.00	0.00
		78.2						0.154	0.181	0.210	0.169	0.060			0.030	0.050	0.060	0.030

SINGLE AREA UNIT HYDROGRAPH - PROPOSED LINE B

Node	Subarea	Area (acres)	Soil Type	Land Use	Curve Number CN			Low Loss Fraction (1-Y)					A_p	F_p	Maximum Loss Rate (F_m)			
								Storm Event (Year)										
								EV		HC								
								100	10	2	25	100			Storm Event (Year)			
					AMC			P24 (Inches)							EV			HC
					II	I	III	3.52	2.17	1.34	2.69	3.52			> 5	5	2	All
9004	Line B	22.46	B	Commercial	68	49	85	18.98	18.10	17.04	18.88	21.53	0.10	0.30	0.67	1.12	1.35	0.67
9004	Line B	33.181	D	Commercial	84	69	96	28.77	27.15	25.11	28.87	32.79	0.10	0.20	1.00	1.66	1.99	0.66
9004	Line B	11.547	A	Desert Brush Gooc	49	30	69	0.18	1.55	4.68	0.14	3.17	1.00	0.40	3.46	5.77	6.93	4.62
9004	Line B	7.7465	D	Desert Brush Gooc	84	69	96	2.08	0.96	0.21	3.64	6.84	1.00	0.20	2.32	3.87	4.65	1.55
		0	B	Barren	86	72	97	0.00	0.00	0.00	0.00	0.00	1.00	0.30	0.00	0.00	0.00	0.00
		0	B	Barren	86	72	97	0.00	0.00	0.00	0.00	0.00	1.00	0.30	0.00	0.00	0.00	0.00
		0	B	Barren	86	72	97	0.00	0.00	0.00	0.00	0.00	1.00	0.30	0.00	0.00	0.00	0.00
		0	B	Open Brush	77	59	92	0.00	0.00	0.00	0.00	0.00	1.00	0.30	0.00	0.00	0.00	0.00
		0	B	Open Brush	77	59	92	0.00	0.00	0.00	0.00	0.00	1.00	0.30	0.00	0.00	0.00	0.00
		74.9						0.333	0.363	0.372	0.312	0.141			0.100	0.166	0.199	0.100

SINGLE AREA UNIT HYDROGRAPH - PROPOSED LINE C

Node	Subarea	Area (acres)	Soil Type	Land Use	Curve Number CN			Low Loss Fraction (1-Y)					A_p	F_p	Maximum Loss Rate (F_m)			
								Storm Event (Year)							Storm Event (Year)			
								EV		HC					EV			HC
								100	10	2	25	100						
					AMC			P24 (Inches)										
					II	I	III	3.52	2.17	1.34	2.69	3.52			> 5	5	2	All
1025	Line C	2.2872	A	Commercial	49	30	69	1.93	1.87	1.82	1.89	2.12	0.10	0.40	0.07	0.11	0.14	0.09
1025	Line C	25.104	B	Commercial	68	49	85	21.21	20.23	19.05	21.10	24.07	0.10	0.30	0.75	1.26	1.51	0.75
1025	Line C	13.47	D	Commercial	84	69	96	11.68	11.02	10.19	11.72	13.31	0.10	0.20	0.40	0.67	0.81	0.27
1025	Line C	461.57	A	Desert Brush Poor	63	43	81	7.01	3.85	49.58	53.33	230.04	1.00	0.40	138.47	230.79	276.94	184.63
1025	Line C	123.34	B	Desert Brush Poor	77	59	92	18.07	4.80	0.01	39.53	93.74	1.00	0.30	37.00	61.67	74.00	37.00
1025	Line C	697.43	D	Desert Brush Poor	88	75	98	258.25	147.88	57.25	400.69	642.19	1.00	0.20	209.23	348.72	418.46	139.49
		0	B	Barren	86	72	97	0.00	0.00	0.00	0.00	0.00	1.00	0.30	0.00	0.00	0.00	0.00
		0	B	Open Brush	77	59	92	0.00	0.00	0.00	0.00	0.00	1.00	0.30	0.00	0.00	0.00	0.00
		0	B	Open Brush	77	59	92	0.00	0.00	0.00	0.00	0.00	1.00	0.30	0.00	0.00	0.00	0.00
		1323.2						0.760	0.857	0.896	0.601	0.240			0.292	0.486	0.583	0.274

SINGLE AREA UNIT HYDROGRAPH - PROPOSED LINE D

Node	Subarea	Area (acres)	Soil Type	Land Use	Curve Number CN			Low Loss Fraction (1-Y)					A_p	F_p	Maximum Loss Rate (F_m)			
								Storm Event (Year)										
								EV		HC								
								100	10	2	25	100			Storm Event (Year)			
					AMC			P24 (Inches)							EV			HC
					II	I	III	3.52	2.17	1.34	2.69	3.52			> 5	5	2	All
1025	Line D	12.863	A	Commercial	49	30	69	10.83	10.54	10.22	10.60	11.93	0.10	0.40	0.39	0.64	0.77	0.51
1025	Line D	2.8903	B	Commercial	68	49	85	2.44	2.33	2.19	2.43	2.77	0.10	0.30	0.09	0.14	0.17	0.09
1025	Line D	0	D	Commercial	84	69	96	0.00	0.00	0.00	0.00	0.00	0.10	0.20	0.00	0.00	0.00	0.00
1025	Line D	256.09	A	Desert Brush Poor	63	43	81	3.89	2.14	27.51	29.59	127.63	1.00	0.40	76.83	128.04	153.65	102.43
1025	Line D	149.01	B	Desert Brush Poor	77	59	92	21.83	5.80	0.01	47.75	113.25	1.00	0.30	44.70	74.50	89.40	44.70
1025	Line D	63.474	D	Desert Brush Poor	88	75	98	23.50	13.46	5.21	36.47	58.45	1.00	0.20	19.04	31.74	38.08	12.69
		0	B	Barren	86	72	97	0.00	0.00	0.00	0.00	0.00	1.00	0.30	0.00	0.00	0.00	0.00
		0	B	Open Brush	77	59	92	0.00	0.00	0.00	0.00	0.00	1.00	0.30	0.00	0.00	0.00	0.00
		0	B	Open Brush	77	59	92	0.00	0.00	0.00	0.00	0.00	1.00	0.30	0.00	0.00	0.00	0.00
		484.3						0.871	0.929	0.907	0.738	0.352			0.291	0.485	0.582	0.331

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

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




 ************************* DESCRIPTION OF STUDY *************************
* Apple Valley 143 Acres - Existing Condition Unit Hydrograph             *
* 10-year 24-hour UH at Node 1025                                         *
* Q3 9/23/22                                                              *
 *************************************************************************

  FILE NAME: AV_E10.DAT
  TIME/DATE OF STUDY: 18:17 09/24/2022
♠


**************************************************************************
  FLOW PROCESS FROM NODE   5000.00 TO NODE   1025.00 IS CODE =   1
--------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
==========================================================================

      (UNIT-HYDROGRAPH ADDED TO STREAM #1)

         WATERSHED AREA =    1951.000 ACRES
         BASEFLOW =   0.000 CFS/SQUARE-MILE
         *USER ENTERED "LAG" TIME =    0.350 HOURS
          CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
          THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
          MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
         DESERT(UNDEVELOPED) S-GRAPH SELECTED
         MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) =  0.294
         LOW LOSS FRACTION = 0.883
         *HYDROGRAPH MODEL #1 SPECIFIED*

         SPECIFIED PEAK  5-MINUTES RAINFALL(INCH)=  0.21
         SPECIFIED PEAK 30-MINUTES RAINFALL(INCH)=  0.50
         SPECIFIED PEAK  1-HOUR RAINFALL(INCH) =  0.61
         SPECIFIED PEAK  3-HOUR RAINFALL(INCH) =  0.94
         SPECIFIED PEAK  6-HOUR RAINFALL(INCH) =  1.25
```

SPECIFIED PEAK 24-HOUR RAINFALL(INCH) = 2.17

PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
5-MINUTE FACTOR = 0.913
30-MINUTE FACTOR = 0.913
1-HOUR FACTOR = 0.913
3-HOUR FACTOR = 0.987
6-HOUR FACTOR = 0.993
24-HOUR FACTOR = 0.996

UNIT HYDROGRAPH TIME UNIT = 5.000 MINUTES
UNIT INTERVAL PERCENTAGE OF LAG-TIME = 23.810

UNIT HYDROGRAPH DETERMINATION

INTERVAL NUMBER	"S" GRAPH MEAN VALUES	UNIT HYDROGRAPH ORDINATES(CFS)
1	1.263	297.886
2	6.049	1129.311
3	17.274	2648.655
4	38.117	4917.754
5	53.535	3637.856
6	63.075	2250.942
7	69.603	1540.257
8	74.592	1177.270
9	78.546	932.853
10	81.671	737.346
11	84.264	611.962
12	86.547	538.617
13	88.471	454.024
14	89.980	355.922
15	91.325	317.328
16	92.511	279.954
17	93.581	252.392
18	94.467	208.979
19	95.275	190.764
20	95.971	164.267
21	96.590	146.095
22	97.114	123.562
23	97.543	101.150
24	97.894	82.879
25	98.133	56.440
26	98.387	59.769
27	98.671	67.164
28	98.957	67.434

29	99.243	67.434
30	99.529	67.434
31	99.814	67.434
32	100.000	43.774

****

UNIT PERIOD (NUMBER)	UNIT RAINFALL (INCHES)	UNIT SOIL-LOSS (INCHES)	EFFECTIVE RAINFALL (INCHES)
1	0.0030	0.0027	0.0004
2	0.0030	0.0027	0.0004
3	0.0030	0.0027	0.0004
4	0.0030	0.0027	0.0004
5	0.0030	0.0027	0.0004
6	0.0030	0.0027	0.0004
7	0.0031	0.0027	0.0004
8	0.0031	0.0027	0.0004
9	0.0031	0.0027	0.0004
10	0.0031	0.0027	0.0004
11	0.0031	0.0027	0.0004
12	0.0031	0.0027	0.0004
13	0.0031	0.0028	0.0004
14	0.0031	0.0028	0.0004
15	0.0031	0.0028	0.0004
16	0.0032	0.0028	0.0004
17	0.0032	0.0028	0.0004
18	0.0032	0.0028	0.0004
19	0.0032	0.0028	0.0004
20	0.0032	0.0028	0.0004
21	0.0032	0.0028	0.0004
22	0.0032	0.0028	0.0004
23	0.0032	0.0029	0.0004
24	0.0032	0.0029	0.0004
25	0.0033	0.0029	0.0004
26	0.0033	0.0029	0.0004
27	0.0033	0.0029	0.0004
28	0.0033	0.0029	0.0004
29	0.0033	0.0029	0.0004
30	0.0033	0.0029	0.0004
31	0.0033	0.0029	0.0004
32	0.0033	0.0029	0.0004
33	0.0034	0.0030	0.0004
34	0.0034	0.0030	0.0004
35	0.0034	0.0030	0.0004
36	0.0034	0.0030	0.0004
37	0.0034	0.0030	0.0004
38	0.0034	0.0030	0.0004

39	0.0034	0.0030	0.0004
40	0.0034	0.0030	0.0004
41	0.0035	0.0031	0.0004
42	0.0035	0.0031	0.0004
43	0.0035	0.0031	0.0004
44	0.0035	0.0031	0.0004
45	0.0035	0.0031	0.0004
46	0.0035	0.0031	0.0004
47	0.0035	0.0031	0.0004
48	0.0036	0.0031	0.0004
49	0.0036	0.0032	0.0004
50	0.0036	0.0032	0.0004
51	0.0036	0.0032	0.0004
52	0.0036	0.0032	0.0004
53	0.0036	0.0032	0.0004
54	0.0036	0.0032	0.0004
55	0.0037	0.0032	0.0004
56	0.0037	0.0032	0.0004
57	0.0037	0.0033	0.0004
58	0.0037	0.0033	0.0004
59	0.0037	0.0033	0.0004
60	0.0037	0.0033	0.0004
61	0.0038	0.0033	0.0004
62	0.0038	0.0033	0.0004
63	0.0038	0.0034	0.0004
64	0.0038	0.0034	0.0004
65	0.0038	0.0034	0.0004
66	0.0038	0.0034	0.0004
67	0.0039	0.0034	0.0005
68	0.0039	0.0034	0.0005
69	0.0039	0.0034	0.0005
70	0.0039	0.0035	0.0005
71	0.0039	0.0035	0.0005
72	0.0040	0.0035	0.0005
73	0.0040	0.0035	0.0005
74	0.0040	0.0035	0.0005
75	0.0040	0.0036	0.0005
76	0.0040	0.0036	0.0005
77	0.0041	0.0036	0.0005
78	0.0041	0.0036	0.0005
79	0.0041	0.0036	0.0005
80	0.0041	0.0036	0.0005
81	0.0042	0.0037	0.0005
82	0.0042	0.0037	0.0005
83	0.0042	0.0037	0.0005
84	0.0042	0.0037	0.0005
85	0.0042	0.0037	0.0005
86	0.0043	0.0038	0.0005
87	0.0043	0.0038	0.0005
88	0.0043	0.0038	0.0005

89	0.0043	0.0038	0.0005
90	0.0044	0.0039	0.0005
91	0.0044	0.0039	0.0005
92	0.0044	0.0039	0.0005
93	0.0044	0.0039	0.0005
94	0.0045	0.0039	0.0005
95	0.0045	0.0040	0.0005
96	0.0045	0.0040	0.0005
97	0.0046	0.0040	0.0005
98	0.0046	0.0040	0.0005
99	0.0046	0.0041	0.0005
100	0.0046	0.0041	0.0005
101	0.0047	0.0041	0.0005
102	0.0047	0.0041	0.0005
103	0.0047	0.0042	0.0006
104	0.0048	0.0042	0.0006
105	0.0048	0.0042	0.0006
106	0.0048	0.0043	0.0006
107	0.0049	0.0043	0.0006
108	0.0049	0.0043	0.0006
109	0.0049	0.0044	0.0006
110	0.0050	0.0044	0.0006
111	0.0050	0.0044	0.0006
112	0.0050	0.0044	0.0006
113	0.0051	0.0045	0.0006
114	0.0051	0.0045	0.0006
115	0.0052	0.0046	0.0006
116	0.0052	0.0046	0.0006
117	0.0052	0.0046	0.0006
118	0.0053	0.0047	0.0006
119	0.0053	0.0047	0.0006
120	0.0054	0.0047	0.0006
121	0.0054	0.0048	0.0006
122	0.0055	0.0048	0.0006
123	0.0055	0.0049	0.0006
124	0.0055	0.0049	0.0006
125	0.0056	0.0050	0.0007
126	0.0056	0.0050	0.0007
127	0.0057	0.0050	0.0007
128	0.0057	0.0051	0.0007
129	0.0058	0.0051	0.0007
130	0.0059	0.0052	0.0007
131	0.0059	0.0052	0.0007
132	0.0060	0.0053	0.0007
133	0.0061	0.0053	0.0007
134	0.0061	0.0054	0.0007
135	0.0062	0.0055	0.0007
136	0.0062	0.0055	0.0007
137	0.0063	0.0056	0.0007
138	0.0064	0.0056	0.0007

139	0.0064	0.0057	0.0008
140	0.0065	0.0057	0.0008
141	0.0066	0.0058	0.0008
142	0.0066	0.0059	0.0008
143	0.0068	0.0060	0.0008
144	0.0068	0.0060	0.0008
145	0.0072	0.0064	0.0008
146	0.0073	0.0064	0.0009
147	0.0074	0.0065	0.0009
148	0.0075	0.0066	0.0009
149	0.0076	0.0067	0.0009
150	0.0077	0.0068	0.0009
151	0.0078	0.0069	0.0009
152	0.0079	0.0069	0.0009
153	0.0080	0.0071	0.0009
154	0.0081	0.0072	0.0009
155	0.0083	0.0073	0.0010
156	0.0084	0.0074	0.0010
157	0.0085	0.0075	0.0010
158	0.0086	0.0076	0.0010
159	0.0088	0.0078	0.0010
160	0.0089	0.0079	0.0010
161	0.0092	0.0081	0.0011
162	0.0093	0.0082	0.0011
163	0.0095	0.0084	0.0011
164	0.0096	0.0085	0.0011
165	0.0099	0.0087	0.0012
166	0.0100	0.0089	0.0012
167	0.0103	0.0091	0.0012
168	0.0105	0.0093	0.0012
169	0.0121	0.0107	0.0014
170	0.0123	0.0108	0.0014
171	0.0127	0.0112	0.0015
172	0.0129	0.0114	0.0015
173	0.0134	0.0118	0.0016
174	0.0136	0.0120	0.0016
175	0.0142	0.0125	0.0017
176	0.0144	0.0128	0.0017
177	0.0151	0.0133	0.0018
178	0.0154	0.0136	0.0018
179	0.0162	0.0143	0.0019
180	0.0167	0.0147	0.0020
181	0.0177	0.0156	0.0021
182	0.0182	0.0161	0.0021
183	0.0195	0.0173	0.0023
184	0.0203	0.0179	0.0024
185	0.0144	0.0127	0.0017
186	0.0154	0.0136	0.0018
187	0.0178	0.0157	0.0021
188	0.0195	0.0172	0.0023

189	0.0377	0.0245	0.0132
190	0.0419	0.0245	0.0174
191	0.0572	0.0245	0.0327
192	0.0756	0.0245	0.0511
193	0.1935	0.0245	0.1690
194	0.0478	0.0245	0.0233
195	0.0215	0.0190	0.0025
196	0.0165	0.0145	0.0019
197	0.0212	0.0187	0.0025
198	0.0189	0.0167	0.0022
199	0.0172	0.0151	0.0020
200	0.0158	0.0140	0.0019
201	0.0148	0.0130	0.0017
202	0.0139	0.0122	0.0016
203	0.0131	0.0116	0.0015
204	0.0125	0.0110	0.0015
205	0.0107	0.0094	0.0012
206	0.0102	0.0090	0.0012
207	0.0098	0.0086	0.0011
208	0.0094	0.0083	0.0011
209	0.0090	0.0080	0.0011
210	0.0087	0.0077	0.0010
211	0.0084	0.0075	0.0010
212	0.0082	0.0072	0.0010
213	0.0079	0.0070	0.0009
214	0.0077	0.0068	0.0009
215	0.0075	0.0066	0.0009
216	0.0073	0.0065	0.0009
217	0.0069	0.0061	0.0008
218	0.0067	0.0059	0.0008
219	0.0065	0.0058	0.0008
220	0.0064	0.0057	0.0007
221	0.0063	0.0055	0.0007
222	0.0061	0.0054	0.0007
223	0.0060	0.0053	0.0007
224	0.0059	0.0052	0.0007
225	0.0058	0.0051	0.0007
226	0.0057	0.0050	0.0007
227	0.0056	0.0049	0.0007
228	0.0055	0.0048	0.0006
229	0.0054	0.0048	0.0006
230	0.0053	0.0047	0.0006
231	0.0052	0.0046	0.0006
232	0.0051	0.0045	0.0006
233	0.0051	0.0045	0.0006
234	0.0050	0.0044	0.0006
235	0.0049	0.0043	0.0006
236	0.0048	0.0043	0.0006
237	0.0048	0.0042	0.0006
238	0.0047	0.0042	0.0006

239	0.0047	0.0041	0.0005
240	0.0046	0.0041	0.0005
241	0.0045	0.0040	0.0005
242	0.0045	0.0040	0.0005
243	0.0044	0.0039	0.0005
244	0.0044	0.0039	0.0005
245	0.0043	0.0038	0.0005
246	0.0043	0.0038	0.0005
247	0.0042	0.0037	0.0005
248	0.0042	0.0037	0.0005
249	0.0041	0.0037	0.0005
250	0.0041	0.0036	0.0005
251	0.0041	0.0036	0.0005
252	0.0040	0.0035	0.0005
253	0.0040	0.0035	0.0005
254	0.0039	0.0035	0.0005
255	0.0039	0.0034	0.0005
256	0.0039	0.0034	0.0005
257	0.0038	0.0034	0.0004
258	0.0038	0.0033	0.0004
259	0.0038	0.0033	0.0004
260	0.0037	0.0033	0.0004
261	0.0037	0.0033	0.0004
262	0.0037	0.0032	0.0004
263	0.0036	0.0032	0.0004
264	0.0036	0.0032	0.0004
265	0.0036	0.0031	0.0004
266	0.0035	0.0031	0.0004
267	0.0035	0.0031	0.0004
268	0.0035	0.0031	0.0004
269	0.0034	0.0030	0.0004
270	0.0034	0.0030	0.0004
271	0.0034	0.0030	0.0004
272	0.0034	0.0030	0.0004
273	0.0033	0.0030	0.0004
274	0.0033	0.0029	0.0004
275	0.0033	0.0029	0.0004
276	0.0033	0.0029	0.0004
277	0.0032	0.0029	0.0004
278	0.0032	0.0028	0.0004
279	0.0032	0.0028	0.0004
280	0.0032	0.0028	0.0004
281	0.0032	0.0028	0.0004
282	0.0031	0.0028	0.0004
283	0.0031	0.0028	0.0004
284	0.0031	0.0027	0.0004
285	0.0031	0.0027	0.0004
286	0.0031	0.0027	0.0004
287	0.0030	0.0027	0.0004
288	0.0030	0.0027	0.0004

```
         TOTAL STORM RAINFALL(INCHES) =  2.16
         TOTAL SOIL-LOSS(INCHES) =  1.65
         TOTAL EFFECTIVE RAINFALL(INCHES) =  0.51

------------------------------------------------------------------------------
    TOTAL SOIL-LOSS VOLUME(ACRE-FEET) =     269.0709
    TOTAL STORM RUNOFF VOLUME(ACRE-FEET) =      82.3096
------------------------------------------------------------------------------
```



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==============================================================================

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

==============================================================================
               HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
        (Note: Time indicated is at END of Each Unit Intervals)
------------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.      325.0     650.0     975.0    1300.0
------------------------------------------------------------------------------
  14.000     14.4184     25.83  Q      V  .         .         .         .
  14.083     14.6002     26.39  Q      V  .         .         .         .
  14.167     14.7868     27.11  Q      V  .         .         .         .
  14.250     14.9802     28.07  Q      V  .         .         .         .
  14.333     15.1828     29.42  Q      V  .         .         .         .
  14.417     15.3936     30.61  Q      V  .         .         .         .
  14.500     15.6116     31.66  Q      V  .         .         .         .
  14.583     15.8364     32.63  .Q     V  .         .         .         .
  14.667     16.0680     33.63  .Q     V  .         .         .         .
  14.750     16.3065     34.63  .Q     V  .         .         .         .
  14.833     16.5524     35.70  .Q      V .         .         .         .
  14.917     16.8059     36.81  .Q      V .         .         .         .
  15.000     17.0677     38.02  .Q      V .         .         .         .
  15.083     17.3384     39.30  .Q      V .         .         .         .
  15.167     17.6188     40.72  .Q      V .         .         .         .
  15.250     17.9098     42.25  .Q      V .         .         .         .
  15.333     18.2128     44.00  .Q      V .         .         .         .
  15.417     18.5271     45.64  .Q       V.         .         .         .
  15.500     18.8497     46.85  .Q       V.         .         .         .
  15.583     19.1730     46.93  .Q       V.         .         .         .
  15.667     19.4859     45.44  .Q       V.         .         .         .
  15.750     19.8205     48.59  .Q       V.         .         .         .
  15.833     20.2586     63.61  .Q       V.         .         .         .
  15.917     20.9716    103.53  .  Q      V         .         .         .
  16.000     22.2954    192.22  .    Q    V         .         .         .
  16.083     24.7047    349.82  .         Q V       .         .         .
  16.167     28.8648    604.05  .         .   V   Q .         .         .
  16.250     35.1913    918.60  .         .      V  .       Q .         .
  16.333     43.5246   1209.99  .         .         .V        .      Q  .
```

16.417	50.0480	947.20	. . . V Q. .
16.500	54.4408	637.84	. . Q. V . .
16.583	57.6086	459.96	. . Q . V . .
16.667	60.1168	364.19	. .Q . V. .
16.750	62.1796	299.52	. Q. . V .
16.833	63.8963	249.26	. Q . . .V .
16.917	65.3708	214.10	. Q . . .V .
17.000	66.6728	189.05	. Q . . . V .
17.083	67.8060	164.55	. Q . . . V .
17.167	68.7735	140.48	. Q . . . V .
17.250	69.6435	126.33	. Q . . . V .
17.333	70.4268	113.73	. Q . . . V .
17.417	71.1368	103.09	. Q . . . V .
17.500	71.7659	91.34	. Q . . . V .
17.583	72.3406	83.45	. Q . . . V .
17.667	72.8583	75.16	. Q . . . V .
17.750	73.3265	67.99	. Q . . . V .

↟

TIME(HRS)	VOLUME(AF)	Q(CFS)	0. 325.0 650.0 975.0 1300.0
17.833	73.7444	60.68	.Q . . . V .
17.917	74.1153	53.84	.Q . . . V .
18.000	74.4477	48.27	.Q . . . V .
18.083	74.7438	42.99	.Q . . . V .
18.167	75.0365	42.50	.Q . . . V .
18.250	75.3323	42.95	.Q . . . V .
18.333	75.6215	42.00	.Q . . . V .
18.417	75.8996	40.37	.Q . . . V .
18.500	76.1632	38.28	.Q . . . V .
18.583	76.4053	35.16	.Q . . . V .
18.667	76.6015	28.48	Q . . . V .
18.750	76.7402	20.14	Q . . . V .
18.833	76.8689	18.70	Q . . . V .
18.917	76.9943	18.21	Q . . . V .
19.000	77.1166	17.76	Q . . . V .
19.083	77.2359	17.32	Q . . . V .
19.167	77.3524	16.91	Q . . . V .
19.250	77.4662	16.53	Q . . . V .
19.333	77.5777	16.18	Q . . . V .
19.417	77.6868	15.84	Q . . . V .
19.500	77.7938	15.53	Q . . . V .
19.583	77.8987	15.23	Q . . . V .
19.667	78.0017	14.96	Q . . . V .
19.750	78.1029	14.70	Q . . . V .
19.833	78.2024	14.45	Q . . . V .
19.917	78.3004	14.22	Q . . . V .
20.000	78.3968	14.00	Q . . . V .
20.083	78.4917	13.78	Q . . . V .
20.167	78.5852	13.58	Q . . . V .

20.250	78.6774	13.38	Q	.	.	.	V .
20.333	78.7682	13.19	Q	.	.	.	V .
20.417	78.8578	13.01	Q	.	.	.	V .
20.500	78.9463	12.84	Q	.	.	.	V .
20.583	79.0335	12.67	Q	.	.	.	V .
20.667	79.1196	12.51	Q	.	.	.	V .
20.750	79.2047	12.35	Q	.	.	.	V .
20.833	79.2887	12.20	Q	.	.	.	V .
20.917	79.3717	12.06	Q	.	.	.	V .
21.000	79.4538	11.91	Q	.	.	.	V .
21.083	79.5349	11.78	Q	.	.	.	V .
21.167	79.6151	11.65	Q	.	.	.	V .
21.250	79.6945	11.52	Q	.	.	.	V .
21.333	79.7729	11.39	Q	.	.	.	V .
21.417	79.8506	11.27	Q	.	.	.	V .
21.500	79.9274	11.16	Q	.	.	.	V .
21.583	80.0034	11.04	Q	.	.	.	V .
21.667	80.0787	10.93	Q	.	.	.	V .
21.750	80.1533	10.82	Q	.	.	.	V .
21.833	80.2271	10.72	Q	.	.	.	V .
21.917	80.3002	10.61	Q	.	.	.	V.

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	325.0	650.0	975.0	1300.0
22.000	80.3726	10.51	Q	.	.	.	V.
22.083	80.4443	10.42	Q	.	.	.	V.
22.167	80.5154	10.32	Q	.	.	.	V.
22.250	80.5859	10.23	Q	.	.	.	V.
22.333	80.6557	10.14	Q	.	.	.	V.
22.417	80.7249	10.05	Q	.	.	.	V.
22.500	80.7935	9.96	Q	.	.	.	V.
22.583	80.8616	9.88	Q	.	.	.	V.
22.667	80.9291	9.80	Q	.	.	.	V.
22.750	80.9960	9.72	Q	.	.	.	V.
22.833	81.0624	9.64	Q	.	.	.	V.
22.917	81.1282	9.56	Q	.	.	.	V.
23.000	81.1935	9.49	Q	.	.	.	V.
23.083	81.2584	9.41	Q	.	.	.	V.
23.167	81.3227	9.34	Q	.	.	.	V.
23.250	81.3865	9.27	Q	.	.	.	V.
23.333	81.4499	9.20	Q	.	.	.	V.
23.417	81.5127	9.13	Q	.	.	.	V.
23.500	81.5752	9.06	Q	.	.	.	V.
23.583	81.6371	9.00	Q	.	.	.	V.
23.667	81.6987	8.93	Q	.	.	.	V.
23.750	81.7598	8.87	Q	.	.	.	V.
23.833	81.8204	8.81	Q	.	.	.	V.
23.917	81.8807	8.75	Q	.	.	.	V.
24.000	81.9405	8.69	Q	.	.	.	V.

24.083	81.9992	8.53	Q	.	.	.	V.
24.167	82.0548	8.07	Q	.	.	.	V.
24.250	82.1037	7.09	Q	.	.	.	V.
24.333	82.1403	5.32	Q	.	.	.	V.
24.417	82.1679	4.01	Q	.	.	.	V.
24.500	82.1899	3.19	Q	.	.	.	V.
24.583	82.2080	2.63	Q	.	.	.	V.
24.667	82.2232	2.20	Q	.	.	.	V.
24.750	82.2360	1.86	Q	.	.	.	V.
24.833	82.2469	1.59	Q	.	.	.	V.
24.917	82.2563	1.36	Q	.	.	.	V.
25.000	82.2643	1.16	Q	.	.	.	V.
25.083	82.2712	1.00	Q	.	.	.	V.
25.167	82.2771	0.87	Q	.	.	.	V.
25.250	82.2823	0.75	Q	.	.	.	V.
25.333	82.2867	0.65	Q	.	.	.	V.
25.417	82.2906	0.55	Q	.	.	.	V.
25.500	82.2938	0.48	Q	.	.	.	V.
25.583	82.2966	0.41	Q	.	.	.	V.
25.667	82.2990	0.35	Q	.	.	.	V.
25.750	82.3010	0.29	Q	.	.	.	V.
25.833	82.3027	0.25	Q	.	.	.	V.
25.917	82.3042	0.21	Q	.	.	.	V.
26.000	82.3054	0.18	Q	.	.	.	V.
26.083	82.3065	0.16	Q	.	.	.	V.

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	325.0	650.0	975.0	1300.0
26.167	82.3074	0.14	Q	.	.	.	V.
26.250	82.3082	0.11	Q	.	.	.	V.
26.333	82.3088	0.09	Q	.	.	.	V.
26.417	82.3092	0.06	Q	.	.	.	V.
26.500	82.3095	0.04	Q	.	.	.	V.
26.583	82.3096	0.02	Q	.	.	.	V.

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

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1595.0
10%	80.0
20%	50.0
30%	35.0
40%	25.0
50%	20.0
60%	15.0

70%	15.0
80%	5.0
90%	5.0

END OF FLOODSCx ROUTING ANALYSIS

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

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




 ************************* DESCRIPTION OF STUDY *************************
* Apple Valley 143 Acres - Existing Condition Unit Hydrograph             *
* 100-yr 24h Unit Hydrograph at Node 1025                                 *
* Q3 9/23/22                                                              *
 *************************************************************************

  FILE NAME: AV_E00.DAT
  TIME/DATE OF STUDY: 18:12 09/24/2022
♠


**************************************************************************
  FLOW PROCESS FROM NODE   5000.00 TO NODE   1025.00 IS CODE =   1
--------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
==========================================================================

      (UNIT-HYDROGRAPH ADDED TO STREAM #1)

         WATERSHED AREA =    1951.000 ACRES
         BASEFLOW =   0.000 CFS/SQUARE-MILE
         *USER ENTERED "LAG" TIME =    0.393 HOURS
          CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
          THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
          MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
         DESERT(UNDEVELOPED) S-GRAPH SELECTED
         MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) =  0.294
         LOW LOSS FRACTION = 0.794
         *HYDROGRAPH MODEL #1 SPECIFIED*

         SPECIFIED PEAK  5-MINUTES RAINFALL(INCH)=  0.37
         SPECIFIED PEAK 30-MINUTES RAINFALL(INCH)=  0.88
         SPECIFIED PEAK  1-HOUR RAINFALL(INCH) =  1.08
         SPECIFIED PEAK  3-HOUR RAINFALL(INCH) =  1.58
         SPECIFIED PEAK  6-HOUR RAINFALL(INCH) =  2.06
```

SPECIFIED PEAK 24-HOUR RAINFALL(INCH) = 3.52

PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
5-MINUTE FACTOR = 0.913
30-MINUTE FACTOR = 0.913
1-HOUR FACTOR = 0.913
3-HOUR FACTOR = 0.987
6-HOUR FACTOR = 0.993
24-HOUR FACTOR = 0.996

UNIT HYDROGRAPH TIME UNIT = 5.000 MINUTES
UNIT INTERVAL PERCENTAGE OF LAG-TIME = 21.204

UNIT HYDROGRAPH DETERMINATION

INTERVAL NUMBER	"S" GRAPH MEAN VALUES	UNIT HYDROGRAPH ORDINATES(CFS)
1	1.076	253.862
2	4.965	917.676
3	12.851	1860.728
4	30.115	4073.287
5	46.929	3967.402
6	57.941	2598.102
7	65.167	1705.102
8	70.619	1286.212
9	74.903	1011.014
10	78.419	829.532
11	81.251	668.130
12	83.630	561.432
13	85.745	499.014
14	87.601	437.825
15	89.143	363.931
16	90.401	296.745
17	91.572	276.379
18	92.608	244.282
19	93.558	224.351
20	94.359	188.796
21	95.079	170.105
22	95.749	157.999
23	96.305	131.072
24	96.841	126.531
25	97.251	96.843
26	97.632	89.932
27	97.919	67.677
28	98.131	49.987

29	98.354	52.550
30	98.606	59.549
31	98.861	60.028
32	99.115	60.112
33	99.370	60.028
34	99.624	60.028
35	99.879	60.028
36	100.000	28.639

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UNIT PERIOD (NUMBER)	UNIT RAINFALL (INCHES)	UNIT SOIL-LOSS (INCHES)	EFFECTIVE RAINFALL (INCHES)
1	0.0047	0.0038	0.0010
2	0.0047	0.0038	0.0010
3	0.0048	0.0038	0.0010
4	0.0048	0.0038	0.0010
5	0.0048	0.0038	0.0010
6	0.0048	0.0038	0.0010
7	0.0048	0.0038	0.0010
8	0.0048	0.0038	0.0010
9	0.0049	0.0039	0.0010
10	0.0049	0.0039	0.0010
11	0.0049	0.0039	0.0010
12	0.0049	0.0039	0.0010
13	0.0049	0.0039	0.0010
14	0.0049	0.0039	0.0010
15	0.0050	0.0039	0.0010
16	0.0050	0.0039	0.0010
17	0.0050	0.0040	0.0010
18	0.0050	0.0040	0.0010
19	0.0050	0.0040	0.0010
20	0.0050	0.0040	0.0010
21	0.0051	0.0040	0.0010
22	0.0051	0.0040	0.0010
23	0.0051	0.0040	0.0011
24	0.0051	0.0041	0.0011
25	0.0051	0.0041	0.0011
26	0.0051	0.0041	0.0011
27	0.0052	0.0041	0.0011
28	0.0052	0.0041	0.0011
29	0.0052	0.0041	0.0011
30	0.0052	0.0041	0.0011
31	0.0053	0.0042	0.0011
32	0.0053	0.0042	0.0011
33	0.0053	0.0042	0.0011
34	0.0053	0.0042	0.0011

35	0.0053	0.0042	0.0011
36	0.0053	0.0042	0.0011
37	0.0054	0.0043	0.0011
38	0.0054	0.0043	0.0011
39	0.0054	0.0043	0.0011
40	0.0054	0.0043	0.0011
41	0.0055	0.0043	0.0011
42	0.0055	0.0043	0.0011
43	0.0055	0.0044	0.0011
44	0.0055	0.0044	0.0011
45	0.0056	0.0044	0.0011
46	0.0056	0.0044	0.0011
47	0.0056	0.0044	0.0012
48	0.0056	0.0045	0.0012
49	0.0056	0.0045	0.0012
50	0.0057	0.0045	0.0012
51	0.0057	0.0045	0.0012
52	0.0057	0.0045	0.0012
53	0.0057	0.0046	0.0012
54	0.0058	0.0046	0.0012
55	0.0058	0.0046	0.0012
56	0.0058	0.0046	0.0012
57	0.0058	0.0046	0.0012
58	0.0059	0.0047	0.0012
59	0.0059	0.0047	0.0012
60	0.0059	0.0047	0.0012
61	0.0060	0.0047	0.0012
62	0.0060	0.0047	0.0012
63	0.0060	0.0048	0.0012
64	0.0060	0.0048	0.0012
65	0.0061	0.0048	0.0013
66	0.0061	0.0048	0.0013
67	0.0061	0.0049	0.0013
68	0.0061	0.0049	0.0013
69	0.0062	0.0049	0.0013
70	0.0062	0.0049	0.0013
71	0.0062	0.0050	0.0013
72	0.0063	0.0050	0.0013
73	0.0063	0.0050	0.0013
74	0.0063	0.0050	0.0013
75	0.0064	0.0051	0.0013
76	0.0064	0.0051	0.0013
77	0.0064	0.0051	0.0013
78	0.0065	0.0051	0.0013
79	0.0065	0.0052	0.0013
80	0.0065	0.0052	0.0013
81	0.0066	0.0052	0.0014
82	0.0066	0.0052	0.0014
83	0.0067	0.0053	0.0014
84	0.0067	0.0053	0.0014

85	0.0067	0.0053	0.0014
86	0.0068	0.0054	0.0014
87	0.0068	0.0054	0.0014
88	0.0068	0.0054	0.0014
89	0.0069	0.0055	0.0014
90	0.0069	0.0055	0.0014
91	0.0070	0.0055	0.0014
92	0.0070	0.0056	0.0014
93	0.0071	0.0056	0.0015
94	0.0071	0.0056	0.0015
95	0.0071	0.0057	0.0015
96	0.0072	0.0057	0.0015
97	0.0072	0.0057	0.0015
98	0.0073	0.0058	0.0015
99	0.0073	0.0058	0.0015
100	0.0074	0.0058	0.0015
101	0.0074	0.0059	0.0015
102	0.0075	0.0059	0.0015
103	0.0075	0.0060	0.0016
104	0.0076	0.0060	0.0016
105	0.0076	0.0061	0.0016
106	0.0077	0.0061	0.0016
107	0.0077	0.0061	0.0016
108	0.0078	0.0062	0.0016
109	0.0079	0.0062	0.0016
110	0.0079	0.0063	0.0016
111	0.0080	0.0063	0.0016
112	0.0080	0.0064	0.0017
113	0.0081	0.0064	0.0017
114	0.0081	0.0065	0.0017
115	0.0082	0.0065	0.0017
116	0.0083	0.0066	0.0017
117	0.0084	0.0066	0.0017
118	0.0084	0.0067	0.0017
119	0.0085	0.0067	0.0017
120	0.0085	0.0068	0.0018
121	0.0086	0.0069	0.0018
122	0.0087	0.0069	0.0018
123	0.0088	0.0070	0.0018
124	0.0088	0.0070	0.0018
125	0.0089	0.0071	0.0018
126	0.0090	0.0071	0.0019
127	0.0091	0.0072	0.0019
128	0.0092	0.0073	0.0019
129	0.0093	0.0074	0.0019
130	0.0093	0.0074	0.0019
131	0.0095	0.0075	0.0020
132	0.0095	0.0076	0.0020
133	0.0097	0.0077	0.0020
134	0.0097	0.0077	0.0020

135	0.0099	0.0078	0.0020
136	0.0099	0.0079	0.0020
137	0.0101	0.0080	0.0021
138	0.0102	0.0081	0.0021
139	0.0103	0.0082	0.0021
140	0.0104	0.0082	0.0021
141	0.0106	0.0084	0.0022
142	0.0106	0.0084	0.0022
143	0.0108	0.0086	0.0022
144	0.0109	0.0087	0.0022
145	0.0112	0.0089	0.0023
146	0.0113	0.0090	0.0023
147	0.0115	0.0091	0.0024
148	0.0116	0.0092	0.0024
149	0.0118	0.0094	0.0024
150	0.0119	0.0095	0.0025
151	0.0122	0.0096	0.0025
152	0.0123	0.0097	0.0025
153	0.0125	0.0099	0.0026
154	0.0126	0.0100	0.0026
155	0.0129	0.0103	0.0027
156	0.0131	0.0104	0.0027
157	0.0134	0.0106	0.0028
158	0.0135	0.0107	0.0028
159	0.0138	0.0110	0.0028
160	0.0140	0.0111	0.0029
161	0.0144	0.0114	0.0030
162	0.0145	0.0115	0.0030
163	0.0149	0.0119	0.0031
164	0.0151	0.0120	0.0031
165	0.0156	0.0124	0.0032
166	0.0158	0.0126	0.0033
167	0.0163	0.0130	0.0034
168	0.0166	0.0132	0.0034
169	0.0182	0.0145	0.0038
170	0.0185	0.0147	0.0038
171	0.0192	0.0152	0.0040
172	0.0195	0.0155	0.0040
173	0.0203	0.0161	0.0042
174	0.0207	0.0164	0.0043
175	0.0216	0.0172	0.0045
176	0.0221	0.0175	0.0046
177	0.0232	0.0184	0.0048
178	0.0238	0.0189	0.0049
179	0.0251	0.0199	0.0052
180	0.0258	0.0205	0.0053
181	0.0275	0.0219	0.0057
182	0.0285	0.0226	0.0059
183	0.0307	0.0244	0.0063
184	0.0320	0.0245	0.0075

185	0.0250	0.0199	0.0052
186	0.0267	0.0212	0.0055
187	0.0310	0.0245	0.0065
188	0.0339	0.0245	0.0094
189	0.0670	0.0245	0.0425
190	0.0745	0.0245	0.0500
191	0.1015	0.0245	0.0770
192	0.1341	0.0245	0.1096
193	0.3414	0.0245	0.3169
194	0.0849	0.0245	0.0604
195	0.0374	0.0245	0.0129
196	0.0286	0.0227	0.0059
197	0.0335	0.0245	0.0090
198	0.0295	0.0235	0.0061
199	0.0266	0.0212	0.0055
200	0.0244	0.0194	0.0050
201	0.0226	0.0180	0.0047
202	0.0211	0.0168	0.0044
203	0.0199	0.0158	0.0041
204	0.0188	0.0150	0.0039
205	0.0168	0.0134	0.0035
206	0.0161	0.0128	0.0033
207	0.0154	0.0122	0.0032
208	0.0147	0.0117	0.0030
209	0.0142	0.0113	0.0029
210	0.0137	0.0109	0.0028
211	0.0132	0.0105	0.0027
212	0.0128	0.0101	0.0026
213	0.0124	0.0098	0.0026
214	0.0120	0.0096	0.0025
215	0.0117	0.0093	0.0024
216	0.0114	0.0090	0.0023
217	0.0110	0.0087	0.0023
218	0.0107	0.0085	0.0022
219	0.0105	0.0083	0.0022
220	0.0102	0.0081	0.0021
221	0.0100	0.0079	0.0021
222	0.0098	0.0078	0.0020
223	0.0096	0.0076	0.0020
224	0.0094	0.0075	0.0019
225	0.0092	0.0073	0.0019
226	0.0091	0.0072	0.0019
227	0.0089	0.0071	0.0018
228	0.0087	0.0069	0.0018
229	0.0086	0.0068	0.0018
230	0.0084	0.0067	0.0017
231	0.0083	0.0066	0.0017
232	0.0082	0.0065	0.0017
233	0.0081	0.0064	0.0017
234	0.0079	0.0063	0.0016

235	0.0078	0.0062	0.0016
236	0.0077	0.0061	0.0016
237	0.0076	0.0060	0.0016
238	0.0075	0.0060	0.0015
239	0.0074	0.0059	0.0015
240	0.0073	0.0058	0.0015
241	0.0072	0.0057	0.0015
242	0.0071	0.0057	0.0015
243	0.0070	0.0056	0.0014
244	0.0069	0.0055	0.0014
245	0.0069	0.0055	0.0014
246	0.0068	0.0054	0.0014
247	0.0067	0.0053	0.0014
248	0.0066	0.0053	0.0014
249	0.0066	0.0052	0.0014
250	0.0065	0.0052	0.0013
251	0.0064	0.0051	0.0013
252	0.0064	0.0050	0.0013
253	0.0063	0.0050	0.0013
254	0.0062	0.0049	0.0013
255	0.0062	0.0049	0.0013
256	0.0061	0.0048	0.0013
257	0.0060	0.0048	0.0012
258	0.0060	0.0048	0.0012
259	0.0059	0.0047	0.0012
260	0.0059	0.0047	0.0012
261	0.0058	0.0046	0.0012
262	0.0058	0.0046	0.0012
263	0.0057	0.0045	0.0012
264	0.0057	0.0045	0.0012
265	0.0056	0.0045	0.0012
266	0.0056	0.0044	0.0012
267	0.0055	0.0044	0.0011
268	0.0055	0.0044	0.0011
269	0.0054	0.0043	0.0011
270	0.0054	0.0043	0.0011
271	0.0054	0.0043	0.0011
272	0.0053	0.0042	0.0011
273	0.0053	0.0042	0.0011
274	0.0052	0.0042	0.0011
275	0.0052	0.0041	0.0011
276	0.0052	0.0041	0.0011
277	0.0051	0.0041	0.0011
278	0.0051	0.0040	0.0010
279	0.0051	0.0040	0.0010
280	0.0050	0.0040	0.0010
281	0.0050	0.0040	0.0010
282	0.0049	0.0039	0.0010
283	0.0049	0.0039	0.0010
284	0.0049	0.0039	0.0010

285	0.0048	0.0038	0.0010
286	0.0048	0.0038	0.0010
287	0.0048	0.0038	0.0010
288	0.0048	0.0038	0.0010

TOTAL STORM RAINFALL(INCHES) = 3.51
TOTAL SOIL-LOSS(INCHES) = 2.28
TOTAL EFFECTIVE RAINFALL(INCHES) = 1.22

TOTAL SOIL-LOSS VOLUME(ACRE-FEET) = 371.0758
TOTAL STORM RUNOFF VOLUME(ACRE-FEET) = 198.8717

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

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

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	575.0	1150.0	1725.0	2300.0
14.000	39.8217	70.56	.Q	V .	.	.	.
14.083	40.3179	72.05	.Q	V .	.	.	.
14.167	40.8262	73.80	.Q	V .	.	.	.
14.250	41.3484	75.82	.Q	V .	.	.	.
14.333	41.8889	78.48	.Q	V .	.	.	.
14.417	42.4481	81.19	.Q	V .	.	.	.
14.500	43.0250	83.77	.Q	V .	.	.	.
14.583	43.6189	86.24	.Q	V .	.	.	.
14.667	44.2307	88.83	.Q	V .	.	.	.
14.750	44.8607	91.48	.Q	V.	.	.	.
14.833	45.5104	94.34	.Q	V.	.	.	.
14.917	46.1807	97.33	.Q	V.	.	.	.
15.000	46.8737	100.62	.Q	V.	.	.	.
15.083	47.5909	104.14	.Q	V.	.	.	.
15.167	48.3351	108.06	.Q	V.	.	.	.
15.250	49.1086	112.31	.Q	V.	.	.	.
15.333	49.9170	117.38	. Q	V	.	.	.
15.417	50.7627	122.80	. Q	V	.	.	.
15.500	51.6440	127.96	. Q	V	.	.	.
15.583	52.5607	133.11	. Q	V	.	.	.
15.667	53.4797	133.45	. Q	V	.	.	.
15.750	54.4692	143.67	. Q	V	.	.	.
15.833	55.7388	184.34	. Q	.V	.	.	.
15.917	57.6342	275.21	. Q	.V	.	.	.
16.000	60.8788	471.12	.	Q . V	.	.	.

16.083	66.2170	775.11	. . Q . . . .
16.167	74.4338	1193.08	. . V Q . . .
16.250	85.8128	1652.22	. . V . Q . .
16.333	101.1911	2232.93	. . V . . Q .
16.417	115.6109	2093.76	. . . V . Q .
16.500	126.2053	1538.31	. . . VQ . . .
16.583	133.8576	1111.11	. . Q. V . . .
16.667	139.8954	876.69	. . Q . V . . .
16.750	144.8784	723.53	. . Q . V. . .
16.833	149.0973	612.59	. Q . V. . .
16.917	152.6927	522.06	. Q. . V . .
17.000	155.8308	455.66	. Q . . .V . .
17.083	158.6388	407.72	. Q . . .V . .
17.167	161.1464	364.10	. Q . . . V . .
17.250	163.3569	320.97	. Q . . . V . .
17.333	165.3073	283.20	. Q . . . V . .
17.417	167.1006	260.39	. Q . . . V . .
17.500	168.7411	238.20	. Q . . . V . .
17.583	170.2517	219.33	. Q . . . V . .
17.667	171.6212	198.86	. Q . . . V . .
17.750	172.8820	183.06	. Q . . . V . .

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TIME(HRS)	VOLUME(AF)	Q(CFS)	0. 575.0 1150.0 1725.0 2300.0
17.833	174.0531	170.05	. Q . . . V .
17.917	175.1149	154.17	. Q . . . V .
18.000	176.1011	143.20	. Q . . . V .
18.083	176.9824	127.97	. Q . . . V .
18.167	177.7986	118.52	. Q . . . V .
18.250	178.5374	107.27	.Q . . . V .
18.333	179.2198	99.08	.Q . . . V .
18.417	179.8907	97.41	.Q . . . V .
18.500	180.5638	97.73	.Q . . . V .
18.583	181.2271	96.32	.Q . . . V .
18.667	181.8708	93.46	.Q . . . V .
18.750	182.4870	89.47	.Q . . . V .
18.833	183.0692	84.55	.Q . . . V .
18.917	183.6058	77.91	.Q . . . V .
19.000	184.0458	63.89	.Q . . . V .
19.083	184.4044	52.06	Q . . . V .
19.167	184.7426	49.12	Q . . . V .
19.250	185.0719	47.81	Q . . . V .
19.333	185.3933	46.66	Q . . . V .
19.417	185.7070	45.55	Q . . . V .
19.500	186.0141	44.58	Q . . . V .
19.583	186.3148	43.67	Q . . . V .
19.667	186.6097	42.82	Q . . . V .
19.750	186.8991	42.02	Q . . . V .
19.833	187.1833	41.26	Q . . . V .

19.917	187.4624	40.54	Q	.	.	.	V	.
20.000	187.7369	39.86	Q	.	.	.	V	.
20.083	188.0070	39.21	Q	.	.	.	V	.
20.167	188.2729	38.60	Q	.	.	.	V	.
20.250	188.5347	38.02	Q	.	.	.	V	.
20.333	188.7926	37.46	Q	.	.	.	V	.
20.417	189.0469	36.92	Q	.	.	.	V	.
20.500	189.2976	36.40	Q	.	.	.	V	.
20.583	189.5448	35.90	Q	.	.	.	V	.
20.667	189.7888	35.42	Q	.	.	.	V	.
20.750	190.0296	34.96	Q	.	.	.	V	.
20.833	190.2673	34.51	Q	.	.	.	V	.
20.917	190.5020	34.08	Q	.	.	.	V	.
21.000	190.7339	33.67	Q	.	.	.	V	.
21.083	190.9630	33.26	Q	.	.	.	V	.
21.167	191.1894	32.87	Q	.	.	.	V	.
21.250	191.4132	32.50	Q	.	.	.	V	.
21.333	191.6345	32.13	Q	.	.	.	V	.
21.417	191.8533	31.78	Q	.	.	.	V	.
21.500	192.0698	31.43	Q	.	.	.	V	.
21.583	192.2840	31.10	Q	.	.	.	V	.
21.667	192.4959	30.77	Q	.	.	.	V	.
21.750	192.7057	30.46	Q	.	.	.	V	.
21.833	192.9133	30.15	Q	.	.	.	V	.
21.917	193.1189	29.85	Q	.	.	.	V	.

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TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	575.0	1150.0	1725.0	2300.0
22.000	193.3225	29.56	Q	.	.	.	V .
22.083	193.5241	29.28	Q	.	.	.	V .
22.167	193.7239	29.00	Q	.	.	.	V .
22.250	193.9217	28.73	Q	.	.	.	V.
22.333	194.1178	28.47	Q	.	.	.	V.
22.417	194.3121	28.21	Q	.	.	.	V.
22.500	194.5046	27.96	Q	.	.	.	V.
22.583	194.6955	27.71	Q	.	.	.	V.
22.667	194.8847	27.48	Q	.	.	.	V.
22.750	195.0723	27.24	Q	.	.	.	V.
22.833	195.2583	27.01	Q	.	.	.	V.
22.917	195.4428	26.79	Q	.	.	.	V.
23.000	195.6258	26.57	Q	.	.	.	V.
23.083	195.8074	26.36	Q	.	.	.	V.
23.167	195.9874	26.15	Q	.	.	.	V.
23.250	196.1661	25.94	Q	.	.	.	V.
23.333	196.3434	25.74	Q	.	.	.	V.
23.417	196.5193	25.55	Q	.	.	.	V.
23.500	196.6939	25.35	Q	.	.	.	V.
23.583	196.8672	25.16	Q	.	.	.	V.
23.667	197.0393	24.98	Q	.	.	.	V.

23.750	197.2101	24.80	Q	.	.	.	V.
23.833	197.3796	24.62	Q	.	.	.	V.
23.917	197.5480	24.44	Q	.	.	.	V.
24.000	197.7151	24.27	Q	.	.	.	V.
24.083	197.8794	23.86	Q	.	.	.	V.
24.167	198.0365	22.80	Q	.	.	.	V.
24.250	198.1799	20.83	Q	.	.	.	V.
24.333	198.2952	16.73	Q	.	.	.	V.
24.417	198.3830	12.76	Q	.	.	.	V.
24.500	198.4529	10.14	Q	.	.	.	V.
24.583	198.5108	8.41	Q	.	.	.	V.
24.667	198.5597	7.10	Q	.	.	.	V.
24.750	198.6015	6.07	Q	.	.	.	V.
24.833	198.6375	5.22	Q	.	.	.	V.
24.917	198.6687	4.54	Q	.	.	.	V.
25.000	198.6960	3.96	Q	.	.	.	V.
25.083	198.7197	3.45	Q	.	.	.	V.
25.167	198.7404	3.00	Q	.	.	.	V.
25.250	198.7584	2.62	Q	.	.	.	V.
25.333	198.7744	2.31	Q	.	.	.	V.
25.417	198.7883	2.03	Q	.	.	.	V.
25.500	198.8006	1.78	Q	.	.	.	V.
25.583	198.8113	1.55	Q	.	.	.	V.
25.667	198.8206	1.35	Q	.	.	.	V.
25.750	198.8287	1.18	Q	.	.	.	V.
25.833	198.8357	1.02	Q	.	.	.	V.
25.917	198.8418	0.88	Q	.	.	.	V.
26.000	198.8470	0.75	Q	.	.	.	V.
26.083	198.8515	0.65	Q	.	.	.	V.

↟

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	575.0	1150.0	1725.0	2300.0
26.167	198.8554	0.56	Q	.	.	.	V.
26.250	198.8588	0.49	Q	.	.	.	V.
26.333	198.8618	0.44	Q	.	.	.	V.
26.417	198.8645	0.39	Q	.	.	.	V.
26.500	198.8667	0.33	Q	.	.	.	V.
26.583	198.8686	0.27	Q	.	.	.	V.
26.667	198.8700	0.21	Q	.	.	.	V.
26.750	198.8710	0.15	Q	.	.	.	V.
26.833	198.8716	0.09	Q	.	.	.	V.
26.917	198.8718	0.03	Q	.	.	.	V

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

Percentile of Estimated Peak Flow Rate	Duration (minutes)

0%	1615.0
10%	100.0
20%	65.0
30%	45.0
40%	30.0
50%	25.0
60%	20.0
70%	15.0
80%	10.0
90%	10.0

END OF FLOODSCx ROUTING ANALYSIS

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

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




 ************************* DESCRIPTION OF STUDY *************************
* APPLE VALLEY 143 ACRES - PROPOSED CONDITION                           *
* LINKED UH - MITIGATED 10-YEAR                                         *
* Q3 09/24/2022                                                         *
 *************************************************************************

  FILE NAME: AV_P10.DAT
  TIME/DATE OF STUDY: 18:02 09/24/2022
♠

**************************************************************************
  FLOW PROCESS FROM NODE   1000.00 TO NODE   1025.00 IS CODE =   1
--------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
==========================================================================

      (UNIT-HYDROGRAPH ADDED TO STREAM #1)

         WATERSHED AREA =     484.300 ACRES
         BASEFLOW =   0.000 CFS/SQUARE-MILE
         *USER ENTERED "LAG" TIME =    0.450 HOURS
          CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
          THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
          MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
         DESERT(UNDEVELOPED) S-GRAPH SELECTED
         MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) =  0.291
         LOW LOSS FRACTION = 0.929
         *HYDROGRAPH MODEL #1 SPECIFIED*

         SPECIFIED PEAK  5-MINUTES RAINFALL(INCH)=  0.21
         SPECIFIED PEAK 30-MINUTES RAINFALL(INCH)=  0.50
         SPECIFIED PEAK  1-HOUR RAINFALL(INCH) =  0.61
         SPECIFIED PEAK  3-HOUR RAINFALL(INCH) =  0.94
         SPECIFIED PEAK  6-HOUR RAINFALL(INCH) =  1.25
```

SPECIFIED PEAK 24-HOUR RAINFALL(INCH) = 2.17

PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
5-MINUTE FACTOR = 0.978
30-MINUTE FACTOR = 0.978
1-HOUR FACTOR = 0.978
3-HOUR FACTOR = 0.997
6-HOUR FACTOR = 0.998
24-HOUR FACTOR = 0.999

UNIT HYDROGRAPH TIME UNIT = 5.000 MINUTES
UNIT INTERVAL PERCENTAGE OF LAG-TIME = 18.519

RUNOFF HYDROGRAPH LISTING LIMITS:
MODEL TIME(HOURS) FOR BEGINNING OF RESULTS = 14.00
MODEL TIME(HOURS) FOR END OF RESULTS = 18.00

UNIT HYDROGRAPH DETERMINATION

INTERVAL NUMBER	"S" GRAPH MEAN VALUES	UNIT HYDROGRAPH ORDINATES(CFS)
1	0.893	52.306
2	3.980	180.781
3	9.509	323.879
4	21.370	694.697
5	38.278	990.292
6	50.785	732.534
7	59.473	508.874
8	65.486	352.177
9	70.257	279.406
10	74.118	226.146
11	77.352	189.427
12	80.011	155.738
13	82.295	133.763
14	84.272	115.803
15	86.075	105.564
16	87.663	93.036
17	89.026	79.830
18	90.137	65.072
19	91.184	61.353
20	92.133	55.571
21	93.002	50.852
22	93.804	46.984
23	94.467	38.831
24	95.096	36.878

25	95.690	34.754
26	96.178	28.595
27	96.659	28.187
28	97.067	23.869
29	97.400	19.520
30	97.727	19.125
31	97.948	12.972
32	98.133	10.847
33	98.325	11.243
34	98.544	12.836
35	98.767	13.022
36	98.989	13.009
37	99.211	13.010
38	99.433	13.009
39	99.655	13.009
40	99.877	13.009
41	100.000	7.192

TOTAL SOIL-LOSS VOLUME(ACRE-FEET) = 68.9215
TOTAL STORM RUNOFF VOLUME(ACRE-FEET) = 18.5613

♠

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

==========

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

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	75.0	150.0	225.0	300.0
14.000	2.1248	3.75	Q V	.	.	.	.
14.083	2.1511	3.82	Q V	.	.	.	.
14.167	2.1780	3.90	Q V	.	.	.	.
14.250	2.2054	3.98	Q V	.	.	.	.
14.333	2.2334	4.07	Q V	.	.	.	.
14.417	2.2621	4.16	Q V	.	.	.	.
14.500	2.2915	4.26	Q V	.	.	.	.
14.583	2.3216	4.37	Q V	.	.	.	.
14.667	2.3525	4.48	Q V	.	.	.	.
14.750	2.3842	4.60	Q V	.	.	.	.
14.833	2.4168	4.73	Q V	.	.	.	.
14.917	2.4504	4.88	Q V	.	.	.	.
15.000	2.4850	5.03	Q V	.	.	.	.
15.083	2.5208	5.20	Q V	.	.	.	.
15.167	2.5578	5.38	Q V	.	.	.	.

```
  15.250      2.5963      5.58  Q    V    .         .         .         .
  15.333      2.6363      5.81  Q    V    .         .         .         .
  15.417      2.6779      6.05  Q    V    .         .         .         .
  15.500      2.7211      6.26  Q    V    .         .         .         .
  15.583      2.7656      6.47  Q    V    .         .         .         .
  15.667      2.8110      6.58  Q     V   .         .         .         .
  15.750      2.8619      7.40  Q     V   .         .         .         .
  15.833      2.9340     10.46  .Q    V   .         .         .         .
  15.917      3.0523     17.18  . Q   V   .         .         .         .
  16.000      3.2802     33.10  .   Q  V  .         .         .         .
  16.083      3.7379     66.45  .       Q .         .         .         .
  16.167      4.5249    114.28  .        V.    Q    .         .         .
  16.250      5.6715    166.49  .         . V       . Q       .         .
  16.333      7.3121    238.22  .         .    V    .         .Q        .
  16.417      9.2073    275.18  .         .        V.         .     Q   .
  16.500     10.6938    215.85  .         .         .  V    Q .         .
  16.583     11.7668    155.79  .         .         Q    V    .         .
  16.667     12.5540    114.32  .         .    Q    .      V  .         .
  16.750     13.1857     91.71  .         . Q       .       V .         .
  16.833     13.7090     75.99  .         Q         .        V.         .
  16.917     14.1532     64.50  .       Q .         .         V         .
  17.000     14.5311     54.87  .      Q  .         .         .V        .
  17.083     14.8610     47.90  .     Q   .         .         . V       .
  17.167     15.1523     42.30  .    Q    .         .         . V       .
  17.250     15.4154     38.20  .    Q    .         .         .  V      .
  17.333     15.6494     33.99  .   Q     .         .         .  V      .
  17.417     15.8553     29.90  .  Q      .         .         .   V     .
  17.500     16.0350     26.09  .  Q      .         .         .   V     .
  17.583     16.2013     24.15  .  Q      .         .         .   V     .
  17.667     16.3544     22.23  . Q       .         .         .    V    .
  17.750     16.4954     20.47  . Q       .         .         .    V    .
```



```
 ------------------------------------------------------------------------
  TIME(HRS) VOLUME(AF)   Q(CFS) 0.       75.0     150.0     225.0     300.0
 ------------------------------------------------------------------------
  17.833     16.6250     18.82  . Q       .         .         .    V    .
  17.917     16.7406     16.78  . Q       .         .         .     V   .
  18.000     16.8485     15.66  . Q       .         .         .     V   .
-------------------------------------------------------------------------
```

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

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1085.0
10%	90.0
20%	55.0
30%	40.0

```
            40%                              35.0
            50%                              25.0
            60%                              20.0
            70%                              15.0
            80%                              10.0
            90%                               5.0
```



```
****************************************************************************
  FLOW PROCESS FROM NODE   3005.00 TO NODE   1025.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
============================================================================

      (UNIT-HYDROGRAPH ADDED TO STREAM #2)

         WATERSHED AREA =    1323.200 ACRES
         BASEFLOW =   0.000 CFS/SQUARE-MILE
         *USER ENTERED "LAG" TIME =    0.425 HOURS
          CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
          THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
          MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
         DESERT(UNDEVELOPED) S-GRAPH SELECTED
         MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) =  0.292
         LOW LOSS FRACTION = 0.857
         *HYDROGRAPH MODEL #1 SPECIFIED*

         SPECIFIED PEAK  5-MINUTES RAINFALL(INCH)=  0.21
         SPECIFIED PEAK 30-MINUTES RAINFALL(INCH)=  0.50
         SPECIFIED PEAK  1-HOUR RAINFALL(INCH) =  0.61
         SPECIFIED PEAK  3-HOUR RAINFALL(INCH) =  0.94
         SPECIFIED PEAK  6-HOUR RAINFALL(INCH) =  1.25
         SPECIFIED PEAK 24-HOUR RAINFALL(INCH) =  2.17

         PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
           5-MINUTE FACTOR = 0.941
          30-MINUTE FACTOR = 0.941
           1-HOUR FACTOR = 0.941
           3-HOUR FACTOR = 0.991
           6-HOUR FACTOR = 0.996
          24-HOUR FACTOR = 0.997

         UNIT HYDROGRAPH TIME UNIT =   5.000 MINUTES
         UNIT INTERVAL PERCENTAGE OF LAG-TIME =  19.608


         RUNOFF HYDROGRAPH LISTING LIMITS:
         MODEL TIME(HOURS) FOR BEGINNING OF RESULTS =  14.00
         MODEL TIME(HOURS) FOR END OF RESULTS =  18.00
```

UNIT HYDROGRAPH DETERMINATION

INTERVAL NUMBER	"S" GRAPH MEAN VALUES	UNIT HYDROGRAPH ORDINATES(CFS)
1	0.966	154.553
2	4.360	543.160
3	10.774	1026.410
4	24.856	2253.513
5	42.018	2746.210
6	53.975	1913.442
7	61.965	1278.699
8	67.695	916.816
9	72.300	736.907
10	75.969	587.240
11	79.062	494.967
12	81.600	406.066
13	83.763	346.192
14	85.712	311.801
15	87.445	277.372
16	88.918	235.656
17	90.105	189.963
18	91.214	177.492
19	92.212	159.686
20	93.123	145.818
21	93.951	132.493
22	94.633	109.204
23	95.300	106.655
24	95.880	92.898
25	96.390	81.581
26	96.880	78.457
27	97.253	59.615
28	97.606	56.459
29	97.888	45.174
30	98.084	31.401
31	98.283	31.848
32	98.512	36.535
33	98.747	37.682
34	98.982	37.650
35	99.218	37.651
36	99.453	37.650
37	99.688	37.650
38	99.924	37.650
39	100.000	12.236

```
--------------------------------------------------------------------------------
    TOTAL SOIL-LOSS VOLUME(ACRE-FEET) =     176.4243
    TOTAL STORM RUNOFF VOLUME(ACRE-FEET) =      62.1863
--------------------------------------------------------------------------------
```



```
================================================================================

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

================================================================================
               HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
        (Note: Time indicated is at END of Each Unit Intervals)
--------------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.      200.0     400.0     600.0     800.0
--------------------------------------------------------------------------------
  14.000     11.7626     20.87  .Q     V  .         .         .         .
  14.083     11.9093     21.30  .Q     V  .         .         .         .
  14.167     12.0594     21.79  .Q     V  .         .         .         .
  14.250     12.2133     22.35  .Q     V  .         .         .         .
  14.333     12.3722     23.07  .Q     V  .         .         .         .
  14.417     12.5366     23.87  .Q      V .         .         .         .
  14.500     12.7061     24.62  .Q      V .         .         .         .
  14.583     12.8807     25.34  .Q      V .         .         .         .
  14.667     13.0602     26.07  .Q      V .         .         .         .
  14.750     13.2449     26.82  .Q      V .         .         .         .
  14.833     13.4352     27.62  .Q      V .         .         .         .
  14.917     13.6312     28.46  .Q      V .         .         .         .
  15.000     13.8335     29.37  .Q      V .         .         .         .
  15.083     14.0425     30.35  .Q       V.         .         .         .
  15.167     14.2589     31.42  .Q       V.         .         .         .
  15.250     14.4834     32.60  .Q       V.         .         .         .
  15.333     14.7169     33.90  .Q       V.         .         .         .
  15.417     14.9594     35.21  .Q       V.         .         .         .
  15.500     15.2097     36.34  .Q       V.         .         .         .
  15.583     15.4661     37.23  .Q       V.         .         .         .
  15.667     15.7225     37.22  .Q        V         .         .         .
  15.750     15.9896     38.79  .Q        V         .         .         .
  15.833     16.3103     46.56  . Q       V         .         .         .
  15.917     16.7562     64.75  .  Q      V         .         .         .
  16.000     17.5018    108.27  .    Q    .V        .         .         .
  16.083     18.8531    196.21  .        Q. V       .         .         .
  16.167     21.1183    328.90  .         .  V  Q   .         .         .
  16.250     24.4138    478.51  .         .    V    .  Q      .         .
  16.333     29.1333    685.27  .         .       V .         .   Q     .
  16.417     34.1424    727.32  .         .         .V        .     Q   .
  16.500     37.9087    546.87  .         .         .   V  Q  .         .
  16.583     40.6037    391.32  .         .        Q.     V   .         .
  16.667     42.6562    298.03  .         .   Q     .      V  .         .
  16.750     44.3498    245.91  .         . Q       .       V .         .
```

```
  16.833     45.7687    206.03  .         Q         .        V.         .
  16.917     46.9936    177.85  .       Q .         .         V         .
  17.000     48.0515    153.60  .      Q  .         .         V         .
  17.083     48.9855    135.62  .     Q   .         .         .V        .
  17.167     49.8313    122.80  .     Q   .         .         . V       .
  17.250     50.5928    110.57  .    Q    .         .         . V       .
  17.333     51.2667     97.86  .   Q     .         .         . V       .
  17.417     51.8585     85.93  .   Q     .         .         .  V      .
  17.500     52.4064     79.56  .  Q      .         .         .  V      .
  17.583     52.9124     73.46  .  Q      .         .         .   V     .
  17.667     53.3804     67.95  .  Q      .         .         .   V     .
  17.750     53.8122     62.70  .  Q      .         .         .   V     .
```

```
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.      200.0     400.0     600.0     800.0
```

```
  17.833     54.2025     56.67  . Q       .         .         .   V     .
  17.917     54.5711     53.52  . Q       .         .         .    V    .
  18.000     54.9103     49.25  . Q       .         .         .    V    .
```

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

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1085.0
10%	100.0
20%	60.0
30%	40.0
40%	35.0
50%	25.0
60%	20.0
70%	15.0
80%	10.0
90%	10.0

```
 ************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1025.00 IS CODE =   7
 ------------------------------------------------------------------------
  >>>>>STREAM NUMBER 2 ADDED TO STREAM NUMBER 1<<<<<
 ========================================================================
```

```
 ************************************************************************
  FLOW PROCESS FROM NODE   8000.00 TO NODE   3013.00 IS CODE =   1
```

```
------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
========================================================================

      (UNIT-HYDROGRAPH ADDED TO STREAM #3)

         WATERSHED AREA =      78.200 ACRES
         BASEFLOW =   0.000 CFS/SQUARE-MILE
         *USER ENTERED "LAG" TIME =    0.244 HOURS
          CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
          THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
          MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
         DESERT(UNDEVELOPED) S-GRAPH SELECTED
         MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) =  0.030
         LOW LOSS FRACTION = 0.181
         *HYDROGRAPH MODEL #1 SPECIFIED*

         SPECIFIED PEAK  5-MINUTES RAINFALL(INCH)=  0.21
         SPECIFIED PEAK 30-MINUTES RAINFALL(INCH)=  0.50
         SPECIFIED PEAK  1-HOUR RAINFALL(INCH) =  0.61
         SPECIFIED PEAK  3-HOUR RAINFALL(INCH) =  0.94
         SPECIFIED PEAK  6-HOUR RAINFALL(INCH) =  1.25
         SPECIFIED PEAK 24-HOUR RAINFALL(INCH) =  2.17

         PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
           5-MINUTE FACTOR = 0.997
          30-MINUTE FACTOR = 0.997
           1-HOUR FACTOR = 0.997
           3-HOUR FACTOR = 0.999
           6-HOUR FACTOR = 1.000
          24-HOUR FACTOR = 1.000

         UNIT HYDROGRAPH TIME UNIT =   5.000 MINUTES
         UNIT INTERVAL PERCENTAGE OF LAG-TIME =  34.153


         RUNOFF HYDROGRAPH LISTING LIMITS:
         MODEL TIME(HOURS) FOR BEGINNING OF RESULTS =  14.00
         MODEL TIME(HOURS) FOR END OF RESULTS =  18.00


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

------------------------------------------------------------------------
    INTERVAL          "S" GRAPH          UNIT HYDROGRAPH
     NUMBER          MEAN VALUES          ORDINATES(CFS)
------------------------------------------------------------------------
        1                 2.150                20.333
        2                12.608                98.909
```

3	39.359	252.988
4	58.859	184.415
5	69.282	98.573
6	76.206	65.481
7	81.134	46.608
8	84.869	35.328
9	87.907	28.733
10	90.151	21.221
11	92.005	17.529
12	93.567	14.777
13	94.815	11.801
14	95.884	10.105
15	96.758	8.269
16	97.429	6.343
17	97.934	4.778
18	98.283	3.304
19	98.682	3.771
20	99.092	3.877
21	99.491	3.771
22	99.889	3.771
23	100.000	1.047

TOTAL SOIL-LOSS VOLUME(ACRE-FEET) = 2.0029
TOTAL STORM RUNOFF VOLUME(ACRE-FEET) = 12.1297

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

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

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	22.5	45.0	67.5	90.0
14.000	4.1250	7.40	. Q	. V	.	.	.
14.083	4.1770	7.56	. Q	. V	.	.	.
14.167	4.2300	7.70	. Q	. V	.	.	.
14.250	4.2839	7.82	. Q	. V	.	.	.
14.333	4.3387	7.96	. Q	. V	.	.	.
14.417	4.3948	8.15	. Q	. V	.	.	.
14.500	4.4523	8.34	. Q	. V	.	.	.
14.583	4.5113	8.57	. Q	. V	.	.	.
14.667	4.5720	8.81	. Q	. V	.	.	.
14.750	4.6345	9.08	. Q	. V	.	.	.
14.833	4.6989	9.36	. Q	. V	.	.	.

14.917	4.7657	9.69	.	Q	.	V	.	.	.
15.000	4.8348	10.05	.	Q	.	V	.	.	.
15.083	4.9071	10.49	.	Q	.	V	.	.	.
15.167	4.9827	10.98	.	Q	.	V	.	.	.
15.250	5.0624	11.57	.	Q	.	V	.	.	.
15.333	5.1466	12.22	.	Q	.	V	.	.	.
15.417	5.2355	12.91	.	Q	.	V	.	.	.
15.500	5.3271	13.29	.	Q	.	V	.	.	.
15.583	5.4174	13.12	.	Q	.	V	.	.	.
15.667	5.5098	13.41	.	Q	.	V	.	.	.
15.750	5.6116	14.77	.	Q	.	V	.	.	.
15.833	5.7345	17.85	.	Q	.	V	.	.	.
15.917	5.9020	24.32	.	Q	.	V	.	.	.
16.000	6.1197	31.61	.	.	Q	V	.	.	.
16.083	6.4195	43.53	.	.	.	Q.V	.	.	.
16.167	6.8545	63.16	.	.	.	. V	Q	.	.
16.250	7.4479	86.16	.	.	.	. V	.	.	Q .
16.333	7.9356	70.82	.	.	.	. V	.Q	.	.
16.417	8.2753	49.32	.	.	.	.Q	V	.	.
16.500	8.5347	37.67	.	.	Q	.	V	.	.
16.583	8.7500	31.26	.	.	Q	.	V	.	.
16.667	8.9349	26.84	.	.Q	.	.	V.	.	.
16.750	9.0962	23.42	.	Q	.	.	V.	.	.
16.833	9.2361	20.31	.	Q.	.	.	V	.	.
16.917	9.3606	18.08	.	Q	.	.	V	.	.
17.000	9.4728	16.29	.	Q	.	.	.V	.	.
17.083	9.5739	14.68	.	Q	.	.	.V	.	.
17.167	9.6661	13.39	.	Q	.	.	.V	.	.
17.250	9.7507	12.27	.	Q	.	.	. V	.	.
17.333	9.8282	11.25	.	Q	.	.	. V	.	.
17.417	9.8997	10.39	.	Q	.	.	. V	.	.
17.500	9.9664	9.68	.	Q	.	.	. V	.	.
17.583	10.0304	9.30	.	Q	.	.	. V	.	.
17.667	10.0917	8.90	.	Q	.	.	. V	.	.
17.750	10.1499	8.44	.	Q	.	.	. V	.	.

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	22.5	45.0	67.5	90.0
17.833	10.2046	7.95	. Q	.	.	. V	.
17.917	10.2535	7.11	. Q	.	.	. V	.
18.000	10.2989	6.58	. Q	.	.	. V	.

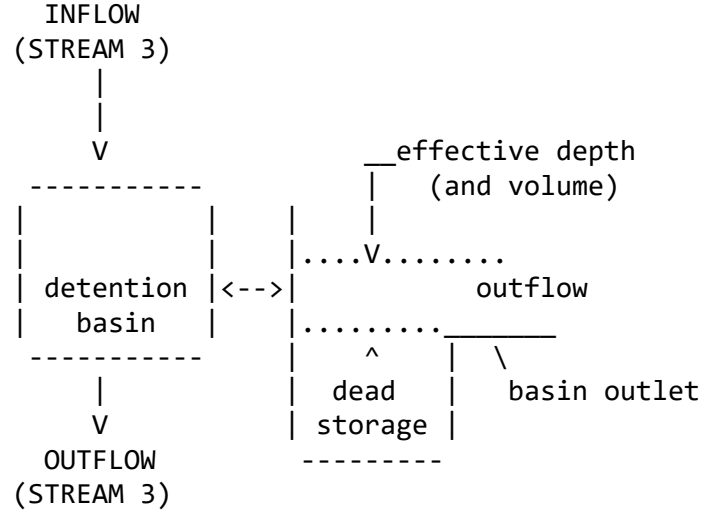
TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
==========	=========

0%	1085.0
10%	185.0
20%	70.0
30%	45.0
40%	30.0
50%	25.0
60%	15.0
70%	15.0
80%	10.0
90%	5.0

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**************************************************************************
  FLOW PROCESS FROM NODE   3013.00 TO NODE   3013.00 IS CODE = 3.3
--------------------------------------------------------------------------
  >>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #3<<<<<
==========================================================================
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ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 3
THROUGH A FLOW-THROUGH DETENTION BASIN
SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
  DEAD STORAGE(AF) =      0.000
  SPECIFIED DEAD STORAGE(AF) FILLED =      0.000
  SPECIFIED EFFECTIVE VOLUME(AF) FILLED ABOVE OUTLET =      0.000
  DETENTION BASIN CONSTANT LOSS RATE(CFS) =    8.94


BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

 INTERVAL    DEPTH      OUTFLOW     STORAGE
  NUMBER      (FT)       (CFS)       (AF)
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1	0.00	0.00	0.000
2	1.00	0.00	1.320
3	4.00	0.00	5.270
4	5.20	0.00	6.890
5	6.20	168.00	7.900

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FINITE DIFFERENCE ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):

(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time; MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
14.017	0.000	7.56	7.56	0.00	0.0	0.000
14.033	0.000	7.56	7.56	0.00	0.0	0.000
14.050	0.000	7.56	7.56	0.00	0.0	0.000
14.067	0.000	7.56	7.56	0.00	0.0	0.000
14.083	0.000	7.56	7.56	0.00	0.0	0.000
14.100	0.000	7.70	7.70	0.00	0.0	0.000
14.117	0.000	7.70	7.70	0.00	0.0	0.000
14.133	0.000	7.70	7.70	0.00	0.0	0.000
14.150	0.000	7.70	7.70	0.00	0.0	0.000
14.167	0.000	7.70	7.70	0.00	0.0	0.000
14.183	0.000	7.82	7.82	0.00	0.0	0.000
14.200	0.000	7.82	7.82	0.00	0.0	0.000
14.217	0.000	7.82	7.82	0.00	0.0	0.000
14.233	0.000	7.82	7.82	0.00	0.0	0.000
14.250	0.000	7.82	7.82	0.00	0.0	0.000
14.267	0.000	7.96	7.96	0.00	0.0	0.000
14.283	0.000	7.96	7.96	0.00	0.0	0.000
14.300	0.000	7.96	7.96	0.00	0.0	0.000
14.317	0.000	7.96	7.96	0.00	0.0	0.000
14.333	0.000	7.96	7.96	0.00	0.0	0.000
14.350	0.000	8.15	8.15	0.00	0.0	0.000
14.367	0.000	8.15	8.15	0.00	0.0	0.000
14.383	0.000	8.15	8.15	0.00	0.0	0.000
14.400	0.000	8.15	8.15	0.00	0.0	0.000
14.417	0.000	8.15	8.15	0.00	0.0	0.000
14.433	0.000	8.34	8.34	0.00	0.0	0.000
14.450	0.000	8.34	8.34	0.00	0.0	0.000
14.467	0.000	8.34	8.34	0.00	0.0	0.000
14.483	0.000	8.34	8.34	0.00	0.0	0.000
14.500	0.000	8.34	8.34	0.00	0.0	0.000
14.517	0.000	8.57	8.57	0.00	0.0	0.000
14.533	0.000	8.57	8.57	0.00	0.0	0.000
14.550	0.000	8.57	8.57	0.00	0.0	0.000

14.567	0.000	8.57	8.57	0.00	0.0	0.000
14.583	0.000	8.57	8.57	0.00	0.0	0.000
14.600	0.000	8.81	8.81	0.00	0.0	0.000
14.617	0.000	8.81	8.81	0.00	0.0	0.000
14.633	0.000	8.81	8.81	0.00	0.0	0.000
14.650	0.000	8.81	8.81	0.00	0.0	0.000
14.667	0.000	8.81	8.81	0.00	0.0	0.000
14.683	0.000	9.08	8.94	0.00	0.0	0.000
14.700	0.000	9.08	8.94	0.00	0.0	0.000
14.717	0.000	9.08	8.94	0.00	0.0	0.001
14.733	0.000	9.08	8.94	0.00	0.0	0.001
14.750	0.000	9.08	8.94	0.00	0.0	0.001
14.767	0.000	9.36	8.94	0.00	0.0	0.002
14.783	0.000	9.36	8.94	0.00	0.0	0.002
14.800	0.000	9.36	8.94	0.00	0.0	0.003
14.817	0.000	9.36	8.94	0.00	0.0	0.003
14.833	0.000	9.36	8.94	0.00	0.0	0.004



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FINITE DIFFERENCE ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
14.850	0.000	9.69	8.94	0.00	0.0	0.005
14.867	0.000	9.69	8.94	0.00	0.0	0.006
14.883	0.000	9.69	8.94	0.01	0.0	0.007
14.900	0.000	9.69	8.94	0.01	0.0	0.008
14.917	0.000	9.69	8.94	0.01	0.0	0.009
14.933	0.000	10.05	8.94	0.01	0.0	0.011
14.950	0.000	10.05	8.94	0.01	0.0	0.012
14.967	0.000	10.05	8.94	0.01	0.0	0.014
14.983	0.000	10.05	8.94	0.01	0.0	0.015
15.000	0.000	10.05	8.94	0.01	0.0	0.017
15.017	0.000	10.49	8.94	0.01	0.0	0.019
15.033	0.000	10.49	8.94	0.02	0.0	0.021
15.050	0.000	10.49	8.94	0.02	0.0	0.023
15.067	0.000	10.49	8.94	0.02	0.0	0.025
15.083	0.000	10.49	8.94	0.02	0.0	0.027
15.100	0.000	10.98	8.94	0.02	0.0	0.030
15.117	0.000	10.98	8.94	0.02	0.0	0.033
15.133	0.000	10.98	8.94	0.03	0.0	0.036
15.150	0.000	10.98	8.94	0.03	0.0	0.039
15.167	0.000	10.98	8.94	0.03	0.0	0.041
15.183	0.000	11.57	8.94	0.03	0.0	0.045
15.200	0.000	11.57	8.94	0.04	0.0	0.049
15.217	0.000	11.57	8.94	0.04	0.0	0.052

15.233	0.000	11.57	8.94	0.04	0.0	0.056
15.250	0.000	11.57	8.94	0.05	0.0	0.059
15.267	0.000	12.22	8.94	0.05	0.0	0.064
15.283	0.000	12.22	8.94	0.05	0.0	0.069
15.300	0.000	12.22	8.94	0.06	0.0	0.073
15.317	0.000	12.22	8.94	0.06	0.0	0.078
15.333	0.000	12.22	8.94	0.06	0.0	0.082
15.350	0.000	12.91	8.94	0.07	0.0	0.088
15.367	0.000	12.91	8.94	0.07	0.0	0.093
15.383	0.000	12.91	8.94	0.07	0.0	0.098
15.400	0.000	12.91	8.94	0.08	0.0	0.104
15.417	0.000	12.91	8.94	0.08	0.0	0.109
15.433	0.000	13.29	8.94	0.09	0.0	0.115
15.450	0.000	13.29	8.94	0.09	0.0	0.121
15.467	0.000	13.29	8.94	0.10	0.0	0.127
15.483	0.000	13.29	8.94	0.10	0.0	0.133
15.500	0.000	13.29	8.94	0.11	0.0	0.139
15.517	0.000	13.12	8.94	0.11	0.0	0.145
15.533	0.000	13.12	8.94	0.11	0.0	0.151
15.550	0.000	13.12	8.94	0.12	0.0	0.157
15.567	0.000	13.12	8.94	0.12	0.0	0.162
15.583	0.000	13.12	8.94	0.13	0.0	0.168
15.600	0.000	13.41	8.94	0.13	0.0	0.174
15.617	0.000	13.41	8.94	0.14	0.0	0.181
15.633	0.000	13.41	8.94	0.14	0.0	0.187
15.650	0.000	13.41	8.94	0.15	0.0	0.193
15.667	0.000	13.41	8.94	0.15	0.0	0.199

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FINITE DIFFERENCE ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
15.683	0.000	14.77	8.94	0.16	0.0	0.207
15.700	0.000	14.77	8.94	0.16	0.0	0.215
15.717	0.000	14.77	8.94	0.17	0.0	0.223
15.733	0.000	14.77	8.94	0.18	0.0	0.231
15.750	0.000	14.77	8.94	0.18	0.0	0.239
15.767	0.000	17.85	8.94	0.19	0.0	0.251
15.783	0.000	17.85	8.94	0.20	0.0	0.264
15.800	0.000	17.85	8.94	0.21	0.0	0.276
15.817	0.000	17.85	8.94	0.22	0.0	0.288
15.833	0.000	17.85	8.94	0.23	0.0	0.301
15.850	0.000	24.32	8.94	0.24	0.0	0.322
15.867	0.000	24.32	8.94	0.26	0.0	0.343
15.883	0.000	24.32	8.94	0.28	0.0	0.364

15.900	0.000	24.32	8.94	0.29	0.0	0.385
15.917	0.000	24.32	8.94	0.31	0.0	0.406
15.933	0.000	31.61	8.94	0.33	0.0	0.438
15.950	0.000	31.61	8.94	0.36	0.0	0.469
15.967	0.000	31.61	8.94	0.38	0.0	0.500
15.983	0.000	31.61	8.94	0.40	0.0	0.531
16.000	0.000	31.61	8.94	0.43	0.0	0.563
16.017	0.000	43.53	8.94	0.46	0.0	0.610
16.033	0.000	43.53	8.94	0.50	0.0	0.658
16.050	0.000	43.53	8.94	0.53	0.0	0.706
16.067	0.000	43.53	8.94	0.57	0.0	0.753
16.083	0.000	43.53	8.94	0.61	0.0	0.801
16.100	0.000	63.16	8.94	0.66	0.0	0.876
16.117	0.000	63.16	8.94	0.72	0.0	0.950
16.133	0.000	63.16	8.94	0.78	0.0	1.025
16.150	0.000	63.16	8.94	0.83	0.0	1.100
16.167	0.000	63.16	8.94	0.89	0.0	1.174
16.183	0.000	86.16	8.94	0.97	0.0	1.281
16.200	0.000	86.16	8.94	1.05	0.0	1.387
16.217	0.000	86.16	8.94	1.13	0.0	1.493
16.233	0.000	86.16	8.94	1.21	0.0	1.600
16.250	0.000	86.16	8.94	1.29	0.0	1.706
16.267	0.000	70.82	8.94	1.36	0.0	1.791
16.283	0.000	70.82	8.94	1.42	0.0	1.877
16.300	0.000	70.82	8.94	1.49	0.0	1.962
16.317	0.000	70.82	8.94	1.55	0.0	2.047
16.333	0.000	70.82	8.94	1.62	0.0	2.132
16.350	0.000	49.32	8.94	1.66	0.0	2.188
16.367	0.000	49.32	8.94	1.70	0.0	2.243
16.383	0.000	49.32	8.94	1.74	0.0	2.299
16.400	0.000	49.32	8.94	1.79	0.0	2.355
16.417	0.000	49.32	8.94	1.83	0.0	2.410
16.433	0.000	37.67	8.94	1.86	0.0	2.450
16.450	0.000	37.67	8.94	1.89	0.0	2.489
16.467	0.000	37.67	8.94	1.92	0.0	2.529
16.483	0.000	37.67	8.94	1.95	0.0	2.569
16.500	0.000	37.67	8.94	1.98	0.0	2.608



FINITE DIFFERENCE ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
16.517	0.000	31.26	8.94	2.00	0.0	2.639
16.533	0.000	31.26	8.94	2.03	0.0	2.670
16.550	0.000	31.26	8.94	2.05	0.0	2.700

16.567	0.000	31.26	8.94	2.07	0.0	2.731
16.583	0.000	31.26	8.94	2.10	0.0	2.762
16.600	0.000	26.84	8.94	2.11	0.0	2.787
16.617	0.000	26.84	8.94	2.13	0.0	2.811
16.633	0.000	26.84	8.94	2.15	0.0	2.836
16.650	0.000	26.84	8.94	2.17	0.0	2.861
16.667	0.000	26.84	8.94	2.19	0.0	2.885
16.683	0.000	23.42	8.94	2.20	0.0	2.905
16.700	0.000	23.42	8.94	2.22	0.0	2.925
16.717	0.000	23.42	8.94	2.23	0.0	2.945
16.733	0.000	23.42	8.94	2.25	0.0	2.965
16.750	0.000	23.42	8.94	2.26	0.0	2.985
16.767	0.000	20.31	8.94	2.28	0.0	3.001
16.783	0.000	20.31	8.94	2.29	0.0	3.016
16.800	0.000	20.31	8.94	2.30	0.0	3.032
16.817	0.000	20.31	8.94	2.31	0.0	3.048
16.833	0.000	20.31	8.94	2.32	0.0	3.063
16.850	0.000	18.08	8.94	2.33	0.0	3.076
16.867	0.000	18.08	8.94	2.34	0.0	3.088
16.883	0.000	18.08	8.94	2.35	0.0	3.101
16.900	0.000	18.08	8.94	2.36	0.0	3.114
16.917	0.000	18.08	8.94	2.37	0.0	3.126
16.933	0.000	16.29	8.94	2.38	0.0	3.136
16.950	0.000	16.29	8.94	2.39	0.0	3.147
16.967	0.000	16.29	8.94	2.39	0.0	3.157
16.983	0.000	16.29	8.94	2.40	0.0	3.167
17.000	0.000	16.29	8.94	2.41	0.0	3.177
17.017	0.000	14.68	8.94	2.42	0.0	3.185
17.033	0.000	14.68	8.94	2.42	0.0	3.193
17.050	0.000	14.68	8.94	2.43	0.0	3.201
17.067	0.000	14.68	8.94	2.43	0.0	3.209
17.083	0.000	14.68	8.94	2.44	0.0	3.216
17.100	0.000	13.39	8.94	2.44	0.0	3.223
17.117	0.000	13.39	8.94	2.45	0.0	3.229
17.133	0.000	13.39	8.94	2.45	0.0	3.235
17.150	0.000	13.39	8.94	2.46	0.0	3.241
17.167	0.000	13.39	8.94	2.46	0.0	3.247
17.183	0.000	12.27	8.94	2.47	0.0	3.252
17.200	0.000	12.27	8.94	2.47	0.0	3.256
17.217	0.000	12.27	8.94	2.47	0.0	3.261
17.233	0.000	12.27	8.94	2.48	0.0	3.265
17.250	0.000	12.27	8.94	2.48	0.0	3.270
17.267	0.000	11.25	8.94	2.48	0.0	3.273
17.283	0.000	11.25	8.94	2.49	0.0	3.276
17.300	0.000	11.25	8.94	2.49	0.0	3.280
17.317	0.000	11.25	8.94	2.49	0.0	3.283
17.333	0.000	11.25	8.94	2.49	0.0	3.286



==========

FINITE DIFFERENCE ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):

(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
17.350	0.000	10.39	8.94	2.49	0.0	3.288
17.367	0.000	10.39	8.94	2.50	0.0	3.290
17.383	0.000	10.39	8.94	2.50	0.0	3.292
17.400	0.000	10.39	8.94	2.50	0.0	3.294
17.417	0.000	10.39	8.94	2.50	0.0	3.296
17.433	0.000	9.68	8.94	2.50	0.0	3.297
17.450	0.000	9.68	8.94	2.50	0.0	3.298
17.467	0.000	9.68	8.94	2.50	0.0	3.299
17.483	0.000	9.68	8.94	2.50	0.0	3.300
17.500	0.000	9.68	8.94	2.50	0.0	3.301
17.517	0.000	9.30	8.94	2.50	0.0	3.302
17.533	0.000	9.30	8.94	2.51	0.0	3.302
17.550	0.000	9.30	8.94	2.51	0.0	3.303
17.567	0.000	9.30	8.94	2.51	0.0	3.303
17.583	0.000	9.30	8.94	2.51	0.0	3.304
17.600	0.000	8.90	8.94	2.51	0.0	3.303
17.617	0.000	8.90	8.94	2.51	0.0	3.303
17.633	0.000	8.90	8.94	2.51	0.0	3.303
17.650	0.000	8.90	8.94	2.51	0.0	3.303
17.667	0.000	8.90	8.94	2.51	0.0	3.303
17.683	0.000	8.44	8.94	2.51	0.0	3.303
17.700	0.000	8.44	8.94	2.51	0.0	3.302
17.717	0.000	8.44	8.94	2.50	0.0	3.301
17.733	0.000	8.44	8.94	2.50	0.0	3.300
17.750	0.000	8.44	8.94	2.50	0.0	3.300
17.767	0.000	7.95	8.94	2.50	0.0	3.298
17.783	0.000	7.95	8.94	2.50	0.0	3.297
17.800	0.000	7.95	8.94	2.50	0.0	3.296
17.817	0.000	7.95	8.94	2.50	0.0	3.294
17.833	0.000	7.95	8.94	2.50	0.0	3.293
17.850	0.000	7.11	8.94	2.50	0.0	3.290
17.867	0.000	7.11	8.94	2.49	0.0	3.288
17.883	0.000	7.11	8.94	2.49	0.0	3.285
17.900	0.000	7.11	8.94	2.49	0.0	3.283
17.917	0.000	7.11	8.94	2.49	0.0	3.280
17.933	0.000	6.58	8.94	2.49	0.0	3.277
17.950	0.000	6.58	8.94	2.48	0.0	3.274
17.967	0.000	6.58	8.94	2.48	0.0	3.271
17.983	0.000	6.58	8.94	2.48	0.0	3.267
18.000	0.000	6.58	8.94	2.48	0.0	3.264

PROCESS SUMMARY OF STORAGE:
INFLOW VOLUME = 12.321 AF

```
     BASIN  STORAGE =      0.000 AF (WITH      0.000 AF INITIALLY FILLED)
     OUTFLOW VOLUME =      0.000 AF
     LOSS    VOLUME =     12.321 AF
```

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```
 ****************************************************************************
   FLOW PROCESS FROM NODE   3013.00 TO NODE   3013.00 IS CODE =   9
 ----------------------------------------------------------------------------
   >>>>>MOVE STREAM NUMBER 3 FORWARD IN TIME BY   0.100 HOURS<<<<<
 ============================================================================
 ***STREAM 3 IS ZERO...STREAM NOW DEFINED AS ZERO***
```

↟

```
 ****************************************************************************
   FLOW PROCESS FROM NODE   3013.00 TO NODE   1025.00 IS CODE =   7
 ----------------------------------------------------------------------------
   >>>>>STREAM NUMBER 3 ADDED TO STREAM NUMBER 1<<<<<
 ============================================================================
 ***STREAM 3 IS ZERO...STREAM NOW DEFINED AS ZERO***
```

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```
 ****************************************************************************
   FLOW PROCESS FROM NODE   9000.00 TO NODE   3012.00 IS CODE =   1
 ----------------------------------------------------------------------------
   >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
 ============================================================================

       (UNIT-HYDROGRAPH ADDED TO STREAM #4)

          WATERSHED AREA =      74.900 ACRES
          BASEFLOW =   0.000 CFS/SQUARE-MILE
          *USER ENTERED "LAG" TIME =    0.234 HOURS
           CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
           THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
           MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
          DESERT(UNDEVELOPED) S-GRAPH SELECTED
          MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) =  0.100
          LOW LOSS FRACTION = 0.363
          *HYDROGRAPH MODEL #1 SPECIFIED*

          SPECIFIED PEAK  5-MINUTES RAINFALL(INCH)=  0.21
          SPECIFIED PEAK 30-MINUTES RAINFALL(INCH)=  0.50
          SPECIFIED PEAK  1-HOUR RAINFALL(INCH) =  0.61
          SPECIFIED PEAK  3-HOUR RAINFALL(INCH) =  0.94
          SPECIFIED PEAK  6-HOUR RAINFALL(INCH) =  1.25
          SPECIFIED PEAK 24-HOUR RAINFALL(INCH) =  2.17
```

PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
5-MINUTE FACTOR = 0.997
30-MINUTE FACTOR = 0.997
1-HOUR FACTOR = 0.997
3-HOUR FACTOR = 0.999
6-HOUR FACTOR = 1.000
24-HOUR FACTOR = 1.000

UNIT HYDROGRAPH TIME UNIT = 5.000 MINUTES
UNIT INTERVAL PERCENTAGE OF LAG-TIME = 35.613

RUNOFF HYDROGRAPH LISTING LIMITS:
MODEL TIME(HOURS) FOR BEGINNING OF RESULTS = 14.00
MODEL TIME(HOURS) FOR END OF RESULTS = 18.00

UNIT HYDROGRAPH DETERMINATION

INTERVAL NUMBER	"S" GRAPH MEAN VALUES	UNIT HYDROGRAPH ORDINATES(CFS)
1	2.293	20.775
2	13.986	105.917
3	42.064	254.337
4	60.778	169.509
5	70.803	90.813
6	77.501	60.675
7	82.257	43.075
8	85.919	33.173
9	88.798	26.083
10	90.941	19.404
11	92.733	16.237
12	94.215	13.423
13	95.416	10.884
14	96.400	8.909
15	97.195	7.198
16	97.792	5.410
17	98.177	3.487
18	98.579	3.639
19	99.006	3.871
20	99.408	3.639
21	99.810	3.639
22	100.000	1.725

TOTAL SOIL-LOSS VOLUME(ACRE-FEET) = 4.1045

TOTAL STORM RUNOFF VOLUME(ACRE-FEET) = 9.4330

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

==========

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

TIME(HRS)	VOLUME(AF)	Q(CFS)	0. 20.0 40.0 60.0 80.0
14.000	3.0793	5.53	. Q . V . . .
14.083	3.1182	5.65	. Q . V . . .
14.167	3.1578	5.75	. Q . V . . .
14.250	3.1981	5.84	. Q . V . . .
14.333	3.2391	5.95	. Q . V . . .
14.417	3.2810	6.09	. Q . V . . .
14.500	3.3239	6.24	. Q . V . . .
14.583	3.3681	6.41	. Q . V . . .
14.667	3.4134	6.59	. Q . V . . .
14.750	3.4602	6.79	. Q . V . . .
14.833	3.5084	7.00	. Q . V . . .
14.917	3.5583	7.25	. Q . V . . .
15.000	3.6100	7.51	. Q . V . . .
15.083	3.6638	7.81	. Q . V . . .
15.167	3.7198	8.13	. Q . V . . .
15.250	3.7784	8.51	. Q . V . . .
15.333	3.8398	8.92	. Q . V . . .
15.417	3.9042	9.35	. Q . V . . .
15.500	3.9701	9.57	. Q . V . . .
15.583	4.0351	9.44	. Q . V . . .
15.667	4.1016	9.66	. Q . V . . .
15.750	4.1752	10.68	. Q . V . . .
15.833	4.2677	13.43	. Q . V . . .
15.917	4.4023	19.55	. Q. V . . .
16.000	4.5842	26.41	. . Q V. . .
16.083	4.8470	38.15	. . QV . .
16.167	5.2474	58.14	. . . V Q. .
16.250	5.7954	79.57	. . . V . Q.
16.333	6.2194	61.56	. . . V Q .
16.417	6.5036	41.26	. . Q V . .
16.500	6.7161	30.86	. . Q . V . .
16.583	6.8894	25.15	. Q . V. .
16.667	7.0365	21.36	. Q . V. .
16.750	7.1632	18.40	. Q. . V .
16.833	7.2724	15.86	. Q . . V .
16.917	7.3695	14.10	. Q . . .V .

```
  17.000      7.4564     12.61  .     Q   .         .         .V        .
  17.083      7.5341     11.29  .    Q    .         .         .V        .
  17.167      7.6044     10.20  .    Q    .         .         . V       .
  17.250      7.6684      9.29  .   Q     .         .         . V       .
  17.333      7.7267      8.47  .   Q     .         .         . V       .
  17.417      7.7801      7.75  .  Q      .         .         . V       .
  17.500      7.8311      7.40  .  Q      .         .         .  V      .
  17.583      7.8799      7.09  .  Q      .         .         .  V      .
  17.667      7.9260      6.70  .  Q      .         .         .  V      .
  17.750      7.9693      6.29  .  Q      .         .         .  V      .
```



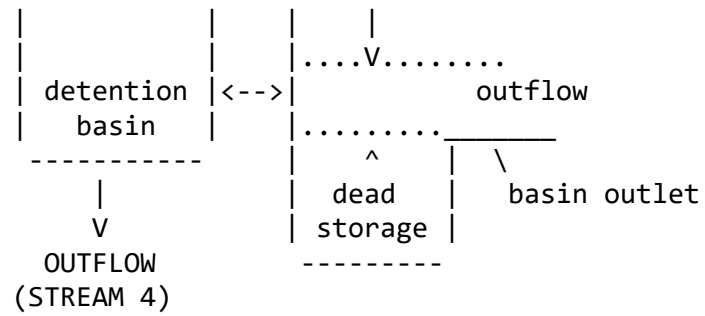
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 ------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       20.0      40.0      60.0      80.0
 ------------------------------------------------------------------------
  17.833      8.0080      5.62  . Q       .         .         .  V      .
  17.917      8.0428      5.05  . Q       .         .         .   V     .
  18.000      8.0760      4.82  . Q       .         .         .   V     .
-------------------------------------------------------------------------------
    TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
    (Note: 100% of Peak Flow Rate estimate assumed to have
    an instantaneous time duration)

    Percentile of Estimated              Duration
        Peak Flow Rate                   (minutes)
    ======================               =========
               0%                         1085.0
              10%                          135.0
              20%                           55.0
              30%                           40.0
              40%                           25.0
              50%                           20.0
              60%                           15.0
              70%                           15.0
              80%                            5.0
              90%                            5.0
```



```
 ********************************************************************************
   FLOW PROCESS FROM NODE   3012.00 TO NODE   3012.00 IS CODE = 3.1
 --------------------------------------------------------------------------------
   >>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #4<<<<<
 ================================================================================

                      INFLOW
                     (STREAM 4)
                          |
                          |
                          V                __effective depth
                      ----------           |   (and volume)
```



ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 4
THROUGH A FLOW-THROUGH DETENTION BASIN
SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
DEAD STORAGE(AF) = 0.000
SPECIFIED DEAD STORAGE(AF) FILLED = 0.000
SPECIFIED EFFECTIVE VOLUME(AF) FILLED ABOVE OUTLET = 0.000
DETENTION BASIN CONSTANT LOSS RATE(CFS) = 0.50

BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

INTERVAL NUMBER	DEPTH (FT)	OUTFLOW (CFS)	STORAGE (AF)
1	0.00	0.00	0.000
2	3.00	0.50	7.560
3	6.00	2.00	22.760
4	7.00	129.00	27.160

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(5-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
14.083	0.000	5.65	0.50	0.98	0.2	2.469
14.167	0.000	5.75	0.50	0.99	0.2	2.505
14.250	0.000	5.84	0.50	1.01	0.2	2.540
14.333	0.000	5.95	0.50	1.02	0.2	2.577
14.417	0.000	6.09	0.50	1.04	0.2	2.614
14.500	0.000	6.24	0.50	1.05	0.2	2.652
14.583	0.000	6.41	0.50	1.07	0.2	2.692
14.667	0.000	6.59	0.50	1.08	0.2	2.732
14.750	0.000	6.79	0.50	1.10	0.2	2.774

14.833	0.000	7.00	0.50	1.12	0.2	2.818
14.917	0.000	7.25	0.50	1.14	0.2	2.863
15.000	0.000	7.51	0.50	1.15	0.2	2.910
15.083	0.000	7.81	0.50	1.17	0.2	2.959
15.167	0.000	8.13	0.50	1.19	0.2	3.010
15.250	0.000	8.51	0.50	1.22	0.2	3.064
15.333	0.000	8.92	0.50	1.24	0.2	3.121
15.417	0.000	9.35	0.50	1.26	0.2	3.180
15.500	0.000	9.57	0.50	1.29	0.2	3.241
15.583	0.000	9.44	0.50	1.31	0.2	3.301
15.667	0.000	9.66	0.50	1.33	0.2	3.363
15.750	0.000	10.68	0.50	1.36	0.2	3.431
15.833	0.000	13.43	0.50	1.40	0.2	3.519
15.917	0.000	19.55	0.50	1.45	0.2	3.648
16.000	0.000	26.41	0.50	1.52	0.2	3.825
16.083	0.000	38.15	0.50	1.62	0.3	4.083
16.167	0.000	58.14	0.50	1.78	0.3	4.478
16.250	0.000	79.57	0.50	1.99	0.3	5.020
16.333	0.000	61.56	0.50	2.16	0.3	5.438
16.417	0.000	41.26	0.50	2.27	0.4	5.716
16.500	0.000	30.86	0.50	2.35	0.4	5.923
16.583	0.000	25.15	0.50	2.42	0.4	6.090
16.667	0.000	21.36	0.50	2.47	0.4	6.231
16.750	0.000	18.40	0.50	2.52	0.4	6.351
16.833	0.000	15.86	0.50	2.56	0.4	6.454
16.917	0.000	14.10	0.50	2.60	0.4	6.545
17.000	0.000	12.61	0.50	2.63	0.4	6.625
17.083	0.000	11.29	0.50	2.66	0.4	6.696
17.167	0.000	10.20	0.50	2.68	0.4	6.760
17.250	0.000	9.29	0.50	2.71	0.4	6.818
17.333	0.000	8.47	0.50	2.73	0.5	6.869
17.417	0.000	7.75	0.50	2.74	0.5	6.916
17.500	0.000	7.40	0.50	2.76	0.5	6.960
17.583	0.000	7.09	0.50	2.78	0.5	7.003
17.667	0.000	6.70	0.50	2.79	0.5	7.042
17.750	0.000	6.29	0.50	2.81	0.5	7.079
17.833	0.000	5.62	0.50	2.82	0.5	7.111
17.917	0.000	5.05	0.50	2.83	0.5	7.139
18.000	0.000	4.82	0.50	2.84	0.5	7.165

PROCESS SUMMARY OF STORAGE:
INFLOW VOLUME = 9.433 AF
BASIN STORAGE = 0.000 AF (WITH 0.000 AF INITIALLY FILLED)
OUTFLOW VOLUME = 2.981 AF
LOSS VOLUME = 6.452 AF



****

FLOW PROCESS FROM NODE 3012.00 TO NODE 1025.00 IS CODE = 9

>>>>>MOVE STREAM NUMBER 4 FORWARD IN TIME BY 0.100 HOURS<<<<<

==========

MODEL TIME	STREAM 4 (CFS)	STREAM 4 MOVED 0.100 HOURS
14.000	0.16	0.16
14.083	0.16	0.16
14.167	0.16	0.16
14.250	0.17	0.16
14.333	0.17	0.17
14.417	0.17	0.17
14.500	0.17	0.17
14.583	0.18	0.17
14.667	0.18	0.18
14.750	0.18	0.18
14.833	0.18	0.18
14.917	0.19	0.18
15.000	0.19	0.19
15.083	0.19	0.19
15.167	0.20	0.19
15.250	0.20	0.20
15.333	0.20	0.20
15.417	0.21	0.20
15.500	0.21	0.21
15.583	0.22	0.21
15.667	0.22	0.22
15.750	0.22	0.22
15.833	0.23	0.22
15.917	0.24	0.23
16.000	0.25	0.24
16.083	0.26	0.25
16.167	0.28	0.26
16.250	0.31	0.28
16.333	0.35	0.31
16.417	0.37	0.34
16.500	0.38	0.36
16.583	0.40	0.38
16.667	0.41	0.39
16.750	0.42	0.41
16.833	0.42	0.41
16.917	0.43	0.42
17.000	0.44	0.43
17.083	0.44	0.43
17.167	0.44	0.44
17.250	0.45	0.44
17.333	0.45	0.45
17.417	0.46	0.45
17.500	0.46	0.46

↟

MODEL TIME	STREAM 4 (CFS)	STREAM 4 MOVED 0.100 HOURS
17.583	0.46	0.46
17.667	0.46	0.46
17.750	0.47	0.46
17.833	0.47	0.47
17.917	0.47	0.47
18.000	0.47	0.47

↟

```
**************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1025.00 IS CODE =   7
--------------------------------------------------------------------------
  >>>>>STREAM NUMBER 4 ADDED TO STREAM NUMBER 1<<<<<
==========================================================================
```

↟

```
**************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1025.00 IS CODE =  11
--------------------------------------------------------------------------
  >>>>>VIEW STREAM NUMBER 1 HYDROGRAPH<<<<<
==========================================================================
```

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

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	275.0	550.0	825.0	1100.0
14.000	13.9567	24.78	Q	V .	.	.	.
14.083	14.1308	25.28	Q	V .	.	.	.
14.167	14.3088	25.85	Q	V .	.	.	.
14.250	14.4913	26.50	Q	V .	.	.	.
14.333	14.6794	27.31	Q	V .	.	.	.
14.417	14.8736	28.20	.Q	V .	.	.	.
14.500	15.0737	29.06	.Q	V .	.	.	.
14.583	15.2796	29.89	.Q	V .	.	.	.
14.667	15.4912	30.73	.Q	V .	.	.	.
14.750	15.7089	31.61	.Q	V .	.	.	.
14.833	15.9329	32.54	.Q	V .	.	.	.
14.917	16.1638	33.52	.Q	V .	.	.	.
15.000	16.4020	34.59	.Q	V .	.	.	.
15.083	16.6481	35.74	.Q	V .	.	.	.
15.167	16.9029	37.00	.Q	V .	.	.	.
15.250	17.1673	38.38	.Q	V .	.	.	.
15.333	17.4422	39.92	.Q	V .	.	.	.

15.417	17.7277	41.46	.Q V . . . .
15.500	18.0226	42.81	.Q V . . . .
15.583	18.3250	43.91	.Q V . . . .
15.667	18.6282	44.02	.Q V . . . .
15.750	18.9478	46.41	.Q V. . . .
15.833	19.3420	57.24	. Q V. . . .
15.917	19.9078	82.15	. Q V. . . .
16.000	20.8830	141.61	. Q V. . . .
16.083	22.6937	262.91	. QV . . .
16.167	25.7477	443.44	. . V Q . . .
16.250	30.1917	645.27	. . V . Q . .
16.333	36.5539	923.80	. . V . . Q .
16.417	43.4605	1002.83	. . V . Q .
16.500	48.7158	763.08	. . . V Q . .
16.583	52.4864	547.49	. . Q. V . .
16.667	55.3289	412.74	. . Q . V . .
16.750	57.6569	338.02	. . Q . V . .
16.833	59.6021	282.44	. Q . V . .
16.917	61.2740	242.77	. Q . . V. .
17.000	62.7127	208.90	. Q . . V. .
17.083	63.9797	183.96	. Q . . V .
17.167	65.1198	165.54	. Q . . .V .
17.250	66.1474	149.21	. Q . . .V .
17.333	67.0585	132.29	. Q . . . V .
17.417	67.8593	116.28	. Q . . . V .
17.500	68.5901	106.11	. Q . . . V .
17.583	69.2655	98.07	. Q . . . V .
17.667	69.8897	90.64	. Q . . . V .
17.750	70.4657	83.63	. Q . . . V .

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TIME(HRS)	VOLUME(AF)	Q(CFS)	0. 275.0 550.0 825.0 1100.0
17.833	70.9889	75.96	. Q . . . V .
17.917	71.4762	70.76	. Q . . . V .
18.000	71.9265	65.39	. Q . . . V .
18.083	72.3422	60.35	. Q . . . V .
18.167	72.7268	55.85	. Q . . . V .
18.250	73.0728	50.24	.Q . . . V .
18.333	73.3917	46.30	.Q . . . V .
18.417	73.6788	41.69	.Q . . . V .
18.500	73.9402	37.95	.Q . . . V .
18.583	74.1890	36.13	.Q . . . V .
18.667	74.4366	35.94	.Q . . . V .
18.750	74.6830	35.78	.Q . . . V .
18.833	74.9279	35.57	.Q . . . V .
18.917	75.1678	34.83	.Q . . . V .
19.000	75.4007	33.81	.Q . . . V .
19.083	75.6229	32.27	.Q . . . V .
19.167	75.8291	29.94	.Q . . . V .

19.250	75.9957	24.19	Q	.	.	.	V	.
19.333	76.1373	20.56	Q	.	.	.	V	.
19.417	76.2644	18.45	Q	.	.	.	V	.
19.500	76.3790	16.65	Q	.	.	.	V	.
19.583	76.4901	16.12	Q	.	.	.	V	.
19.667	76.5988	15.79	Q	.	.	.	V	.
19.750	76.7055	15.49	Q	.	.	.	V	.
19.833	76.8102	15.20	Q	.	.	.	V	.
19.917	76.9131	14.93	Q	.	.	.	V	.
20.000	77.0142	14.68	Q	.	.	.	V	.
20.083	77.1136	14.44	Q	.	.	.	V	.
20.167	77.2115	14.21	Q	.	.	.	V	.
20.250	77.3079	14.00	Q	.	.	.	V	.
20.333	77.4029	13.79	Q	.	.	.	V	.
20.417	77.4966	13.60	Q	.	.	.	V	.
20.500	77.5889	13.41	Q	.	.	.	V	.
20.583	77.6801	13.24	Q	.	.	.	V	.
20.667	77.7701	13.06	Q	.	.	.	V	.
20.750	77.8589	12.90	Q	.	.	.	V	.
20.833	77.9466	12.74	Q	.	.	.	V	.
20.917	78.0333	12.58	Q	.	.	.	V	.
21.000	78.1189	12.44	Q	.	.	.	V	.
21.083	78.2036	12.29	Q	.	.	.	V	.
21.167	78.2873	12.15	Q	.	.	.	V	.
21.250	78.3701	12.02	Q	.	.	.	V	.
21.333	78.4520	11.89	Q	.	.	.	V	.
21.417	78.5330	11.77	Q	.	.	.	V	.
21.500	78.6132	11.65	Q	.	.	.	V	.
21.583	78.6926	11.53	Q	.	.	.	V	.
21.667	78.7712	11.41	Q	.	.	.	V	.
21.750	78.8491	11.30	Q	.	.	.	V	.
21.833	78.9262	11.20	Q	.	.	.	V	.
21.917	79.0025	11.09	Q	.	.	.	V	.

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TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	275.0	550.0	825.0	1100.0
22.000	79.0782	10.99	Q	.	.	.	V .
22.083	79.1532	10.89	Q	.	.	.	V .
22.167	79.2275	10.79	Q	.	.	.	V .
22.250	79.3012	10.70	Q	.	.	.	V .
22.333	79.3742	10.61	Q	.	.	.	V .
22.417	79.4467	10.52	Q	.	.	.	V .
22.500	79.5185	10.43	Q	.	.	.	V .
22.583	79.5897	10.34	Q	.	.	.	V .
22.667	79.6603	10.26	Q	.	.	.	V .
22.750	79.7304	10.18	Q	.	.	.	V .
22.833	79.8000	10.10	Q	.	.	.	V .
22.917	79.8690	10.02	Q	.	.	.	V .
23.000	79.9374	9.94	Q	.	.	.	V .

23.083	80.0054	9.87	Q	.	.	.	V .
23.167	80.0729	9.79	Q	.	.	.	V .
23.250	80.1398	9.72	Q	.	.	.	V .
23.333	80.2063	9.65	Q	.	.	.	V .
23.417	80.2723	9.58	Q	.	.	.	V .
23.500	80.3379	9.52	Q	.	.	.	V .
23.583	80.4030	9.45	Q	.	.	.	V .
23.667	80.4676	9.39	Q	.	.	.	V .
23.750	80.5318	9.32	Q	.	.	.	V .
23.833	80.5956	9.26	Q	.	.	.	V .
23.917	80.6590	9.20	Q	.	.	.	V .
24.000	80.7219	9.14	Q	.	.	.	V .
24.083	80.7839	9.00	Q	.	.	.	V .
24.167	80.8437	8.68	Q	.	.	.	V .
24.250	80.8996	8.11	Q	.	.	.	V .
24.333	80.9474	6.95	Q	.	.	.	V .
24.417	80.9854	5.52	Q	.	.	.	V .
24.500	81.0165	4.51	Q	.	.	.	V .
24.583	81.0428	3.83	Q	.	.	.	V .
24.667	81.0658	3.34	Q	.	.	.	V .
24.750	81.0861	2.94	Q	.	.	.	V .
24.833	81.1041	2.62	Q	.	.	.	V .
24.917	81.1203	2.36	Q	.	.	.	V .
25.000	81.1351	2.14	Q	.	.	.	V .
25.083	81.1485	1.95	Q	.	.	.	V .
25.167	81.1607	1.78	Q	.	.	.	V .
25.250	81.1720	1.63	Q	.	.	.	V .
25.333	81.1823	1.50	Q	.	.	.	V .
25.417	81.1919	1.39	Q	.	.	.	V .
25.500	81.2008	1.30	Q	.	.	.	V .
25.583	81.2092	1.21	Q	.	.	.	V .
25.667	81.2170	1.13	Q	.	.	.	V .
25.750	81.2243	1.06	Q	.	.	.	V .
25.833	81.2311	1.00	Q	.	.	.	V .
25.917	81.2376	0.94	Q	.	.	.	V .
26.000	81.2437	0.89	Q	.	.	.	V .
26.083	81.2495	0.84	Q	.	.	.	V .

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TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	275.0	550.0	825.0	1100.0
26.167	81.2550	0.80	Q	.	.	.	V .
26.250	81.2603	0.77	Q	.	.	.	V .
26.333	81.2654	0.74	Q	.	.	.	V .
26.417	81.2703	0.71	Q	.	.	.	V .
26.500	81.2750	0.69	Q	.	.	.	V .
26.583	81.2797	0.67	Q	.	.	.	V .
26.667	81.2842	0.65	Q	.	.	.	V .
26.750	81.2885	0.63	Q	.	.	.	V .
26.833	81.2927	0.61	Q	.	.	.	V .

26.917	81.2968	0.59	Q	.	.	.	V	.
27.000	81.3008	0.57	Q	.	.	.	V	.
27.083	81.3046	0.55	Q	.	.	.	V	.
27.167	81.3082	0.53	Q	.	.	.	V	.
27.250	81.3118	0.52	Q	.	.	.	V	.
27.333	81.3154	0.52	Q	.	.	.	V	.
27.417	81.3190	0.52	Q	.	.	.	V	.
27.500	81.3225	0.52	Q	.	.	.	V	.
27.583	81.3261	0.52	Q	.	.	.	V	.
27.667	81.3297	0.52	Q	.	.	.	V	.
27.750	81.3332	0.52	Q	.	.	.	V	.
27.833	81.3367	0.51	Q	.	.	.	V	.
27.917	81.3403	0.51	Q	.	.	.	V	.
28.000	81.3438	0.51	Q	.	.	.	V	.
28.083	81.3473	0.51	Q	.	.	.	V	.
28.167	81.3509	0.51	Q	.	.	.	V	.
28.250	81.3544	0.51	Q	.	.	.	V	.
28.333	81.3579	0.51	Q	.	.	.	V	.
28.417	81.3614	0.51	Q	.	.	.	V	.
28.500	81.3649	0.51	Q	.	.	.	V	.
28.583	81.3684	0.51	Q	.	.	.	V	.
28.667	81.3719	0.51	Q	.	.	.	V	.
28.750	81.3754	0.51	Q	.	.	.	V	.
28.833	81.3789	0.51	Q	.	.	.	V	.
28.917	81.3824	0.51	Q	.	.	.	V	.
29.000	81.3858	0.50	Q	.	.	.	V	.
29.083	81.3893	0.50	Q	.	.	.	V	.
29.167	81.3928	0.50	Q	.	.	.	V	.
29.250	81.3962	0.50	Q	.	.	.	V	.
29.333	81.3997	0.50	Q	.	.	.	V	.
29.417	81.4032	0.50	Q	.	.	.	V	.
29.500	81.4066	0.50	Q	.	.	.	V	.
29.583	81.4100	0.50	Q	.	.	.	V	.
29.667	81.4135	0.50	Q	.	.	.	V	.
29.750	81.4169	0.50	Q	.	.	.	V	.
29.833	81.4204	0.50	Q	.	.	.	V	.
29.917	81.4238	0.50	Q	.	.	.	V	.
30.000	81.4272	0.50	Q	.	.	.	V	.
30.083	81.4306	0.50	Q	.	.	.	V	.
30.167	81.4341	0.50	Q	.	.	.	V	.
30.250	81.4375	0.50	Q	.	.	.	V	.

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TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	275.0	550.0	825.0	1100.0
30.333	81.4409	0.50	Q	.	.	.	V .
30.417	81.4443	0.50	Q	.	.	.	V .
30.500	81.4477	0.50	Q	.	.	.	V .
30.583	81.4511	0.49	Q	.	.	.	V .
30.667	81.4545	0.49	Q	.	.	.	V .

30.750	81.4579	0.49	Q	.	.	.	V .
30.833	81.4613	0.49	Q	.	.	.	V .
30.917	81.4647	0.49	Q	.	.	.	V .
31.000	81.4681	0.49	Q	.	.	.	V .
31.083	81.4715	0.49	Q	.	.	.	V .
31.167	81.4749	0.49	Q	.	.	.	V .
31.250	81.4783	0.49	Q	.	.	.	V .
31.333	81.4817	0.49	Q	.	.	.	V .
31.417	81.4850	0.49	Q	.	.	.	V .
31.500	81.4884	0.49	Q	.	.	.	V .
31.583	81.4918	0.49	Q	.	.	.	V .
31.667	81.4951	0.49	Q	.	.	.	V .
31.750	81.4985	0.49	Q	.	.	.	V .
31.833	81.5019	0.49	Q	.	.	.	V .
31.917	81.5052	0.49	Q	.	.	.	V .
32.000	81.5086	0.49	Q	.	.	.	V .
32.083	81.5119	0.49	Q	.	.	.	V .
32.167	81.5153	0.49	Q	.	.	.	V .
32.250	81.5186	0.49	Q	.	.	.	V .
32.333	81.5219	0.49	Q	.	.	.	V .
32.417	81.5253	0.48	Q	.	.	.	V .
32.500	81.5286	0.48	Q	.	.	.	V .
32.583	81.5320	0.48	Q	.	.	.	V .
32.667	81.5353	0.48	Q	.	.	.	V .
32.750	81.5386	0.48	Q	.	.	.	V .
32.833	81.5419	0.48	Q	.	.	.	V .
32.917	81.5452	0.48	Q	.	.	.	V .
33.000	81.5486	0.48	Q	.	.	.	V .
33.083	81.5519	0.48	Q	.	.	.	V .
33.167	81.5552	0.48	Q	.	.	.	V .
33.250	81.5585	0.48	Q	.	.	.	V .
33.333	81.5618	0.48	Q	.	.	.	V .
33.417	81.5651	0.48	Q	.	.	.	V .
33.500	81.5684	0.48	Q	.	.	.	V .
33.583	81.5717	0.48	Q	.	.	.	V .
33.667	81.5750	0.48	Q	.	.	.	V .
33.750	81.5783	0.48	Q	.	.	.	V .
33.833	81.5816	0.48	Q	.	.	.	V .
33.917	81.5848	0.48	Q	.	.	.	V .
34.000	81.5881	0.48	Q	.	.	.	V .
34.083	81.5914	0.48	Q	.	.	.	V .
34.167	81.5947	0.48	Q	.	.	.	V .
34.250	81.5979	0.47	Q	.	.	.	V .
34.333	81.6012	0.47	Q	.	.	.	V .
34.417	81.6045	0.47	Q	.	.	.	V .

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TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	275.0	550.0	825.0	1100.0
34.500	81.6077	0.47	Q	.	.	.	V .

34.583	81.6110	0.47	Q	.	.	.	V .
34.667	81.6142	0.47	Q	.	.	.	V .
34.750	81.6175	0.47	Q	.	.	.	V .
34.833	81.6207	0.47	Q	.	.	.	V .
34.917	81.6240	0.47	Q	.	.	.	V .
35.000	81.6272	0.47	Q	.	.	.	V .
35.083	81.6305	0.47	Q	.	.	.	V .
35.167	81.6337	0.47	Q	.	.	.	V .
35.250	81.6369	0.47	Q	.	.	.	V.
35.333	81.6402	0.47	Q	.	.	.	V.
35.417	81.6434	0.47	Q	.	.	.	V.
35.500	81.6466	0.47	Q	.	.	.	V.
35.583	81.6498	0.47	Q	.	.	.	V.
35.667	81.6531	0.47	Q	.	.	.	V.
35.750	81.6563	0.47	Q	.	.	.	V.
35.833	81.6595	0.47	Q	.	.	.	V.
35.917	81.6627	0.47	Q	.	.	.	V.
36.000	81.6659	0.47	Q	.	.	.	V.

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

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	2165.0
10%	95.0
20%	60.0
30%	40.0
40%	35.0
50%	25.0
60%	20.0
70%	15.0
80%	10.0
90%	10.0

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END OF FLOODSCx ROUTING ANALYSIS

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




 ************************* DESCRIPTION OF STUDY *************************
* APPLE VALLEY 143 ACRES - PROPOSED CONDITION                           *
* LINKED UH - MITIGATED 100-YEAR                                        *
* Q3 09/24/2022                                                         *
 *************************************************************************

  FILE NAME: AV_P00.DAT
  TIME/DATE OF STUDY: 18:05 09/24/2022
♠

**************************************************************************
  FLOW PROCESS FROM NODE   1000.00 TO NODE   1025.00 IS CODE =   1
--------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
==========================================================================

      (UNIT-HYDROGRAPH ADDED TO STREAM #1)

         WATERSHED AREA =     484.300 ACRES
         BASEFLOW =   0.000 CFS/SQUARE-MILE
         *USER ENTERED "LAG" TIME =    0.393 HOURS
          CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
          THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
          MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
         DESERT(UNDEVELOPED) S-GRAPH SELECTED
         MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) =  0.291
         LOW LOSS FRACTION = 0.871
         *HYDROGRAPH MODEL #1 SPECIFIED*

         SPECIFIED PEAK  5-MINUTES RAINFALL(INCH)=  0.37
         SPECIFIED PEAK 30-MINUTES RAINFALL(INCH)=  0.88
         SPECIFIED PEAK  1-HOUR RAINFALL(INCH) =  1.08
         SPECIFIED PEAK  3-HOUR RAINFALL(INCH) =  1.58
         SPECIFIED PEAK  6-HOUR RAINFALL(INCH) =  2.06
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SPECIFIED PEAK 24-HOUR RAINFALL(INCH) = 3.52

PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
5-MINUTE FACTOR = 0.978
30-MINUTE FACTOR = 0.978
1-HOUR FACTOR = 0.978
3-HOUR FACTOR = 0.997
6-HOUR FACTOR = 0.998
24-HOUR FACTOR = 0.999

UNIT HYDROGRAPH TIME UNIT = 5.000 MINUTES
UNIT INTERVAL PERCENTAGE OF LAG-TIME = 21.204

RUNOFF HYDROGRAPH LISTING LIMITS:
MODEL TIME(HOURS) FOR BEGINNING OF RESULTS = 14.00
MODEL TIME(HOURS) FOR END OF RESULTS = 18.00

UNIT HYDROGRAPH DETERMINATION

INTERVAL NUMBER	"S" GRAPH MEAN VALUES	UNIT HYDROGRAPH ORDINATES(CFS)
1	1.076	63.017
2	4.965	227.796
3	12.851	461.892
4	30.115	1011.119
5	46.929	984.835
6	57.941	644.931
7	65.167	423.260
8	70.619	319.278
9	74.903	250.966
10	78.419	205.916
11	81.251	165.851
12	83.630	139.365
13	85.745	123.871
14	87.601	108.682
15	89.143	90.339
16	90.401	73.662
17	91.572	68.606
18	92.608	60.639
19	93.558	55.691
20	94.359	46.865
21	95.079	42.225
22	95.749	39.220
23	96.305	32.536
24	96.841	31.409

25	97.251	24.039
26	97.632	22.324
27	97.919	16.799
28	98.131	12.408
29	98.354	13.045
30	98.606	14.782
31	98.861	14.901
32	99.115	14.922
33	99.370	14.901
34	99.624	14.901
35	99.879	14.901
36	100.000	7.109

TOTAL SOIL-LOSS VOLUME(ACRE-FEET) = 97.9794
TOTAL STORM RUNOFF VOLUME(ACRE-FEET) = 43.9210

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

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

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	175.0	350.0	525.0	700.0
14.000	6.1775	10.86	Q V	.	.	.	.
14.083	6.2538	11.07	Q V	.	.	.	.
14.167	6.3315	11.29	Q V	.	.	.	.
14.250	6.4106	11.48	Q V	.	.	.	.
14.333	6.4906	11.62	Q V	.	.	.	.
14.417	6.5718	11.78	Q V	.	.	.	.
14.500	6.6544	12.01	Q V	.	.	.	.
14.583	6.7389	12.27	Q V	.	.	.	.
14.667	6.8256	12.58	Q V	.	.	.	.
14.750	6.9145	12.92	Q V	.	.	.	.
14.833	7.0061	13.30	Q V	.	.	.	.
14.917	7.1005	13.71	Q V	.	.	.	.
15.000	7.1981	14.17	Q V	.	.	.	.
15.083	7.2992	14.68	Q V	.	.	.	.
15.167	7.4043	15.25	Q V	.	.	.	.
15.250	7.5138	15.91	Q V	.	.	.	.
15.333	7.6296	16.81	Q V	.	.	.	.
15.417	7.7531	17.94	.Q V	.	.	.	.
15.500	7.8866	19.38	.Q V	.	.	.	.
15.583	8.0337	21.37	.Q V	.	.	.	.

15.667	8.1926	23.07	.Q V . . . .
15.750	8.3887	28.48	.Q V . . . .
15.833	8.6898	43.71	. Q V . . . .
15.917	9.1850	71.90	. Q V . . . .
16.000	10.0573	126.66	. Q V. . . .
16.083	11.4988	209.30	. VQ . . .
16.167	13.7153	321.84	. . V Q . . .
16.250	16.7803	445.04	. . V . Q . .
16.333	20.9145	600.28	. . V. . Q .
16.417	24.7943	563.35	. . . V . Q .
16.500	27.6499	414.64	. . . Q V . .
16.583	29.7038	298.23	. . Q . V . .
16.667	31.2984	231.54	. Q . V . .
16.750	32.5866	187.04	. Q . V. .
16.833	33.6564	155.33	. Q . . V .
16.917	34.5526	130.13	. Q . . .V .
17.000	35.3229	111.86	. Q . . . V .
17.083	36.0034	98.81	. Q . . . V .
17.167	36.6035	87.13	. Q . . . V .
17.250	37.1254	75.78	. Q . . . V .
17.333	37.5808	66.13	. Q . . . V .
17.417	37.9971	60.45	. Q . . . V .
17.500	38.3749	54.85	. Q . . . V .
17.583	38.7198	50.08	. Q . . . V .
17.667	39.0288	44.87	. Q . . . V .
17.750	39.3102	40.86	. Q . . . V .

TIME(HRS)	VOLUME(AF)	Q(CFS)	0. 175.0 350.0 525.0 700.0
17.833	39.5689	37.57	. Q . . . V .
17.917	39.7998	33.52	.Q . . . V .
18.000	40.0118	30.79	.Q . . . V .

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

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1085.0
10%	95.0
20%	60.0
30%	45.0
40%	30.0
50%	25.0
60%	20.0
70%	15.0
80%	10.0

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            90%                              10.0
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****************************************************************************
  FLOW PROCESS FROM NODE   3005.00 TO NODE   1025.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
============================================================================

      (UNIT-HYDROGRAPH ADDED TO STREAM #2)

         WATERSHED AREA =    1323.200 ACRES
         BASEFLOW =   0.000 CFS/SQUARE-MILE
         *USER ENTERED "LAG" TIME =    0.393 HOURS
          CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
          THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
          MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
         DESERT(UNDEVELOPED) S-GRAPH SELECTED
         MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) =  0.292
         LOW LOSS FRACTION = 0.760
         *HYDROGRAPH MODEL #1 SPECIFIED*

         SPECIFIED PEAK  5-MINUTES RAINFALL(INCH)=  0.37
         SPECIFIED PEAK 30-MINUTES RAINFALL(INCH)=  0.88
         SPECIFIED PEAK  1-HOUR RAINFALL(INCH) =  1.08
         SPECIFIED PEAK  3-HOUR RAINFALL(INCH) =  1.58
         SPECIFIED PEAK  6-HOUR RAINFALL(INCH) =  2.06
         SPECIFIED PEAK 24-HOUR RAINFALL(INCH) =  3.52

         PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
           5-MINUTE FACTOR = 0.941
          30-MINUTE FACTOR = 0.941
           1-HOUR FACTOR = 0.941
           3-HOUR FACTOR = 0.991
           6-HOUR FACTOR = 0.996
          24-HOUR FACTOR = 0.997

         UNIT HYDROGRAPH TIME UNIT =   5.000 MINUTES
         UNIT INTERVAL PERCENTAGE OF LAG-TIME =  21.204


         RUNOFF HYDROGRAPH LISTING LIMITS:
         MODEL TIME(HOURS) FOR BEGINNING OF RESULTS =  14.00
         MODEL TIME(HOURS) FOR END OF RESULTS =  18.00


============================================================================
                      UNIT HYDROGRAPH DETERMINATION
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INTERVAL NUMBER	"S" GRAPH MEAN VALUES	UNIT HYDROGRAPH ORDINATES(CFS)
1	1.076	172.174
2	4.965	622.383
3	12.851	1261.976
4	30.115	2762.569
5	46.929	2690.757
6	57.941	1762.075
7	65.167	1156.428
8	70.619	872.330
9	74.903	685.686
10	78.419	562.602
11	81.251	453.137
12	83.630	380.772
13	85.745	338.439
14	87.601	296.940
15	89.143	246.824
16	90.401	201.258
17	91.572	187.444
18	92.608	165.676
19	93.558	152.158
20	94.359	128.044
21	95.079	115.368
22	95.749	107.158
23	96.305	88.895
24	96.841	85.815
25	97.251	65.680
26	97.632	60.993
27	97.919	45.899
28	98.131	33.902
29	98.354	35.640
30	98.606	40.387
31	98.861	40.712
32	99.115	40.769
33	99.370	40.712
34	99.624	40.712
35	99.879	40.712
36	100.000	19.423

TOTAL SOIL-LOSS VOLUME(ACRE-FEET) = 240.0767
TOTAL STORM RUNOFF VOLUME(ACRE-FEET) = 146.9543

2 4 - H O U R S T O R M

R U N O F F H Y D R O G R A P H

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

TIME(HRS)	VOLUME(AF)	Q(CFS)	0. 400.0 800.0 1200.0 1600.0
14.000	31.4379	55.52	.Q V . . . .
14.083	31.8281	56.66	.Q V . . . .
14.167	32.2269	57.91	.Q V . . . .
14.250	32.6348	59.23	.Q V . . . .
14.333	33.0531	60.74	.Q V . . . .
14.417	33.4822	62.30	.Q V. . . .
14.500	33.9226	63.94	.Q V. . . .
14.583	34.3746	65.64	.Q V. . . .
14.667	34.8394	67.48	.Q V. . . .
14.750	35.3174	69.41	.Q V. . . .
14.833	35.8101	71.54	.Q V. . . .
14.917	36.3183	73.79	.Q V. . . .
15.000	36.8437	76.29	.Q V . . .
15.083	37.3877	78.98	.Q V . . .
15.167	37.9525	82.01	. Q V . . .
15.250	38.5401	85.31	. Q V . . .
15.333	39.1536	89.08	. Q V . . .
15.417	39.7935	92.92	. Q V . . .
15.500	40.4584	96.55	. Q .V . . .
15.583	41.1437	99.51	. Q .V . . .
15.667	41.8385	100.89	. Q .V . . .
15.750	42.5959	109.96	. Q .V . . .
15.833	43.5586	139.79	. Q .V . . .
15.917	44.9638	204.04	. Q . V . . .
16.000	47.3154	341.45	. Q . V . . .
16.083	51.1330	554.31	. . Q . . .
16.167	56.9650	846.81	. . V .Q . .
16.250	65.0092	1168.02	. . V . Q. .
16.333	75.8507	1574.18	. . V . Q.
16.417	86.0212	1476.77	. . . V . Q .
16.500	93.5127	1087.76	. . . V Q . .
16.583	98.9391	787.91	. . Q. V . .
16.667	103.2136	620.66	. . Q . V . .
16.750	106.7444	512.67	. Q . V. .
16.833	109.7454	435.74	. Q . V. .
16.917	112.3118	372.64	. Q. . V .
17.000	114.5565	325.93	. Q . . .V .
17.083	116.5681	292.08	. Q . . .V .
17.167	118.3677	261.30	. Q . . . V .
17.250	119.9587	231.01	. Q . . . V .
17.333	121.3688	204.75	. Q . . . V .
17.417	122.6698	188.90	. Q . . . V .

```
  17.500    123.8638    173.37  .   Q     .         .         .  V      .
  17.583    124.9662    160.07  .   Q     .         .         .   V     .
  17.667    125.9692    145.64  .  Q      .         .         .   V     .
  17.750    126.8948    134.40  .  Q      .         .         .   V     .
```



```
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.      400.0     800.0    1200.0    1600.0
  17.833    127.7566    125.13  .  Q      .         .         .   V     .
  17.917    128.5406    113.84  . Q       .         .         .   V     .
  18.000    129.2708    106.02  . Q       .         .         .    V    .
```

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

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1085.0
10%	105.0
20%	65.0
30%	45.0
40%	30.0
50%	30.0
60%	20.0
70%	15.0
80%	10.0
90%	10.0



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 ****************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1025.00 IS CODE =   7
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  >>>>>STREAM NUMBER 2 ADDED TO STREAM NUMBER 1<<<<<
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 ****************************************************************************
  FLOW PROCESS FROM NODE   8000.00 TO NODE   3013.00 IS CODE =   1
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  >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
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      (UNIT-HYDROGRAPH ADDED TO STREAM #3)

         WATERSHED AREA =      78.200 ACRES
         BASEFLOW =   0.000 CFS/SQUARE-MILE
```

*USER ENTERED "LAG" TIME =   0.232 HOURS
 CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
 THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
 MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
DESERT(UNDEVELOPED) S-GRAPH SELECTED
MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) = 0.030
LOW LOSS FRACTION = 0.154
HYDROGRAPH MODEL #1 SPECIFIED

SPECIFIED PEAK 5-MINUTES RAINFALL(INCH)= 0.37
SPECIFIED PEAK 30-MINUTES RAINFALL(INCH)= 0.88
SPECIFIED PEAK 1-HOUR RAINFALL(INCH) = 1.08
SPECIFIED PEAK 3-HOUR RAINFALL(INCH) = 1.58
SPECIFIED PEAK 6-HOUR RAINFALL(INCH) = 2.06
SPECIFIED PEAK 24-HOUR RAINFALL(INCH) = 3.52

PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
  5-MINUTE FACTOR = 0.997
 30-MINUTE FACTOR = 0.997
  1-HOUR FACTOR = 0.997
  3-HOUR FACTOR = 0.999
  6-HOUR FACTOR = 1.000
 24-HOUR FACTOR = 1.000

UNIT HYDROGRAPH TIME UNIT =   5.000 MINUTES
UNIT INTERVAL PERCENTAGE OF LAG-TIME = 35.920

RUNOFF HYDROGRAPH LISTING LIMITS:
MODEL TIME(HOURS) FOR BEGINNING OF RESULTS = 14.00
MODEL TIME(HOURS) FOR END OF RESULTS = 18.00

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UNIT HYDROGRAPH DETERMINATION

INTERVAL NUMBER	"S" GRAPH MEAN VALUES	UNIT HYDROGRAPH ORDINATES(CFS)
1	2.324	21.979
2	14.291	113.175
3	42.610	267.821
4	61.158	175.416
5	71.110	94.117
6	77.762	62.911
7	82.485	44.668
8	86.128	34.452
9	88.975	26.920
10	91.100	20.098

11	92.881	16.846
12	94.341	13.811
13	95.534	11.278
14	96.507	9.202
15	97.275	7.265
16	97.854	5.472
17	98.230	3.560
18	98.643	3.907
19	99.074	4.077
20	99.487	3.907
21	99.900	3.907
22	100.000	0.941

TOTAL SOIL-LOSS VOLUME(ACRE-FEET) = 2.5316

TOTAL STORM RUNOFF VOLUME(ACRE-FEET) = 20.3929

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

==========

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

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	50.0	100.0	150.0	200.0
14.000	6.7555	12.05	. Q	. V	.	.	.
14.083	6.8402	12.30	. Q	. V	.	.	.
14.167	6.9259	12.44	. Q	. V	.	.	.
14.250	7.0114	12.41	. Q	. V	.	.	.
14.333	7.0975	12.50	. Q	. V	.	.	.
14.417	7.1852	12.74	. Q	. V	.	.	.
14.500	7.2751	13.05	. Q	. V	.	.	.
14.583	7.3676	13.44	. Q	. V	.	.	.
14.667	7.4631	13.87	. Q	. V	.	.	.
14.750	7.5621	14.37	. Q	. V	.	.	.
14.833	7.6648	14.91	. Q	. V	.	.	.
14.917	7.7719	15.55	. Q	. V	.	.	.
15.000	7.8836	16.22	. Q	. V	.	.	.
15.083	8.0007	17.01	. Q	. V	.	.	.
15.167	8.1237	17.86	. Q	. V	.	.	.
15.250	8.2537	18.87	. Q	. V	.	.	.
15.333	8.3912	19.97	. Q	. V	.	.	.
15.417	8.5372	21.21	. Q	. V	.	.	.
15.500	8.6898	22.15	. Q	. V	.	.	.
15.583	8.8461	22.70	. Q	. V	.	.	.

15.667	9.0110	23.95	. Q . V . . .
15.750	9.1959	26.84	. Q . V . . .
15.833	9.4239	33.10	. Q . V . . .
15.917	9.7379	45.59	. Q. V. . .
16.000	10.1443	59.02	. .Q V. . .
16.083	10.7044	81.32	. . Q V . .
16.167	11.5235	118.94	. . . VQ . .
16.250	12.6131	158.20	. . . V .Q .
16.333	13.4665	123.91	. . . Q V . .
16.417	14.0596	86.12	. . Q . V . .
16.500	14.5133	65.88	. . Q . V . .
16.583	14.8854	54.02	. Q . V. .
16.667	15.2013	45.87	. Q. . V. .
16.750	15.4726	39.39	. Q . . V .
16.833	15.7064	33.94	. Q . . V .
16.917	15.9131	30.01	. Q . . .V .
17.000	16.0966	26.65	. Q . . .V .
17.083	16.2603	23.76	. Q . . .V .
17.167	16.4080	21.45	. Q . . . V .
17.250	16.5435	19.68	. Q . . . V .
17.333	16.6680	18.07	. Q . . . V .
17.417	16.7826	16.64	. Q . . . V .
17.500	16.8920	15.88	. Q . . . V .
17.583	16.9963	15.15	. Q . . . V .
17.667	17.0947	14.29	. Q . . . V .
17.750	17.1868	13.38	. Q . . . V .
17.833	17.2681	11.81	. Q . . . V .
17.917	17.3431	10.89	. Q . . . V .
18.000	17.4150	10.43	. Q . . . V .

TIME(HRS)	VOLUME(AF)	Q(CFS)	0. 50.0 100.0 150.0 200.0

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

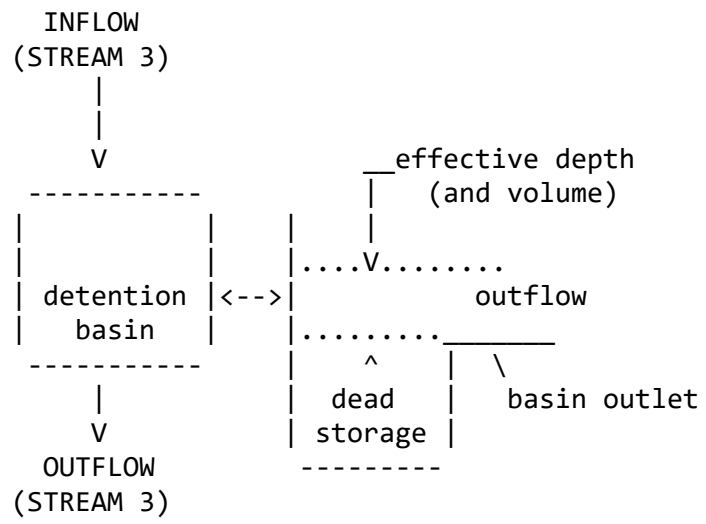
Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1085.0
10%	155.0
20%	65.0
30%	40.0
40%	30.0
50%	25.0
60%	15.0
70%	15.0
80%	5.0

90% 5.0

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FLOW PROCESS FROM NODE 3013.00 TO NODE 3013.00 IS CODE = 3.3

>>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #3<<<<<
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ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 3
THROUGH A FLOW-THROUGH DETENTION BASIN
SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
DEAD STORAGE(AF) = 0.000
SPECIFIED DEAD STORAGE(AF) FILLED = 0.000
SPECIFIED EFFECTIVE VOLUME(AF) FILLED ABOVE OUTLET = 0.000
DETENTION BASIN CONSTANT LOSS RATE(CFS) = 8.94

BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

INTERVAL NUMBER	DEPTH (FT)	OUTFLOW (CFS)	STORAGE (AF)
1	0.00	0.00	0.000
2	1.00	0.00	1.320
3	4.00	0.00	5.270
4	5.20	0.00	6.890
5	6.20	168.00	7.900

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FINITE DIFFERENCE ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
14.017	0.000	12.30	8.94	0.14	0.0	0.181
14.033	0.000	12.30	8.94	0.14	0.0	0.186
14.050	0.000	12.30	8.94	0.14	0.0	0.191
14.067	0.000	12.30	8.94	0.15	0.0	0.195
14.083	0.000	12.30	8.94	0.15	0.0	0.200
14.100	0.000	12.44	8.94	0.16	0.0	0.205
14.117	0.000	12.44	8.94	0.16	0.0	0.210
14.133	0.000	12.44	8.94	0.16	0.0	0.214
14.150	0.000	12.44	8.94	0.17	0.0	0.219
14.167	0.000	12.44	8.94	0.17	0.0	0.224
14.183	0.000	12.41	8.94	0.17	0.0	0.229
14.200	0.000	12.41	8.94	0.18	0.0	0.234
14.217	0.000	12.41	8.94	0.18	0.0	0.238
14.233	0.000	12.41	8.94	0.18	0.0	0.243
14.250	0.000	12.41	8.94	0.19	0.0	0.248
14.267	0.000	12.50	8.94	0.19	0.0	0.253
14.283	0.000	12.50	8.94	0.20	0.0	0.258
14.300	0.000	12.50	8.94	0.20	0.0	0.263
14.317	0.000	12.50	8.94	0.20	0.0	0.268
14.333	0.000	12.50	8.94	0.21	0.0	0.272
14.350	0.000	12.74	8.94	0.21	0.0	0.278
14.367	0.000	12.74	8.94	0.21	0.0	0.283
14.383	0.000	12.74	8.94	0.22	0.0	0.288
14.400	0.000	12.74	8.94	0.22	0.0	0.293
14.417	0.000	12.74	8.94	0.23	0.0	0.299
14.433	0.000	13.05	8.94	0.23	0.0	0.304
14.450	0.000	13.05	8.94	0.23	0.0	0.310
14.467	0.000	13.05	8.94	0.24	0.0	0.316
14.483	0.000	13.05	8.94	0.24	0.0	0.321
14.500	0.000	13.05	8.94	0.25	0.0	0.327
14.517	0.000	13.44	8.94	0.25	0.0	0.333
14.533	0.000	13.44	8.94	0.26	0.0	0.339
14.550	0.000	13.44	8.94	0.26	0.0	0.346
14.567	0.000	13.44	8.94	0.27	0.0	0.352
14.583	0.000	13.44	8.94	0.27	0.0	0.358
14.600	0.000	13.87	8.94	0.28	0.0	0.365
14.617	0.000	13.87	8.94	0.28	0.0	0.372
14.633	0.000	13.87	8.94	0.29	0.0	0.378
14.650	0.000	13.87	8.94	0.29	0.0	0.385
14.667	0.000	13.87	8.94	0.30	0.0	0.392
14.683	0.000	14.37	8.94	0.30	0.0	0.399
14.700	0.000	14.37	8.94	0.31	0.0	0.407

14.717	0.000	14.37	8.94	0.31	0.0	0.414
14.733	0.000	14.37	8.94	0.32	0.0	0.422
14.750	0.000	14.37	8.94	0.33	0.0	0.429
14.767	0.000	14.91	8.94	0.33	0.0	0.438
14.783	0.000	14.91	8.94	0.34	0.0	0.446
14.800	0.000	14.91	8.94	0.34	0.0	0.454
14.817	0.000	14.91	8.94	0.35	0.0	0.462
14.833	0.000	14.91	8.94	0.36	0.0	0.470

FINITE DIFFERENCE ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
14.850	0.000	15.55	8.94	0.36	0.0	0.480
14.867	0.000	15.55	8.94	0.37	0.0	0.489
14.883	0.000	15.55	8.94	0.38	0.0	0.498
14.900	0.000	15.55	8.94	0.38	0.0	0.507
14.917	0.000	15.55	8.94	0.39	0.0	0.516
14.933	0.000	16.22	8.94	0.40	0.0	0.526
14.950	0.000	16.22	8.94	0.41	0.0	0.536
14.967	0.000	16.22	8.94	0.41	0.0	0.546
14.983	0.000	16.22	8.94	0.42	0.0	0.556
15.000	0.000	16.22	8.94	0.43	0.0	0.566
15.017	0.000	17.01	8.94	0.44	0.0	0.577
15.033	0.000	17.01	8.94	0.45	0.0	0.588
15.050	0.000	17.01	8.94	0.45	0.0	0.599
15.067	0.000	17.01	8.94	0.46	0.0	0.611
15.083	0.000	17.01	8.94	0.47	0.0	0.622
15.100	0.000	17.86	8.94	0.48	0.0	0.634
15.117	0.000	17.86	8.94	0.49	0.0	0.646
15.133	0.000	17.86	8.94	0.50	0.0	0.658
15.150	0.000	17.86	8.94	0.51	0.0	0.671
15.167	0.000	17.86	8.94	0.52	0.0	0.683
15.183	0.000	18.87	8.94	0.53	0.0	0.697
15.200	0.000	18.87	8.94	0.54	0.0	0.710
15.217	0.000	18.87	8.94	0.55	0.0	0.724
15.233	0.000	18.87	8.94	0.56	0.0	0.738
15.250	0.000	18.87	8.94	0.57	0.0	0.751
15.267	0.000	19.97	8.94	0.58	0.0	0.767
15.283	0.000	19.97	8.94	0.59	0.0	0.782
15.300	0.000	19.97	8.94	0.60	0.0	0.797
15.317	0.000	19.97	8.94	0.62	0.0	0.812
15.333	0.000	19.97	8.94	0.63	0.0	0.827
15.350	0.000	21.21	8.94	0.64	0.0	0.844
15.367	0.000	21.21	8.94	0.65	0.0	0.861

15.383	0.000	21.21	8.94	0.67	0.0	0.878
15.400	0.000	21.21	8.94	0.68	0.0	0.895
15.417	0.000	21.21	8.94	0.69	0.0	0.912
15.433	0.000	22.15	8.94	0.70	0.0	0.930
15.450	0.000	22.15	8.94	0.72	0.0	0.948
15.467	0.000	22.15	8.94	0.73	0.0	0.966
15.483	0.000	22.15	8.94	0.75	0.0	0.985
15.500	0.000	22.15	8.94	0.76	0.0	1.003
15.517	0.000	22.70	8.94	0.77	0.0	1.022
15.533	0.000	22.70	8.94	0.79	0.0	1.041
15.550	0.000	22.70	8.94	0.80	0.0	1.060
15.567	0.000	22.70	8.94	0.82	0.0	1.079
15.583	0.000	22.70	8.94	0.83	0.0	1.098
15.600	0.000	23.95	8.94	0.85	0.0	1.118
15.617	0.000	23.95	8.94	0.86	0.0	1.139
15.633	0.000	23.95	8.94	0.88	0.0	1.160
15.650	0.000	23.95	8.94	0.89	0.0	1.180
15.667	0.000	23.95	8.94	0.91	0.0	1.201



FINITE DIFFERENCE ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
15.683	0.000	26.84	8.94	0.93	0.0	1.226
15.700	0.000	26.84	8.94	0.95	0.0	1.250
15.717	0.000	26.84	8.94	0.97	0.0	1.275
15.733	0.000	26.84	8.94	0.98	0.0	1.300
15.750	0.000	26.84	8.94	1.00	0.0	1.324
15.767	0.000	33.10	8.94	1.03	0.0	1.358
15.783	0.000	33.10	8.94	1.05	0.0	1.391
15.800	0.000	33.10	8.94	1.08	0.0	1.424
15.817	0.000	33.10	8.94	1.10	0.0	1.457
15.833	0.000	33.10	8.94	1.13	0.0	1.491
15.850	0.000	45.59	8.94	1.17	0.0	1.541
15.867	0.000	45.59	8.94	1.21	0.0	1.592
15.883	0.000	45.59	8.94	1.24	0.0	1.642
15.900	0.000	45.59	8.94	1.28	0.0	1.693
15.917	0.000	45.59	8.94	1.32	0.0	1.743
15.933	0.000	59.02	8.94	1.37	0.0	1.812
15.950	0.000	59.02	8.94	1.43	0.0	1.881
15.967	0.000	59.02	8.94	1.48	0.0	1.950
15.983	0.000	59.02	8.94	1.53	0.0	2.019
16.000	0.000	59.02	8.94	1.58	0.0	2.088
16.017	0.000	81.32	8.94	1.66	0.0	2.188
16.033	0.000	81.32	8.94	1.73	0.0	2.287

16.050	0.000	81.32	8.94	1.81	0.0	2.387
16.067	0.000	81.32	8.94	1.89	0.0	2.487
16.083	0.000	81.32	8.94	1.96	0.0	2.586
16.100	0.000	118.94	8.94	2.08	0.0	2.738
16.117	0.000	118.94	8.94	2.19	0.0	2.889
16.133	0.000	118.94	8.94	2.31	0.0	3.041
16.150	0.000	118.94	8.94	2.42	0.0	3.193
16.167	0.000	118.94	8.94	2.54	0.0	3.344
16.183	0.000	158.20	8.94	2.69	0.0	3.550
16.200	0.000	158.20	8.94	2.85	0.0	3.755
16.217	0.000	158.20	8.94	3.01	0.0	3.961
16.233	0.000	158.20	8.94	3.16	0.0	4.166
16.250	0.000	158.20	8.94	3.32	0.0	4.372
16.267	0.000	123.91	8.94	3.44	0.0	4.530
16.283	0.000	123.91	8.94	3.56	0.0	4.689
16.300	0.000	123.91	8.94	3.68	0.0	4.847
16.317	0.000	123.91	8.94	3.80	0.0	5.005
16.333	0.000	123.91	8.94	3.92	0.0	5.164
16.350	0.000	86.12	8.94	4.00	0.0	5.270
16.367	0.000	86.12	8.94	4.08	0.0	5.376
16.383	0.000	86.12	8.94	4.16	0.0	5.483
16.400	0.000	86.12	8.94	4.24	0.0	5.589
16.417	0.000	86.12	8.94	4.32	0.0	5.695
16.433	0.000	65.88	8.94	4.37	0.0	5.774
16.450	0.000	65.88	8.94	4.43	0.0	5.852
16.467	0.000	65.88	8.94	4.49	0.0	5.931
16.483	0.000	65.88	8.94	4.55	0.0	6.009
16.500	0.000	65.88	8.94	4.61	0.0	6.088



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FINITE DIFFERENCE ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
16.517	0.000	54.02	8.94	4.65	0.0	6.150
16.533	0.000	54.02	8.94	4.70	0.0	6.212
16.550	0.000	54.02	8.94	4.74	0.0	6.274
16.567	0.000	54.02	8.94	4.79	0.0	6.336
16.583	0.000	54.02	8.94	4.84	0.0	6.398
16.600	0.000	45.87	8.94	4.87	0.0	6.449
16.617	0.000	45.87	8.94	4.91	0.0	6.500
16.633	0.000	45.87	8.94	4.95	0.0	6.551
16.650	0.000	45.87	8.94	4.99	0.0	6.602
16.667	0.000	45.87	8.94	5.02	0.0	6.652
16.683	0.000	39.39	8.94	5.06	0.0	6.694
16.700	0.000	39.39	8.94	5.09	0.0	6.736

16.717	0.000	39.39	8.94	5.12	0.0	6.778
16.733	0.000	39.39	8.94	5.15	0.0	6.820
16.750	0.000	39.39	8.94	5.18	0.0	6.862
16.767	0.000	33.94	8.94	5.21	0.5	6.896
16.783	0.000	33.94	8.94	5.24	3.4	6.926
16.800	0.000	33.94	8.94	5.26	7.9	6.949
16.817	0.000	33.94	8.94	5.28	11.4	6.968
16.833	0.000	33.94	8.94	5.29	14.2	6.983
16.850	0.000	30.01	8.94	5.30	16.0	6.990
16.867	0.000	30.01	8.94	5.30	17.1	6.995
16.883	0.000	30.01	8.94	5.31	17.9	7.000
16.900	0.000	30.01	8.94	5.31	18.5	7.003
16.917	0.000	30.01	8.94	5.31	19.1	7.006
16.933	0.000	26.65	8.94	5.31	19.1	7.004
16.950	0.000	26.65	8.94	5.31	18.8	7.002
16.967	0.000	26.65	8.94	5.31	18.6	7.001
16.983	0.000	26.65	8.94	5.31	18.4	7.000
17.000	0.000	26.65	8.94	5.31	18.3	7.000
17.017	0.000	23.76	8.94	5.30	17.9	6.995
17.033	0.000	23.76	8.94	5.30	17.2	6.992
17.050	0.000	23.76	8.94	5.30	16.7	6.989
17.067	0.000	23.76	8.94	5.30	16.4	6.987
17.083	0.000	23.76	8.94	5.29	16.0	6.986
17.100	0.000	21.45	8.94	5.29	15.6	6.981
17.117	0.000	21.45	8.94	5.29	14.9	6.978
17.133	0.000	21.45	8.94	5.28	14.4	6.975
17.150	0.000	21.45	8.94	5.28	14.0	6.973
17.167	0.000	21.45	8.94	5.28	13.7	6.972
17.183	0.000	19.68	8.94	5.28	13.3	6.968
17.200	0.000	19.68	8.94	5.27	12.8	6.965
17.217	0.000	19.68	8.94	5.27	12.4	6.963
17.233	0.000	19.68	8.94	5.27	12.0	6.961
17.250	0.000	19.68	8.94	5.27	11.8	6.960
17.267	0.000	18.07	8.94	5.27	11.4	6.957
17.283	0.000	18.07	8.94	5.26	10.9	6.954
17.300	0.000	18.07	8.94	5.26	10.6	6.952
17.317	0.000	18.07	8.94	5.26	10.3	6.951
17.333	0.000	18.07	8.94	5.26	10.0	6.950



FINITE DIFFERENCE ROUTING MODEL RESULTS(1-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
17.350	0.000	16.64	8.94	5.26	9.7	6.947
17.367	0.000	16.64	8.94	5.25	9.3	6.945

17.383	0.000	16.64	8.94	5.25	9.0	6.943
17.400	0.000	16.64	8.94	5.25	8.7	6.942
17.417	0.000	16.64	8.94	5.25	8.5	6.941
17.433	0.000	15.88	8.94	5.25	8.3	6.939
17.450	0.000	15.88	8.94	5.25	8.0	6.937
17.467	0.000	15.88	8.94	5.25	7.8	6.936
17.483	0.000	15.88	8.94	5.24	7.6	6.935
17.500	0.000	15.88	8.94	5.24	7.5	6.935
17.517	0.000	15.15	8.94	5.24	7.3	6.933
17.533	0.000	15.15	8.94	5.24	7.1	6.932
17.550	0.000	15.15	8.94	5.24	6.9	6.931
17.567	0.000	15.15	8.94	5.24	6.7	6.930
17.583	0.000	15.15	8.94	5.24	6.6	6.930
17.600	0.000	14.29	8.94	5.24	6.5	6.928
17.617	0.000	14.29	8.94	5.24	6.2	6.927
17.633	0.000	14.29	8.94	5.24	6.0	6.926
17.650	0.000	14.29	8.94	5.23	5.9	6.925
17.667	0.000	14.29	8.94	5.23	5.8	6.925
17.683	0.000	13.38	8.94	5.23	5.6	6.923
17.700	0.000	13.38	8.94	5.23	5.4	6.922
17.717	0.000	13.38	8.94	5.23	5.2	6.921
17.733	0.000	13.38	8.94	5.23	5.0	6.920
17.750	0.000	13.38	8.94	5.23	4.9	6.919
17.767	0.000	11.81	8.94	5.23	4.6	6.917
17.783	0.000	11.81	8.94	5.22	4.3	6.915
17.800	0.000	11.81	8.94	5.22	4.0	6.913
17.817	0.000	11.81	8.94	5.22	3.8	6.912
17.833	0.000	11.81	8.94	5.22	3.6	6.911
17.850	0.000	10.89	8.94	5.22	3.3	6.909
17.867	0.000	10.89	8.94	5.22	3.1	6.908
17.883	0.000	10.89	8.94	5.22	2.8	6.906
17.900	0.000	10.89	8.94	5.22	2.6	6.905
17.917	0.000	10.89	8.94	5.21	2.5	6.905
17.933	0.000	10.43	8.94	5.21	2.3	6.904
17.950	0.000	10.43	8.94	5.21	2.2	6.903
17.967	0.000	10.43	8.94	5.21	2.0	6.902
17.983	0.000	10.43	8.94	5.21	1.9	6.901
18.000	0.000	10.43	8.94	5.21	1.8	6.901

PROCESS SUMMARY OF STORAGE:
INFLOW VOLUME = 20.411 AF
BASIN STORAGE = 0.000 AF (WITH 0.000 AF INITIALLY FILLED)
OUTFLOW VOLUME = 1.009 AF
LOSS VOLUME = 19.402 AF



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FLOW PROCESS FROM NODE 3013.00 TO NODE 3013.00 IS CODE = 9

>>>>>MOVE STREAM NUMBER 3 FORWARD IN TIME BY 0.100 HOURS<<<<<

MODEL TIME	STREAM 3 (CFS)	STREAM 3 MOVED 0.100 HOURS
14.000	0.00	0.00
14.083	0.00	0.00
14.167	0.00	0.00
14.250	0.00	0.00
14.333	0.00	0.00
14.417	0.00	0.00
14.500	0.00	0.00
14.583	0.00	0.00
14.667	0.00	0.00
14.750	0.00	0.00
14.833	0.00	0.00
14.917	0.00	0.00
15.000	0.00	0.00
15.083	0.00	0.00
15.167	0.00	0.00
15.250	0.00	0.00
15.333	0.00	0.00
15.417	0.00	0.00
15.500	0.00	0.00
15.583	0.00	0.00
15.667	0.00	0.00
15.750	0.00	0.00
15.833	0.00	0.00
15.917	0.00	0.00
16.000	0.00	0.00
16.083	0.00	0.00
16.167	0.00	0.00
16.250	0.00	0.00
16.333	0.00	0.00
16.417	0.00	0.00
16.500	0.00	0.00
16.583	0.00	0.00
16.667	0.00	0.00
16.750	0.00	0.00
16.833	7.48	0.00
16.917	17.71	5.98
17.000	18.66	15.66
17.083	16.85	18.47
17.167	14.53	17.21
17.250	12.44	15.00
17.333	10.63	12.86
17.417	9.03	10.99
17.500	7.82	9.35



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 MODEL      STREAM 3       STREAM 3
  TIME       (CFS)      MOVED  0.100 HOURS
 17.583        6.92             8.06
 17.667        6.09             7.10
 17.750        5.21             6.25
 17.833        4.05             5.39
 17.917        2.87             4.28
 18.000        2.06             3.11
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   FLOW PROCESS FROM NODE   3013.00 TO NODE   1025.00 IS CODE =   7
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   >>>>>STREAM NUMBER 3 ADDED TO STREAM NUMBER 1<<<<<
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   FLOW PROCESS FROM NODE   9000.00 TO NODE   3012.00 IS CODE =   1
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   >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
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      (UNIT-HYDROGRAPH ADDED TO STREAM #4)

         WATERSHED AREA =      74.900 ACRES
         BASEFLOW =   0.000 CFS/SQUARE-MILE
         *USER ENTERED "LAG" TIME =    0.217 HOURS
          CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
          THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
          MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
         DESERT(UNDEVELOPED) S-GRAPH SELECTED
         MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) =  0.100
         LOW LOSS FRACTION = 0.333
         *HYDROGRAPH MODEL #1 SPECIFIED*

         SPECIFIED PEAK  5-MINUTES RAINFALL(INCH)=  0.37
         SPECIFIED PEAK 30-MINUTES RAINFALL(INCH)=  0.88
         SPECIFIED PEAK  1-HOUR RAINFALL(INCH) =  1.08
         SPECIFIED PEAK  3-HOUR RAINFALL(INCH) =  1.58
         SPECIFIED PEAK  6-HOUR RAINFALL(INCH) =  2.06
         SPECIFIED PEAK 24-HOUR RAINFALL(INCH) =  3.52

         PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
           5-MINUTE FACTOR = 0.997
          30-MINUTE FACTOR = 0.997
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1-HOUR FACTOR = 0.997
3-HOUR FACTOR = 0.999
6-HOUR FACTOR = 1.000
24-HOUR FACTOR = 1.000

UNIT HYDROGRAPH TIME UNIT = 5.000 MINUTES
UNIT INTERVAL PERCENTAGE OF LAG-TIME = 38.402

RUNOFF HYDROGRAPH LISTING LIMITS:
MODEL TIME(HOURS) FOR BEGINNING OF RESULTS = 14.00
MODEL TIME(HOURS) FOR END OF RESULTS = 18.00

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UNIT HYDROGRAPH DETERMINATION

INTERVAL NUMBER	"S" GRAPH MEAN VALUES	UNIT HYDROGRAPH ORDINATES(CFS)
1	2.577	23.339
2	16.915	129.878
3	46.748	270.236
4	63.979	156.086
5	73.429	85.593
6	79.741	57.181
7	84.203	40.419
8	87.720	31.855
9	90.263	23.037
10	92.305	18.498
11	93.976	15.138
12	95.303	12.017
13	96.381	9.762
14	97.232	7.708
15	97.852	5.622
16	98.258	3.673
17	98.704	4.038
18	99.164	4.174
19	99.610	4.038
20	100.000	3.530

TOTAL SOIL-LOSS VOLUME(ACRE-FEET) = 5.6730
TOTAL STORM RUNOFF VOLUME(ACRE-FEET) = 16.2859

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

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

TIME(HRS)	VOLUME(AF)	Q(CFS)	0. 50.0 100.0 150.0 200.0
14.000	5.1174	9.15	.Q . V . . .
14.083	5.1816	9.33	.Q . V . . .
14.167	5.2465	9.42	.Q . V . . .
14.250	5.3111	9.38	.Q . V . . .
14.333	5.3763	9.47	.Q . V . . .
14.417	5.4427	9.65	.Q . V . . .
14.500	5.5106	9.86	.Q . V . . .
14.583	5.5804	10.12	. Q . V . . .
14.667	5.6520	10.41	. Q . V . . .
14.750	5.7260	10.74	. Q . V . . .
14.833	5.8025	11.10	. Q . V . . .
14.917	5.8818	11.52	. Q . V . . .
15.000	5.9641	11.96	. Q . V . . .
15.083	6.0501	12.47	. Q . V . . .
15.167	6.1398	13.03	. Q . V . . .
15.250	6.2344	13.73	. Q . V . . .
15.333	6.3350	14.60	. Q . V . . .
15.417	6.4429	15.67	. Q . V . . .
15.500	6.5560	16.42	. Q . V . . .
15.583	6.6722	16.87	. Q . V . . .
15.667	6.7972	18.14	. Q . V . . .
15.750	6.9422	21.06	. Q . V . . .
15.833	7.1336	27.79	. Q . V . . .
15.917	7.4117	40.39	. Q . V . . .
16.000	7.7808	53.58	. Q V. . .
16.083	8.3064	76.32	. . Q V . .
16.167	9.1089	116.53	. . . VQ . .
16.250	10.1448	150.41	. . . V Q .
16.333	10.8992	109.54	. . .Q V . .
16.417	11.4117	74.41	. . Q . V . .
16.500	11.7965	55.88	. .Q . V . .
16.583	12.1059	44.92	. Q . . V. .
16.667	12.3642	37.50	. Q . . V .
16.750	12.5791	31.21	. Q . . V .
16.833	12.7642	26.88	. Q . . .V .
16.917	12.9260	23.49	. Q . . .V .
17.000	13.0676	20.57	. Q . . . V .
17.083	13.1933	18.24	. Q . . . V .
17.167	13.3058	16.35	. Q . . . V .
17.250	13.4081	14.85	. Q . . . V .
17.333	13.5016	13.57	. Q . . . V .

```
  17.417     13.5904     12.90  . Q       .         .         .  V      .
  17.500     13.6749     12.26  . Q       .         .         .  V      .
  17.583     13.7539     11.47  . Q       .         .         .  V      .
  17.667     13.8262     10.50  . Q       .         .         .  V      .
  17.750     13.8875      8.91  .Q        .         .         .   V     .
```

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```
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       50.0     100.0     150.0     200.0
```

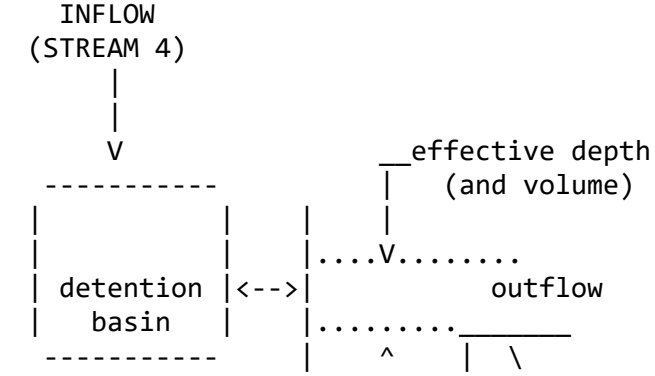
```
  17.833     13.9451      8.36  .Q        .         .         .   V     .
  17.917     14.0004      8.02  .Q        .         .         .   V     .
  18.000     14.0537      7.74  .Q        .         .         .   V     .
```

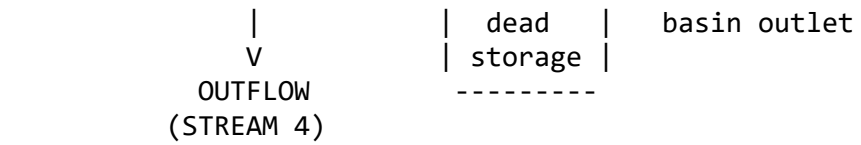
TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1085.0
10%	110.0
20%	55.0
30%	35.0
40%	25.0
50%	20.0
60%	15.0
70%	15.0
80%	5.0
90%	5.0

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 ****************************************************************************
  FLOW PROCESS FROM NODE   3012.00 TO NODE   3012.00 IS CODE = 3.1
 ----------------------------------------------------------------------------
  >>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #4<<<<<
 ============================================================================
```





ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 4
THROUGH A FLOW-THROUGH DETENTION BASIN
SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
DEAD STORAGE(AF) = 0.000
SPECIFIED DEAD STORAGE(AF) FILLED = 0.000
SPECIFIED EFFECTIVE VOLUME(AF) FILLED ABOVE OUTLET = 0.000
DETENTION BASIN CONSTANT LOSS RATE(CFS) = 0.50

BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

INTERVAL NUMBER	DEPTH (FT)	OUTFLOW (CFS)	STORAGE (AF)
1	0.00	0.00	0.000
2	3.00	0.50	7.560
3	6.00	2.00	22.760
4	7.00	129.00	27.160

==========

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(5-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time;
MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
14.083	0.000	9.33	0.50	1.77	0.3	4.469
14.167	0.000	9.42	0.50	1.80	0.3	4.529
14.250	0.000	9.38	0.50	1.82	0.3	4.588
14.333	0.000	9.47	0.50	1.84	0.3	4.647
14.417	0.000	9.65	0.50	1.87	0.3	4.708
14.500	0.000	9.86	0.50	1.89	0.3	4.770
14.583	0.000	10.12	0.50	1.92	0.3	4.835
14.667	0.000	10.41	0.50	1.94	0.3	4.901
14.750	0.000	10.74	0.50	1.97	0.3	4.969
14.833	0.000	11.10	0.50	2.00	0.3	5.040
14.917	0.000	11.52	0.50	2.03	0.3	5.113
15.000	0.000	11.96	0.50	2.06	0.3	5.190
15.083	0.000	12.47	0.50	2.09	0.3	5.270
15.167	0.000	13.03	0.50	2.12	0.4	5.354

15.250	0.000	13.73	0.50	2.16	0.4	5.442
15.333	0.000	14.60	0.50	2.20	0.4	5.537
15.417	0.000	15.67	0.50	2.24	0.4	5.639
15.500	0.000	16.42	0.50	2.28	0.4	5.746
15.583	0.000	16.87	0.50	2.32	0.4	5.856
15.667	0.000	18.14	0.50	2.37	0.4	5.975
15.750	0.000	21.06	0.50	2.43	0.4	6.114
15.833	0.000	27.79	0.50	2.50	0.4	6.299
15.917	0.000	40.39	0.50	2.61	0.4	6.571
16.000	0.000	53.58	0.50	2.75	0.4	6.933
16.083	0.000	76.32	0.50	2.96	0.5	7.452
16.167	0.000	116.53	0.50	3.14	0.5	8.248
16.250	0.000	150.41	0.50	3.34	0.6	9.276
16.333	0.000	109.54	0.50	3.49	0.7	10.022
16.417	0.000	74.41	0.50	3.59	0.8	10.526
16.500	0.000	55.88	0.50	3.66	0.8	10.901
16.583	0.000	44.92	0.50	3.72	0.8	11.202
16.667	0.000	37.50	0.50	3.77	0.9	11.450
16.750	0.000	31.21	0.50	3.81	0.9	11.656
16.833	0.000	26.88	0.50	3.84	0.9	11.831
16.917	0.000	23.49	0.50	3.87	0.9	11.983
17.000	0.000	20.57	0.50	3.90	0.9	12.115
17.083	0.000	18.24	0.50	3.92	1.0	12.230
17.167	0.000	16.35	0.50	3.94	1.0	12.333
17.250	0.000	14.85	0.50	3.96	1.0	12.425
17.333	0.000	13.57	0.50	3.98	1.0	12.508
17.417	0.000	12.90	0.50	3.99	1.0	12.587
17.500	0.000	12.26	0.50	4.01	1.0	12.661
17.583	0.000	11.47	0.50	4.02	1.0	12.729
17.667	0.000	10.50	0.50	4.03	1.0	12.791
17.750	0.000	8.91	0.50	4.04	1.0	12.842
17.833	0.000	8.36	0.50	4.05	1.0	12.889
17.917	0.000	8.02	0.50	4.06	1.0	12.934
18.000	0.000	7.74	0.50	4.07	1.0	12.977

PROCESS SUMMARY OF STORAGE:
INFLOW VOLUME = 16.286 AF
BASIN STORAGE = 0.000 AF (WITH 0.000 AF INITIALLY FILLED)
OUTFLOW VOLUME = 7.441 AF
LOSS VOLUME = 8.844 AF



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FLOW PROCESS FROM NODE 3012.00 TO NODE 1025.00 IS CODE = 9

>>>>>MOVE STREAM NUMBER 4 FORWARD IN TIME BY 0.100 HOURS<<<<<

==========

MODEL TIME	STREAM 4 (CFS)	STREAM 4 MOVED 0.100 HOURS
14.000	0.29	0.29
14.083	0.29	0.29
14.167	0.30	0.29
14.250	0.30	0.30
14.333	0.31	0.30
14.417	0.31	0.30
14.500	0.31	0.31
14.583	0.32	0.31
14.667	0.32	0.32
14.750	0.33	0.32
14.833	0.33	0.33
14.917	0.34	0.33
15.000	0.34	0.33
15.083	0.35	0.34
15.167	0.35	0.34
15.250	0.36	0.35
15.333	0.36	0.36
15.417	0.37	0.36
15.500	0.38	0.37
15.583	0.38	0.38
15.667	0.39	0.38
15.750	0.40	0.39
15.833	0.41	0.40
15.917	0.43	0.41
16.000	0.45	0.42
16.083	0.48	0.44
16.167	0.53	0.47
16.250	0.62	0.52
16.333	0.71	0.60
16.417	0.77	0.69
16.500	0.81	0.76
16.583	0.84	0.80
16.667	0.87	0.84
16.750	0.89	0.87
16.833	0.91	0.89
16.917	0.93	0.91
17.000	0.94	0.93
17.083	0.96	0.94
17.167	0.97	0.95
17.250	0.98	0.96
17.333	0.98	0.97
17.417	0.99	0.98
17.500	1.00	0.99



MODEL TIME	STREAM 4 (CFS)	STREAM 4 MOVED 0.100 HOURS

17.583	1.01	1.00
17.667	1.01	1.01
17.750	1.02	1.01
17.833	1.02	1.02
17.917	1.03	1.02
18.000	1.03	1.03

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**************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1025.00 IS CODE =   7
--------------------------------------------------------------------------
  >>>>>STREAM NUMBER 4 ADDED TO STREAM NUMBER 1<<<<<
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**************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1025.00 IS CODE =  11
--------------------------------------------------------------------------
  >>>>>VIEW STREAM NUMBER 1 HYDROGRAPH<<<<<
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STREAM HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
(Note: Time indicated is at END of Each Unit Intervals)

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	550.0	1100.0	1650.0	2200.0
14.000	37.7445	66.66	.Q	V .	.	.	.
14.083	38.2129	68.02	.Q	V .	.	.	.
14.167	38.6915	69.49	.Q	V .	.	.	.
14.250	39.1805	71.01	.Q	V .	.	.	.
14.333	39.6809	72.66	.Q	V .	.	.	.
14.417	40.1932	74.39	.Q	V .	.	.	.
14.500	40.7184	76.26	.Q	V .	.	.	.
14.583	41.2572	78.22	.Q	V .	.	.	.
14.667	41.8107	80.38	.Q	V .	.	.	.
14.750	42.3799	82.65	.Q	V .	.	.	.
14.833	42.9664	85.16	.Q	V .	.	.	.
14.917	43.5713	87.83	.Q	V .	.	.	.
15.000	44.1967	90.80	.Q	V .	.	.	.
15.083	44.8441	94.00	.Q	V .	.	.	.
15.167	45.5163	97.61	.Q	V.	.	.	.
15.250	46.2158	101.57	.Q	V.	.	.	.
15.333	46.9476	106.25	.Q	V.	.	.	.
15.417	47.7135	111.22	. Q	V.	.	.	.
15.500	48.5144	116.29	. Q	V.	.	.	.
15.583	49.3495	121.25	. Q	V.	.	.	.
15.667	50.2058	124.34	. Q	V	.	.	.
15.750	51.1619	138.83	. Q	V	.	.	.

15.833	52.4284	183.90	. Q V . . .
15.917	54.3317	276.35	. Q V . . .
16.000	57.5585	468.53	. Q .V . . .
16.083	62.8206	764.06	. . VQ . . .
16.167	70.8724	1169.11	. . V .Q . .
16.250	81.9852	1613.58	. . V . Q. .
16.333	96.9649	2175.06	. . V. . Q.
16.417	111.0200	2040.80	. . . V . Q .
16.500	121.3723	1503.15	. . . V Q . .
16.583	128.8582	1086.94	. . Q. V . .
16.667	134.7331	853.04	. . Q . V . .
16.750	139.5580	700.58	. . Q . V . .
16.833	143.6349	591.96	. Q . V . .
16.917	147.1449	509.66	. Q. . V. .
17.000	150.2743	454.38	. Q . . V .
17.083	153.1000	410.30	. Q . . V .
17.167	155.6247	366.59	. Q . . .V .
17.250	157.8475	322.75	. Q . . .V .
17.333	159.8083	284.71	. Q . . . V .
17.417	161.6081	261.33	. Q . . . V .
17.500	163.2511	238.56	. Q . . . V .
17.583	164.7608	219.21	. Q . . . V .
17.667	166.1286	198.61	. Q . . . V .
17.750	167.3857	182.52	. Q . . . V .

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TIME(HRS)	VOLUME(AF)	Q(CFS)	0. 550.0 1100.0 1650.0 2200.0
17.833	168.5503	169.10	. Q . . . V .
17.917	169.6017	152.67	. Q . . . V .
18.000	170.5724	140.95	. Q . . . V .
18.083	171.4359	125.38	. Q . . . V .
18.167	172.2328	115.71	. Q . . . V .
18.250	172.9527	104.53	.Q . . . V .
18.333	173.6165	96.38	.Q . . . V .
18.417	174.2679	94.59	.Q . . . V .
18.500	174.9199	94.66	.Q . . . V .
18.583	175.5612	93.13	.Q . . . V .
18.667	176.1835	90.35	.Q . . . V .
18.750	176.7792	86.50	.Q . . . V .
18.833	177.3421	81.73	.Q . . . V .
18.917	177.8607	75.30	.Q . . . V .
19.000	178.2860	61.75	.Q . . . V .
19.083	178.6324	50.30	Q . . . V .
19.167	178.9590	47.42	Q . . . V .
19.250	179.2767	46.13	Q . . . V .
19.333	179.5870	45.06	Q . . . V .
19.417	179.8905	44.06	Q . . . V .
19.500	180.1877	43.16	Q . . . V .
19.583	180.4791	42.32	Q . . . V .

19.667	180.7651	41.53	Q	.	.	.	V	.
19.750	181.0460	40.79	Q	.	.	.	V	.
19.833	181.3221	40.09	Q	.	.	.	V	.
19.917	181.5936	39.42	Q	.	.	.	V	.
20.000	181.8607	38.79	Q	.	.	.	V	.
20.083	182.1237	38.18	Q	.	.	.	V	.
20.167	182.3827	37.61	Q	.	.	.	V	.
20.250	182.6379	37.05	Q	.	.	.	V	.
20.333	182.8894	36.53	Q	.	.	.	V	.
20.417	183.1375	36.02	Q	.	.	.	V	.
20.500	183.3822	35.53	Q	.	.	.	V	.
20.583	183.6237	35.06	Q	.	.	.	V	.
20.667	183.8621	34.61	Q	.	.	.	V	.
20.750	184.0975	34.18	Q	.	.	.	V	.
20.833	184.3299	33.76	Q	.	.	.	V	.
20.917	184.5596	33.35	Q	.	.	.	V	.
21.000	184.7866	32.96	Q	.	.	.	V	.
21.083	185.0110	32.58	Q	.	.	.	V	.
21.167	185.2329	32.21	Q	.	.	.	V	.
21.250	185.4523	31.86	Q	.	.	.	V	.
21.333	185.6693	31.51	Q	.	.	.	V	.
21.417	185.8840	31.18	Q	.	.	.	V	.
21.500	186.0966	30.86	Q	.	.	.	V	.
21.583	186.3069	30.54	Q	.	.	.	V	.
21.667	186.5151	30.23	Q	.	.	.	V	.
21.750	186.7213	29.94	Q	.	.	.	V	.
21.833	186.9255	29.65	Q	.	.	.	V	.
21.917	187.1277	29.36	Q	.	.	.	V	.

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	550.0	1100.0	1650.0	2200.0
22.000	187.3280	29.09	Q	.	.	.	V .
22.083	187.5266	28.82	Q	.	.	.	V .
22.167	187.7233	28.56	Q	.	.	.	V .
22.250	187.9182	28.31	Q	.	.	.	V .
22.333	188.1115	28.06	Q	.	.	.	V .
22.417	188.3031	27.82	Q	.	.	.	V .
22.500	188.4930	27.58	Q	.	.	.	V .
22.583	188.6814	27.35	Q	.	.	.	V .
22.667	188.8682	27.13	Q	.	.	.	V .
22.750	189.0535	26.91	Q	.	.	.	V .
22.833	189.2374	26.69	Q	.	.	.	V .
22.917	189.4197	26.48	Q	.	.	.	V .
23.000	189.6007	26.28	Q	.	.	.	V .
23.083	189.7802	26.07	Q	.	.	.	V .
23.167	189.9585	25.88	Q	.	.	.	V .
23.250	190.1353	25.68	Q	.	.	.	V .
23.333	190.3109	25.49	Q	.	.	.	V .
23.417	190.4852	25.31	Q	.	.	.	V .

23.500	190.6583	25.13	Q	.	.	.	V .
23.583	190.8301	24.95	Q	.	.	.	V .
23.667	191.0007	24.78	Q	.	.	.	V .
23.750	191.1702	24.60	Q	.	.	.	V .
23.833	191.3385	24.44	Q	.	.	.	V .
23.917	191.5057	24.27	Q	.	.	.	V .
24.000	191.6717	24.11	Q	.	.	.	V .
24.083	191.8351	23.72	Q	.	.	.	V .
24.167	191.9916	22.72	Q	.	.	.	V .
24.250	192.1353	20.86	Q	.	.	.	V .
24.333	192.2522	16.98	Q	.	.	.	V .
24.417	192.3433	13.23	Q	.	.	.	V .
24.500	192.4174	10.76	Q	.	.	.	V .
24.583	192.4802	9.12	Q	.	.	.	V .
24.667	192.5345	7.88	Q	.	.	.	V .
24.750	192.5821	6.91	Q	.	.	.	V .
24.833	192.6241	6.10	Q	.	.	.	V .
24.917	192.6617	5.45	Q	.	.	.	V .
25.000	192.6954	4.91	Q	.	.	.	V .
25.083	192.7259	4.42	Q	.	.	.	V .
25.167	192.7534	3.99	Q	.	.	.	V .
25.250	192.7785	3.64	Q	.	.	.	V .
25.333	192.8015	3.35	Q	.	.	.	V .
25.417	192.8227	3.08	Q	.	.	.	V .
25.500	192.8423	2.84	Q	.	.	.	V .
25.583	192.8603	2.62	Q	.	.	.	V .
25.667	192.8771	2.43	Q	.	.	.	V .
25.750	192.8927	2.27	Q	.	.	.	V .
25.833	192.9072	2.11	Q	.	.	.	V .
25.917	192.9209	1.99	Q	.	.	.	V .
26.000	192.9338	1.86	Q	.	.	.	V .
26.083	192.9459	1.77	Q	.	.	.	V .

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TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	550.0	1100.0	1650.0	2200.0
26.167	192.9575	1.68	Q	.	.	.	V .
26.250	192.9686	1.61	Q	.	.	.	V .
26.333	192.9794	1.56	Q	.	.	.	V .
26.417	192.9898	1.51	Q	.	.	.	V .
26.500	192.9998	1.45	Q	.	.	.	V .
26.583	193.0094	1.39	Q	.	.	.	V .
26.667	193.0186	1.34	Q	.	.	.	V .
26.750	193.0274	1.28	Q	.	.	.	V .
26.833	193.0358	1.22	Q	.	.	.	V .
26.917	193.0438	1.16	Q	.	.	.	V .
27.000	193.0517	1.14	Q	.	.	.	V .
27.083	193.0595	1.14	Q	.	.	.	V .
27.167	193.0673	1.13	Q	.	.	.	V .
27.250	193.0751	1.13	Q	.	.	.	V .

27.333	193.0829	1.13	Q	.	.	.	V	.
27.417	193.0907	1.13	Q	.	.	.	V	.
27.500	193.0985	1.13	Q	.	.	.	V	.
27.583	193.1063	1.13	Q	.	.	.	V	.
27.667	193.1140	1.13	Q	.	.	.	V	.
27.750	193.1218	1.13	Q	.	.	.	V	.
27.833	193.1296	1.13	Q	.	.	.	V	.
27.917	193.1373	1.12	Q	.	.	.	V	.
28.000	193.1451	1.12	Q	.	.	.	V	.
28.083	193.1528	1.12	Q	.	.	.	V	.
28.167	193.1605	1.12	Q	.	.	.	V	.
28.250	193.1682	1.12	Q	.	.	.	V	.
28.333	193.1759	1.12	Q	.	.	.	V	.
28.417	193.1836	1.12	Q	.	.	.	V	.
28.500	193.1913	1.12	Q	.	.	.	V	.
28.583	193.1990	1.12	Q	.	.	.	V	.
28.667	193.2067	1.11	Q	.	.	.	V	.
28.750	193.2144	1.11	Q	.	.	.	V	.
28.833	193.2220	1.11	Q	.	.	.	V	.
28.917	193.2297	1.11	Q	.	.	.	V	.
29.000	193.2373	1.11	Q	.	.	.	V	.
29.083	193.2450	1.11	Q	.	.	.	V	.
29.167	193.2526	1.11	Q	.	.	.	V	.
29.250	193.2602	1.11	Q	.	.	.	V	.
29.333	193.2679	1.11	Q	.	.	.	V	.
29.417	193.2755	1.11	Q	.	.	.	V	.
29.500	193.2831	1.10	Q	.	.	.	V	.
29.583	193.2907	1.10	Q	.	.	.	V	.
29.667	193.2982	1.10	Q	.	.	.	V	.
29.750	193.3058	1.10	Q	.	.	.	V	.
29.833	193.3134	1.10	Q	.	.	.	V	.
29.917	193.3210	1.10	Q	.	.	.	V	.
30.000	193.3285	1.10	Q	.	.	.	V	.
30.083	193.3361	1.10	Q	.	.	.	V	.
30.167	193.3436	1.10	Q	.	.	.	V	.
30.250	193.3512	1.09	Q	.	.	.	V	.

↟

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	550.0	1100.0	1650.0	2200.0
30.333	193.3587	1.09	Q	.	.	.	V .
30.417	193.3662	1.09	Q	.	.	.	V .
30.500	193.3737	1.09	Q	.	.	.	V .
30.583	193.3812	1.09	Q	.	.	.	V .
30.667	193.3887	1.09	Q	.	.	.	V .
30.750	193.3962	1.09	Q	.	.	.	V .
30.833	193.4037	1.09	Q	.	.	.	V .
30.917	193.4111	1.09	Q	.	.	.	V .
31.000	193.4186	1.08	Q	.	.	.	V .
31.083	193.4261	1.08	Q	.	.	.	V .

31.167	193.4335	1.08	Q	.	.	.	V .
31.250	193.4410	1.08	Q	.	.	.	V .
31.333	193.4484	1.08	Q	.	.	.	V .
31.417	193.4559	1.08	Q	.	.	.	V .
31.500	193.4633	1.08	Q	.	.	.	V .
31.583	193.4707	1.08	Q	.	.	.	V .
31.667	193.4781	1.08	Q	.	.	.	V .
31.750	193.4855	1.07	Q	.	.	.	V .
31.833	193.4929	1.07	Q	.	.	.	V .
31.917	193.5003	1.07	Q	.	.	.	V .
32.000	193.5077	1.07	Q	.	.	.	V .
32.083	193.5151	1.07	Q	.	.	.	V .
32.167	193.5224	1.07	Q	.	.	.	V .
32.250	193.5298	1.07	Q	.	.	.	V .
32.333	193.5372	1.07	Q	.	.	.	V .
32.417	193.5445	1.07	Q	.	.	.	V .
32.500	193.5518	1.07	Q	.	.	.	V .
32.583	193.5592	1.06	Q	.	.	.	V .
32.667	193.5665	1.06	Q	.	.	.	V .
32.750	193.5738	1.06	Q	.	.	.	V .
32.833	193.5811	1.06	Q	.	.	.	V .
32.917	193.5884	1.06	Q	.	.	.	V .
33.000	193.5957	1.06	Q	.	.	.	V .
33.083	193.6030	1.06	Q	.	.	.	V .
33.167	193.6102	1.06	Q	.	.	.	V .
33.250	193.6175	1.06	Q	.	.	.	V .
33.333	193.6248	1.05	Q	.	.	.	V .
33.417	193.6320	1.05	Q	.	.	.	V .
33.500	193.6393	1.05	Q	.	.	.	V .
33.583	193.6465	1.05	Q	.	.	.	V .
33.667	193.6538	1.05	Q	.	.	.	V .
33.750	193.6610	1.05	Q	.	.	.	V .
33.833	193.6682	1.05	Q	.	.	.	V .
33.917	193.6754	1.05	Q	.	.	.	V .
34.000	193.6826	1.05	Q	.	.	.	V .
34.083	193.6898	1.05	Q	.	.	.	V .
34.167	193.6970	1.04	Q	.	.	.	V .
34.250	193.7042	1.04	Q	.	.	.	V .
34.333	193.7114	1.04	Q	.	.	.	V .
34.417	193.7186	1.04	Q	.	.	.	V .

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	550.0	1100.0	1650.0	2200.0

34.500	193.7257	1.04	Q	.	.	.	V .
34.583	193.7329	1.04	Q	.	.	.	V .
34.667	193.7400	1.04	Q	.	.	.	V .
34.750	193.7471	1.04	Q	.	.	.	V .
34.833	193.7543	1.04	Q	.	.	.	V .
34.917	193.7614	1.03	Q	.	.	.	V .

35.000	193.7685	1.03	Q	.	.	.	V .
35.083	193.7756	1.03	Q	.	.	.	V .
35.167	193.7827	1.03	Q	.	.	.	V .
35.250	193.7898	1.03	Q	.	.	.	V .
35.333	193.7969	1.03	Q	.	.	.	V .
35.417	193.8040	1.03	Q	.	.	.	V .
35.500	193.8111	1.03	Q	.	.	.	V .
35.583	193.8182	1.03	Q	.	.	.	V .
35.667	193.8252	1.03	Q	.	.	.	V .
35.750	193.8323	1.02	Q	.	.	.	V .
35.833	193.8393	1.02	Q	.	.	.	V .
35.917	193.8464	1.02	Q	.	.	.	V .
36.000	193.8534	1.02	Q	.	.	.	V .

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

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	2165.0
10%	105.0
20%	65.0
30%	45.0
40%	30.0
50%	25.0
60%	20.0
70%	15.0
80%	10.0
90%	10.0

END OF FLOODSCx ROUTING ANALYSIS

Appendix J

Underground Infiltration Chamber and Pre-Treatment Design

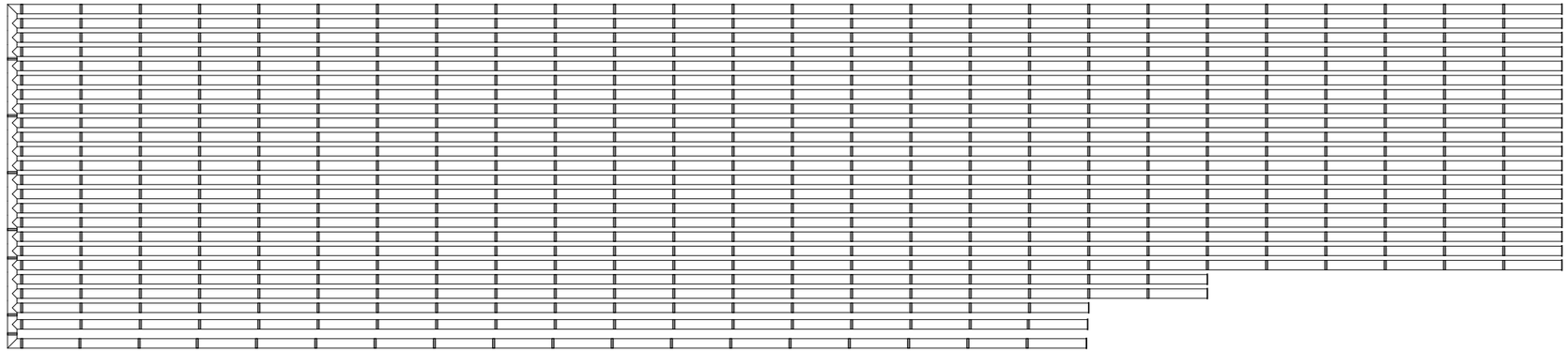
PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20/HS25
- APPROX. LINEAR FOOTAGE = 14,882 LF

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = 344,005 CF
- PIPE STORAGE VOLUME = 187,013 CF
- BACKFILL STORAGE VOLUME = 157,161 CF
- TOTAL STORAGE PROVIDED = 344,173 CF

PIPE DETAILS
- DIAMETER = 48"
- CORRUGATION = 2 2/3x1/2
- GAGE = 16
- COATING = ALT2
- WALL TYPE = PERFORATED
- BARREL SPACING = 24"

BACKFILL DETAILS
- WIDTH AT ENDS = 12"
- ABOVE PIPE = 12"
- WIDTH AT SIDES = 12"
- BELOW PIPE = 12"



NOTES

- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE. ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
- ALL RISERS AND STUBS ARE $2\frac{2}{3}$" x $\frac{1}{2}$" CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
- BAND TYPE TO BE DETERMINED UPON FINAL DESIGN.
- THE PROJECT SUMMARY IS REFLECTIVE OF THE DYODS DESIGN, QUANTITIES ARE APPROX. AND SHOULD BE VERIFIED UPON FINAL DESIGN AND APPROVAL. FOR EXAMPLE, TOTAL EXCAVATION DOES NOT CONSIDER ALL VARIABLES SUCH AS SHORING AND ONLY ACCOUNTS FOR MATERIAL WITHIN THE ESTIMATED EXCAVATION FOOTPRINT.
- THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

ASSEMBLY
SCALE: 1" = 60'

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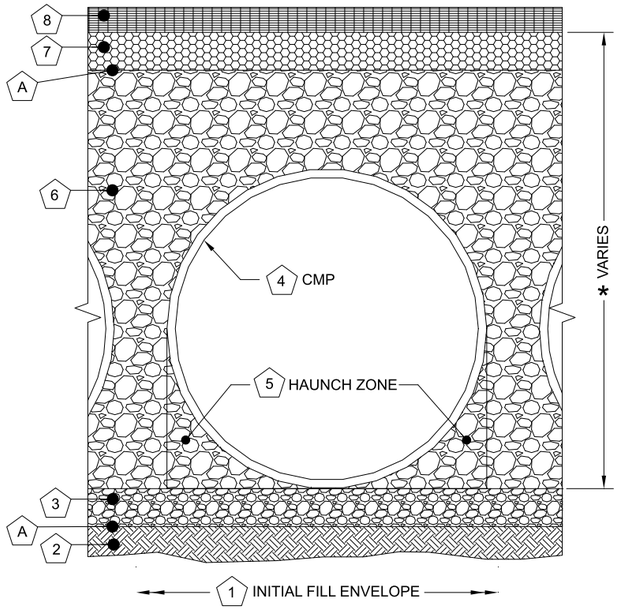
DATE	REVISION DESCRIPTION	BY

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH CMP DETENTION SYSTEMS
CONTECH **DYODS** DRAWING

DYO21225 Apple Valley 143 acre 3
Basin 1 Underground Chamber
Apple Valley, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
13837	21225	9/8/2022
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		



Infiltration Systems - CMP Infiltration & CMP Perforated Drainage Pipe			
Material Location	Description	Material Designation	Designation
8 Rigid or Flexible Pavement (if applicable)			
7 Road Base (if applicable			
A Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45	Engineer Decision for consideration to prevent soil migration into varying soil types. Wrap the trench only.
6 Backfill	Infiltration pipe systems have a pipe perforation sized of 3/8" diameter. An open graded, free draining stone, with a particle size of ½" – 2 ½" diameter is recommended.	AASHTO M 145-A-1 or AASHTO M 43 - 3, 4	Material shall be worked into the pipe haunches by means of shovel-slicing, rodding, air-tamper, vibratory rod, or other effective methods. Compaction of all placed fill material is necessary and shall be considered adequate when no further yielding of the material is observed under the compactor, or under foot, and the Project Engineer or his representative is satisfied with the level of compaction"
3 Bedding Stone	Well graded granular bedding material w/maximum particle size of 3"	AASHTO M43 - 3,357,4,467, 5, 56, 57	For soil aggregates larger than 3/8" a dedicated bedding layer is not required for CMP. Pipe may be placed on the trench bottom comprised of native suitable well graded & granular material. For Arch pipes it is recommended to be shaped to a relatively flat bottom or fine-grade the foundation to a slight v-shape. Soil aggregates less than 3/8" and unsuitable material should be over-excavated and re-placed with a 4"-6" layer of well graded & granular stone per the material designation.
A Geotextile Layer	None	None	Contech does not recommend geotextiles be placed under the invert of Infiltration systems due to the propensity for geotextiles to clog over time.
* Note: The listed AASHTO designations are for gradation only. The stone must also be angular and clean.			

1 MINIMUM WIDTH DEPENDS ON SITE CONDITIONS AND ENGINEERING JUDGEMENT.

FOUNDATION/BEDDING PREPARATION

2 PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER.

5 HAUNCH ZONE MATERIAL SHALL BE PLACED AND UNIFORMLY COMPACTED WITHOUT SOFT SPOTS.

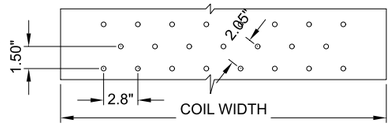
BACKFILL

MATERIAL SHALL BE PLACED IN 8"-10" MAXIMUM LIFTS. INADEQUATE COMPACTION CAN LEAD TO EXCESSIVE DEFLECTIONS WITHIN THE SYSTEM AND SETTLEMENT OF THE SOILS OVER THE SYSTEM. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO-LIFT DIFFERENTIAL BETWEEN THE SIDES OF ANY PIPE IN THE SYSTEM AT ALL TIMES DURING THE BACKFILL PROCESS. BACKFILL SHALL BE ADVANCED ALONG THE LENGTH OF THE SYSTEM AT THE SAME RATE TO AVOID DIFFERENTIAL LOADING ON ANY PIPES IN THE SYSTEM.

EQUIPMENT USED TO PLACE AND COMPACT THE BACKFILL SHALL BE OF A SIZE AND TYPE SO AS NOT TO DISTORT, DAMAGE, OR DISPLACE THE PIPE. ATTENTION MUST BE GIVEN TO PROVIDING ADEQUATE MINIMUM COVER FOR SUCH EQUIPMENT. MAINTAIN BALANCED LOADING ON ALL PIPES IN THE SYSTEM DURING ALL SUCH OPERATIONS.

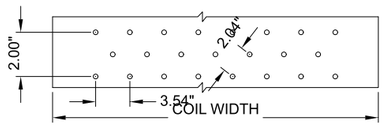
OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS. REFER TO TYPICAL BACKFILL DETAIL FOR MATERIAL REQUIRED.

2 2/3" x 1/2" CORRUGATION - STEEL AND ALUMINUM CMP EDGE SPACING EQUAL ON BOTH SIDES



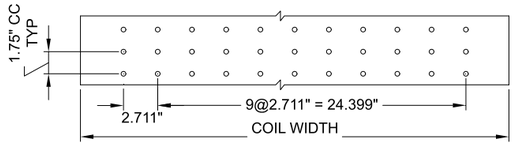
OPEN AREA = 3.76 SQ IN/SQ FT

3" x 1" CORRUGATION - STEEL AND ALUMINUM CMP (COIL PROVIDED FROM CONTECH LANTANA, FL PLANT)



OPEN AREA = 4.16 SQ IN/SQ FT

5" x 1" CORRUGATION - STEEL ONLY
EDGE SPACING EQUAL ON BOTH SIDES



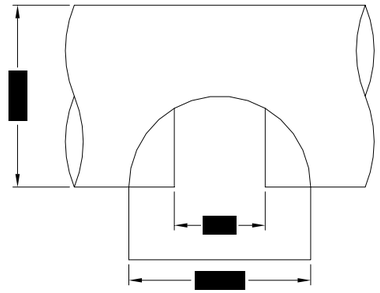
OPEN AREA = 3.33 SQ IN/SQ FT

NOTES:

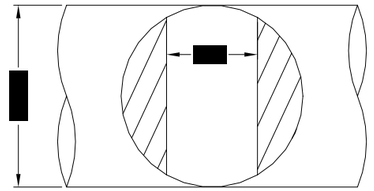
1. PERFORATIONS MEET AASHTO AND ASTM SPECIFICATIONS.
2. PERFORATION OPEN AREA PER SQUARE FOOT OF PIPE IS BASED ON THE NOMINAL DIAMETER AND LENGTH OF PIPE.
3. ALL DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
4. ALL HOLES ⌀3/8".

TYPICAL PERFORATION DETAIL

SCALE: N.T.S.



PLAN

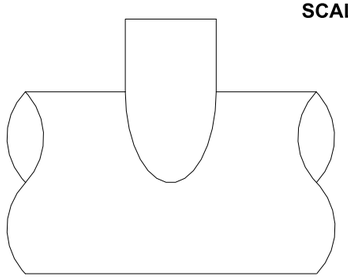


FRONT

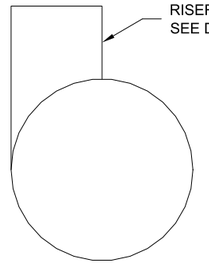
TYPICAL MANWAY DETAIL

SCALE: N.T.S.

NOTE:
MANWAY DETAIL APPLICABLE FOR CMP SYSTEMS WITH DIAMETERS 48" AND LARGER. MANWAYS MAY BE REQUIRED ON SMALLER SYSTEMS DEPENDING ON ACTUAL SITE SPECIFIC CONDITIONS.



ELEVATION

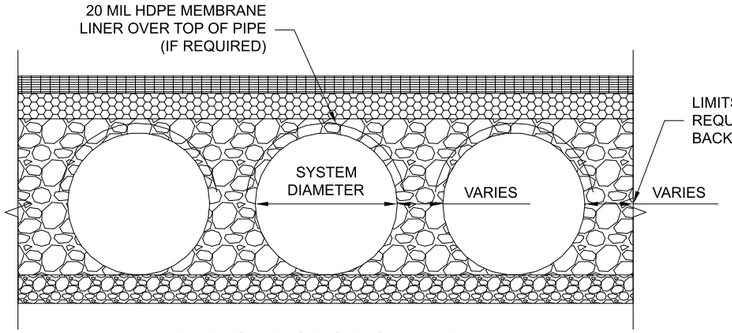


END

TYPICAL RISER DETAIL

SCALE: N.T.S.

NOTE:
LADDERS ARE OPTIONAL AND ARE NOT REQUIRED FOR ALL SYSTEMS.



TYPICAL SECTION VIEW

LINER OVER ROWS
SCALE: N.T.S.

NOTE: IF SALTING AGENTS FOR SNOW AND ICE REMOVAL ARE USED ON OR NEAR THE PROJECT, AN HDPE MEMBRANE LINER IS RECOMMENDED WITH THE SYSTEM. THE IMPERMEABLE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM A CHANGE IN THE SURROUNDING ENVIRONMENT OVER A PERIOD OF TIME. PLEASE REFER TO THE CORRUGATED METAL PIPE DETENTION DESIGN GUIDE FOR ADDITIONAL INFORMATION.

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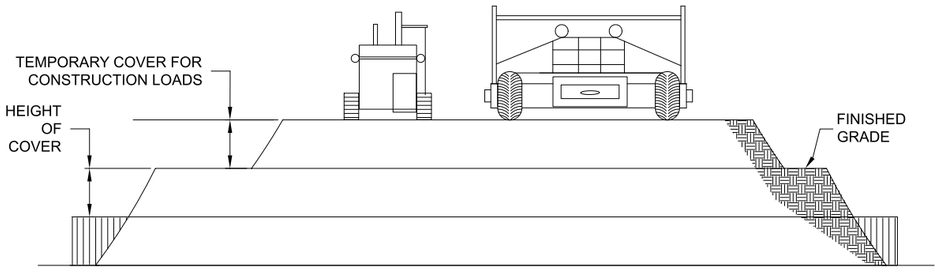
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CONTECH CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO21225 Apple Valley 143 acre 3
Basin 1 Underground Chamber
Apple Valley, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
13837	21225	9/8/2022
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

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CONSTRUCTION LOADS

FOR TEMPORARY CONSTRUCTION VEHICLE LOADS, AN EXTRA AMOUNT OF COMPACTED COVER MAY BE REQUIRED OVER THE TOP OF THE PIPE. THE HEIGHT-OF-COVER SHALL MEET THE MINIMUM REQUIREMENTS SHOWN IN THE TABLE BELOW. THE USE OF HEAVY CONSTRUCTION EQUIPMENT NECESSITATES GREATER PROTECTION FOR THE PIPE THAN FINISHED GRADE COVER MINIMUMS FOR NORMAL HIGHWAY TRAFFIC.

PIPE SPAN, INCHES	AXLE LOADS (kips)			
	18-50	50-75	75-110	110-150
	MINIMUM COVER (FT)			
12-42	2.0	2.5	3.0	3.0
48-72	3.0	3.0	3.5	4.0
78-120	3.0	3.5	4.0	4.0
126-144	3.5	4.0	4.5	4.5

*MINIMUM COVER MAY VARY, DEPENDING ON LOCAL CONDITIONS. THE CONTRACTOR MUST PROVIDE THE ADDITIONAL COVER REQUIRED TO AVOID DAMAGE TO THE PIPE. MINIMUM COVER IS MEASURED FROM THE TOP OF THE PIPE TO THE TOP OF THE MAINTAINED CONSTRUCTION ROADWAY SURFACE.

CONSTRUCTION LOADING DIAGRAM

SCALE: N.T.S.

SPECIFICATION FOR DESIGNED DETENTION SYSTEM:

SCOPE
THIS SPECIFICATION COVERS THE MANUFACTURE AND INSTALLATION OF THE DESIGNED DETENTION SYSTEM DETAILED IN THE PROJECT PLANS.

MATERIAL
THE MATERIAL SHALL CONFORM TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2 STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-274 OR ASTM A-92.

THE GALVANIZED STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-218 OR ASTM A-929.

THE POLYMER COATED STEEL COILS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M-246 OR ASTM A-742.

THE ALUMINUM COILS SHALL CONFORM TO THE APPLICABLE OF AASHTO M-197 OR ASTM B-744.

CONSTRUCTION LOADS
CONSTRUCTION LOADS MAY BE HIGHER THAN FINAL LOADS. FOLLOW THE MANUFACTURER'S OR NCSPA GUIDELINES.

PIPE
THE PIPE SHALL BE MANUFACTURED IN ACCORDANCE TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2: AASHTO M-36 OR ASTM A-760

GALVANIZED: AASHTO M-36 OR ASTM A-760

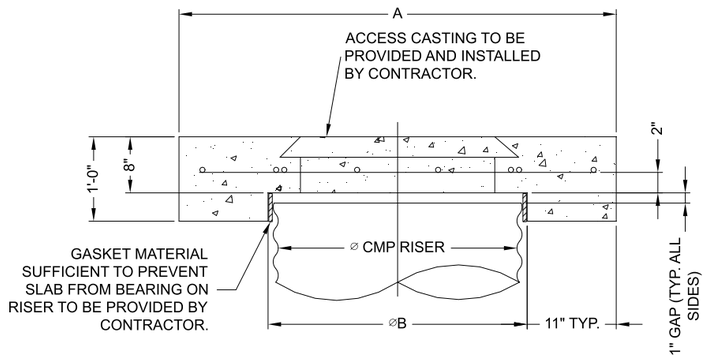
APPLICABLE POLYMER COATED: AASHTO M-245 OR ASTM A-762

ALUMINUM: AASHTO M-196 OR ASTM B-745

APPLICABLE
HANDLING AND ASSEMBLY
SHALL BE IN ACCORDANCE WITH NCSP'S (NATIONAL CORRUGATED STEEL PIPE ASSOCIATION) FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL. SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR ALUMINUM PIPE.
REQUIREMENTS
INSTALLATION
SHALL BE IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SECTION 26, DIVISION II DIVISION II OR ASTM A-798 (FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL) OR ASTM B-788 (FOR ALUMINUM PIPE) AND IN CONFORMANCE WITH THE PROJECT PLANS AND SPECIFICATIONS. IF THERE ARE ANY INCONSISTENCIES OR CONFLICTS THE CONTRACTOR SHOULD DISCUSS AND RESOLVE WITH THE SITE ENGINEER.

IT IS ALWAYS THE RESPONSIBILITY OF THE CONTRACTOR TO FOLLOW OSHA GUIDELINES FOR SAFE PRACTICES.

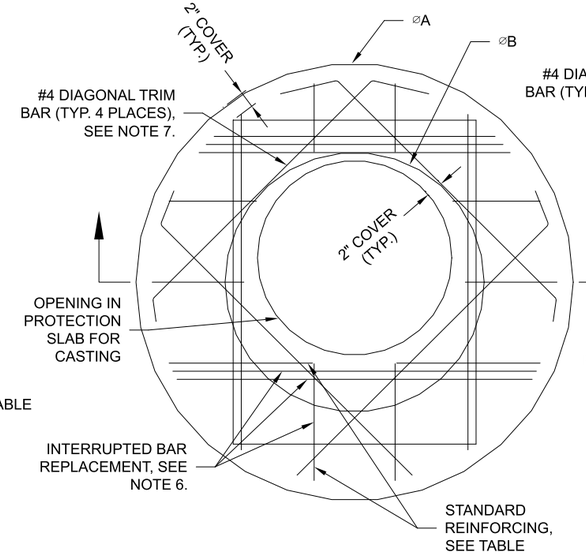
NOTE:
THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.



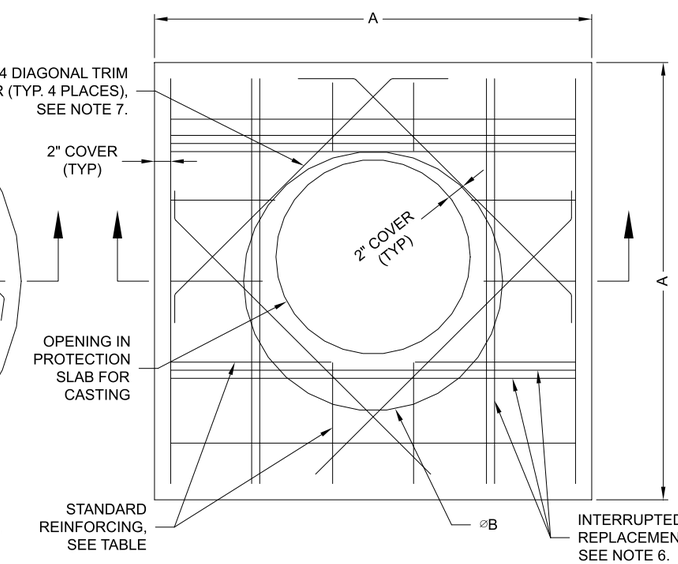
SECTION VIEW

REINFORCING TABLE				
⌀ CMP RISER	A	⌀ B	REINFORCING	**BEARING PRESSURE (PSF)
24"	⌀ 4' 4'X4'	26"	#5 @ 12" OCEW #5 @ 12" OCEW	2,410 1,780
30"	⌀ 4'-6" 4'-6" X 4'-6"	32"	#5 @ 12" OCEW #5 @ 12" OCEW	2,120 1,530
36"	⌀ 5' 5' X 5'	38"	#5 @ 10" OCEW #5 @ 10" OCEW	1,890 1,350
42"	⌀ 5'-6" 5'-6" X 5'-6"	44"	#5 @ 10" OCEW #5 @ 9" OCEW	1,720 1,210
48"	⌀ 6' 6' X 6'	50"	#5 @ 9" OCEW #5 @ 8" OCEW	1,600 1,100

** ASSUMED SOIL BEARING CAPACITY



ROUND OPTION PLAN VIEW



SQUARE OPTION PLAN VIEW

NOTES:

1. DESIGN IN ACCORDANCE WITH AASHTO, 17th EDITION.
2. DESIGN LOAD HS25.
3. EARTH COVER = 1' MAX.
4. CONCRETE STRENGTH = 3,500 psi
5. REINFORCING STEEL = ASTM A615, GRADE 60.
6. PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS EQUAL TO THE BARS INTERRUPTED, HALF EACH SIDE. ADDITIONAL BARS TO BE IN THE SAME PLANE.
7. TRIM OPENING WITH DIAGONAL #4 BARS, EXTEND BARS A MINIMUM OF 12" BEYOND OPENING, BEND BARS AS REQUIRED TO MAINTAIN BAR COVER.
8. PROTECTION SLAB AND ALL MATERIALS TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
9. DETAIL DESIGN BY DELTA ENGINEERING, BINGHAMTON, NY.

MANHOLE CAP DETAIL

SCALE: N.T.S.

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CONTECH CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO21225 Apple Valley 143 acre 3
Basin 1 Underground Chamber
Apple Valley, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
13837	21225	9/8/2022
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		

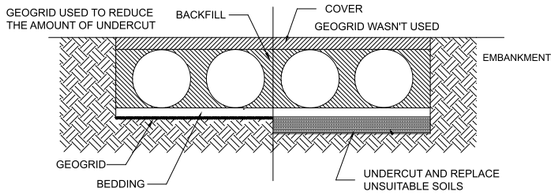
CMP DETENTION INSTALLATION GUIDE

PROPER INSTALLATION OF A FLEXIBLE UNDERGROUND DETENTION SYSTEM WILL ENSURE LONG-TERM PERFORMANCE. THE CONFIGURATION OF THESE SYSTEMS OFTEN REQUIRES SPECIAL CONSTRUCTION PRACTICES THAT DIFFER FROM CONVENTIONAL FLEXIBLE PIPE CONSTRUCTION. CONTECH ENGINEERED SOLUTIONS STRONGLY SUGGESTS SCHEDULING A PRE-CONSTRUCTION MEETING WITH YOUR LOCAL SALES ENGINEER TO DETERMINE IF ADDITIONAL MEASURES, NOT COVERED IN THIS GUIDE, ARE APPROPRIATE FOR YOUR SITE.

FOUNDATION

CONSTRUCT A FOUNDATION THAT CAN SUPPORT THE DESIGN LOADING APPLIED BY THE PIPE AND ADJACENT BACKFILL WEIGHT AS WELL AS MAINTAIN ITS INTEGRITY DURING CONSTRUCTION.

IF SOFT OR UNSUITABLE SOILS ARE ENCOUNTERED, REMOVE THE POOR SOILS DOWN TO A SUITABLE DEPTH AND THEN BUILD UP TO THE APPROPRIATE ELEVATION WITH A COMPETENT BACKFILL MATERIAL. THE STRUCTURAL FILL MATERIAL GRADATION SHOULD NOT ALLOW THE MIGRATION OF FINES, WHICH CAN CAUSE SETTLEMENT OF THE DETENTION SYSTEM OR PAVEMENT ABOVE. IF THE STRUCTURAL FILL MATERIAL IS NOT COMPATIBLE WITH THE UNDERLYING SOILS AN ENGINEERING FABRIC SHOULD BE USED AS A SEPARATOR. IN SOME CASES, USING A STIFF REINFORCING GEOGRID REDUCES OVER EXCAVATION AND REPLACEMENT FILL QUANTITIES.

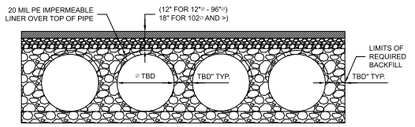


GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING SATURATION OF THE SUBGRADE.

GEOMEMBRANE BARRIER

A SITE'S RESISTIVITY MAY CHANGE OVER TIME WHEN VARIOUS TYPES OF SALTING AGENTS ARE USED, SUCH AS ROAD SALTS FOR DEICING AGENTS. IF SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE, A GEOMEMBRANE BARRIER IS RECOMMENDED WITH THE SYSTEM. THE GEOMEMBRANE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM THE USE OF SUCH AGENTS INCLUDING PREMATURE CORROSION AND REDUCED ACTUAL SERVICE LIFE.

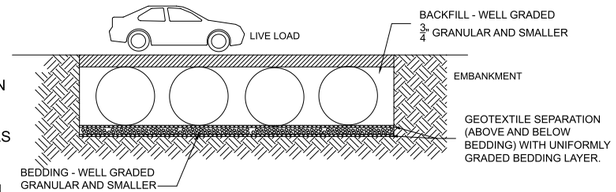
THE PROJECT'S ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/HER BEST JUDGEMENT TO DETERMINE IF ANY ADDITIONAL PROTECTIVE MEASURES ARE REQUIRED. BELOW IS A TYPICAL DETAIL SHOWING THE PLACEMENT OF A GEOMEMBRANE BARRIER FOR PROJECTS WHERE SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE.



IN-SITU TRENCH WALL

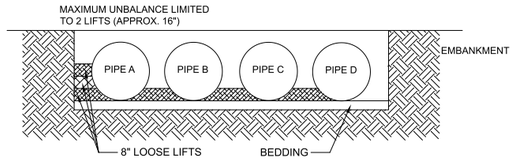
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION BEYOND THE SPRING LINE OF THE OUTER MOST PIPES.

IN MOST CASES THE REQUIREMENTS FOR A SAFE WORK ENVIRONMENT AND PROPER BACKFILL PLACEMENT AND COMPACTION TAKE CARE OF THIS CONCERN.



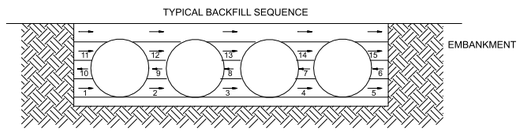
BACKFILL PLACEMENT

MATERIAL SHALL BE WORKED INTO THE PIPE HAUNCHES BY MEANS OF SHOVEL-SLICING, RODDING, AIR TAMPER, VIBRATORY ROD, OR OTHER EFFECTIVE METHODS.

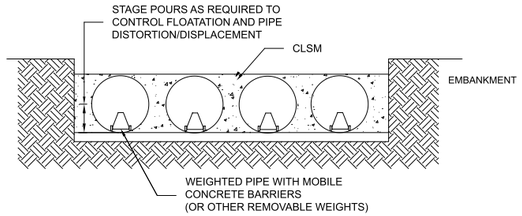


IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE LEVEL OF COMPACTION.

FOR LARGE SYSTEMS, CONVEYOR SYSTEMS, BACKHOES WITH LONG REACHES OR DRAGLINES WITH STONE BUCKETS MAY BE USED TO PLACE BACKFILL. ONCE MINIMUM COVER FOR CONSTRUCTION LOADING ACROSS THE ENTIRE WIDTH OF THE SYSTEM IS REACHED, ADVANCE THE EQUIPMENT TO THE END OF THE RECENTLY PLACED FILL, AND BEGIN THE SEQUENCE AGAIN UNTIL THE SYSTEM IS COMPLETELY BACKFILLED. THIS TYPE OF CONSTRUCTION SEQUENCE PROVIDES ROOM FOR STOCKPILED BACKFILL DIRECTLY BEHIND THE BACKHOE, AS WELL AS THE MOVEMENT OF CONSTRUCTION TRAFFIC. MATERIAL STOCKPILES ON TOP OF THE BACKFILLED DETENTION SYSTEM SHOULD BE LIMITED TO 8- TO 10-FEET HIGH AND MUST PROVIDE BALANCED LOADING ACROSS ALL BARRELS. TO DETERMINE THE PROPER COVER OVER THE PIPES TO ALLOW THE MOVEMENT OF CONSTRUCTION EQUIPMENT SEE TABLE 1, OR CONTACT YOUR LOCAL CONTECH SALES ENGINEER.



WHEN FLOWABLE FILL IS USED, YOU MUST PREVENT PIPE FLOATATION. TYPICALLY, SMALL LIFTS ARE PLACED BETWEEN THE PIPES AND THEN ALLOWED TO SET-UP PRIOR TO THE PLACEMENT OF THE NEXT LIFT. THE ALLOWABLE THICKNESS OF THE CLSM LIFT IS A FUNCTION OF A PROPER BALANCE BETWEEN THE UPLIFT FORCE OF THE CLSM, THE OPPOSING WEIGHT OF THE PIPE, AND THE EFFECT OF OTHER RESTRAINING MEASURES. THE PIPE CAN CARRY LIMITED FLUID PRESSURE WITHOUT PIPE DISTORTION OR DISPLACEMENT, WHICH ALSO AFFECTS THE CLSM LIFT THICKNESS. YOUR LOCAL CONTECH SALES ENGINEER CAN HELP DETERMINE THE PROPER LIFT THICKNESS.

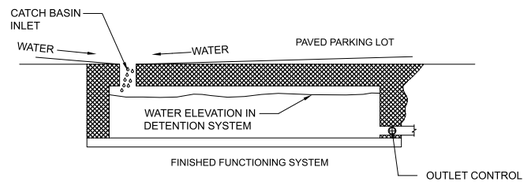


CONSTRUCTION LOADING

TYPICALLY, THE MINIMUM COVER SPECIFIED FOR A PROJECT ASSUMES H-20 LIVE LOAD. BECAUSE CONSTRUCTION LOADS OFTEN EXCEED DESIGN LIVE LOADS, INCREASED TEMPORARY MINIMUM COVER REQUIREMENTS ARE NECESSARY. SINCE CONSTRUCTION EQUIPMENT VARIES FROM JOB TO JOB, IT IS BEST TO ADDRESS EQUIPMENT SPECIFIC MINIMUM COVER REQUIREMENTS WITH YOUR LOCAL CONTECH SALES ENGINEER DURING YOUR PRE-CONSTRUCTION MEETING.

ADDITIONAL CONSIDERATIONS

BECAUSE MOST SYSTEMS ARE CONSTRUCTED BELOW-GRADE, RAINFALL CAN RAPIDLY FILL THE EXCAVATION; POTENTIALLY CAUSING FLOATATION AND MOVEMENT OF THE PREVIOUSLY PLACED PIPES. TO HELP MITIGATE POTENTIAL PROBLEMS, IT IS BEST TO START THE INSTALLATION AT THE DOWNSTREAM END WITH THE OUTLET ALREADY CONSTRUCTED TO ALLOW A ROUTE FOR THE WATER TO ESCAPE. TEMPORARY DIVERSION MEASURES MAY BE REQUIRED FOR HIGH FLOWS DUE TO THE RESTRICTED NATURE OF THE OUTLET PIPE.



CMP DETENTION SYSTEM INSPECTION AND MAINTENANCE

UNDERGROUND STORMWATER DETENTION AND INFILTRATION SYSTEMS MUST BE INSPECTED AND MAINTAINED AT REGULAR INTERVALS FOR PURPOSES OF PERFORMANCE AND LONGEVITY.

INSPECTION

INSPECTION IS THE KEY TO EFFECTIVE MAINTENANCE OF CMP DETENTION SYSTEMS AND IS EASILY PERFORMED. CONTECH RECOMMENDS ONGOING, ANNUAL INSPECTIONS. SITES WITH HIGH TRASH LOAD OR SMALL OUTLET CONTROL ORIFICES MAY NEED MORE FREQUENT INSPECTIONS. THE RATE AT WHICH THE SYSTEM COLLECTS POLLUTANTS WILL DEPEND MORE ON SITE SPECIFIC ACTIVITIES RATHER THAN THE SIZE OR CONFIGURATION OF THE SYSTEM.

INSPECTIONS SHOULD BE PERFORMED MORE OFTEN IN EQUIPMENT WASHDOWN AREAS, IN CLIMATES WHERE SANDING AND/OR SALTING OPERATIONS TAKE PLACE, AND IN OTHER VARIOUS INSTANCES IN WHICH ONE WOULD EXPECT HIGHER ACCUMULATIONS OF SEDIMENT OR ABRASIVE/ CORROSIVE CONDITIONS. A RECORD OF EACH INSPECTION IS TO BE MAINTAINED FOR THE LIFE OF THE SYSTEM

MAINTENANCE

CMP DETENTION SYSTEMS SHOULD BE CLEANED WHEN AN INSPECTION REVEALS ACCUMULATED SEDIMENT OR TRASH IS CLOGGING THE DISCHARGE ORIFICE.

ACCUMULATED SEDIMENT AND TRASH CAN TYPICALLY BE EVACUATED THROUGH THE MANHOLE OVER THE OUTLET ORIFICE. IF MAINTENANCE IS NOT PERFORMED AS RECOMMENDED, SEDIMENT AND TRASH MAY ACCUMULATE IN FRONT OF THE OUTLET ORIFICE. MANHOLE COVERS SHOULD BE SECURELY SEATED FOLLOWING CLEANING ACTIVITIES. CONTECH SUGGESTS THAT ALL SYSTEMS BE DESIGNED WITH AN ACCESS/INSPECTION MANHOLE SITUATED AT OR NEAR THE INLET AND THE OUTLET ORIFICE. SHOULD IT BE NECESSARY TO GET INSIDE THE SYSTEM TO PERFORM MAINTENANCE ACTIVITIES, ALL APPROPRIATE PRECAUTIONS REGARDING CONFINED SPACE ENTRY AND OSHA REGULATIONS SHOULD BE FOLLOWED.

ANNUAL INSPECTIONS ARE BEST PRACTICE FOR ALL UNDERGROUND SYSTEMS. DURING THIS INSPECTION, IF EVIDENCE OF SALTING/DE-ICING AGENTS IS OBSERVED WITHIN THE SYSTEM, IT IS BEST PRACTICE FOR THE SYSTEM TO BE RINSED, INCLUDING ABOVE THE SPRING LINE SOON AFTER THE SPRING THAW AS PART OF THE MAINTENANCE PROGRAM FOR THE SYSTEM.

MAINTAINING AN UNDERGROUND DETENTION OR INFILTRATION SYSTEM IS EASIEST WHEN THERE IS NO FLOW ENTERING THE SYSTEM. FOR THIS REASON, IT IS A GOOD IDEA TO SCHEDULE THE CLEANOUT DURING DRY WEATHER.

THE FOREGOING INSPECTION AND MAINTENANCE EFFORTS HELP ENSURE UNDERGROUND PIPE SYSTEMS USED FOR STORMWATER STORAGE CONTINUE TO FUNCTION AS INTENDED BY IDENTIFYING RECOMMENDED REGULAR INSPECTION AND MAINTENANCE PRACTICES. INSPECTION AND MAINTENANCE RELATED TO THE STRUCTURAL INTEGRITY OF THE PIPE OR THE SOUNDNESS OF PIPE JOINT CONNECTIONS IS BEYOND THE SCOPE OF THIS GUIDE.

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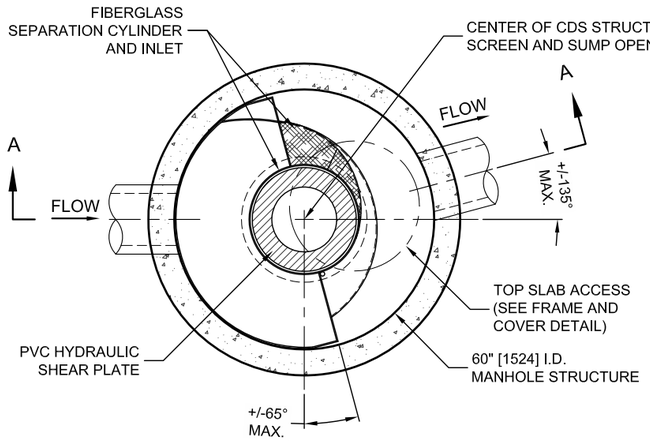
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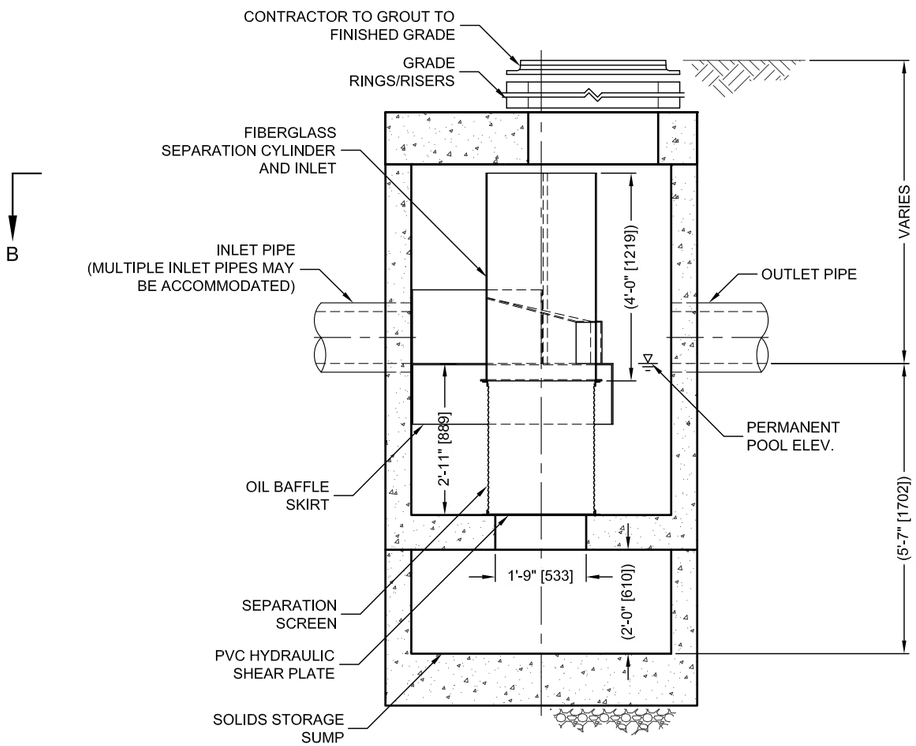
CONTECH CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO21225 Apple Valley 143 acre 3
Basin 1 Underground Chamber
Apple Valley, CA
DETENTION SYSTEM

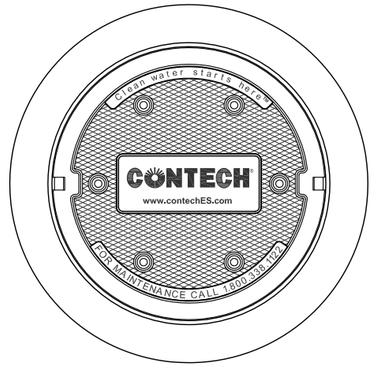
PROJECT No.:	SEQ. No.:	DATE:
13837	21225	9/8/2022
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: 1		



PLAN VIEW B-B
N.T.S.



ELEVATION A-A
N.T.S.



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

CDS2025-5-C DESIGN NOTES

THE STANDARD CDS2025-5-C CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.

CONFIGURATION DESCRIPTION
GRATED INLET ONLY (NO INLET PIPE)
GRATED INLET WITH INLET PIPE OR PIPES
CURB INLET ONLY (NO INLET PIPE)
CURB INLET WITH INLET PIPE OR PIPES
SEPARATE OIL BAFFLE (SINGLE INLET PIPE REQUIRED FOR THIS CONFIGURATION)
SEDIMENT WEIR FOR NJDEP / NJCAT CONFORMING UNITS

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	
WATER QUALITY FLOW RATE (CFS OR L/s)	*
PEAK FLOW RATE (CFS OR L/s)	*
RETURN PERIOD OF PEAK FLOW (YRS)	*
SCREEN APERTURE (2400 OR 4700)	*

PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	*	*	*
INLET PIPE 2	*	*	*
OUTLET PIPE	*	*	*

RIM ELEVATION	*

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

NOTES/SPECIAL REQUIREMENTS:

* PER ENGINEER OF RECORD

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.contechES.com
4. CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET HS20 (AASHTO M 306) LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
6. PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.

INSTALLATION NOTES
A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 5,788,848; 6,641,720; 6,511,595; 6,581,783; RELATED FOREIGN PATENTS, OR OTHER PATENTS PENDING.

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CDS2025-5-C
INLINE CDS
STANDARD DETAIL

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Appendix J

Conceptual Grading

RAW EARTHWORK QUANTITIES

	RAW CUT:	RAW FILL:
	XXX CY	XXX CY
SHRINKAGE @ 20%		XXX CY
SUBSIDENCE @ 0.1'		XXX CY
PAD OVER-EX 4' BELOW EX. GRADE (ALL 3 PADS)	XXX CY	XXX CY
SHRINKAGE @ 20%		XXX CY
UNDERGROUND BASIN SPOILS	XXX CY	
TOTALS:	XXX CY	XXX CY
	NET: 50,000 CY IMPORT	

15 FREEWAY

NEW SECONDARY ROAD

STODDARD WELLS ROAD

BUILDING 2
1,220,000 SF
FFE = 2964.8-2968.7

BUILDING 1
615,000 SF
FFE = 2929.0-2931.7

PLANNED TRAVEL CENTER

DETENTION / WQ BASIN
TOP = 2930.0
BOTTOM = 2923.0

DETENTION / WQ BASIN
TOP = 2925.0
BOTTOM = 2918.0

DETENTION / WQ BASIN
TOP = 2910.0
BOTTOM = 2905.0

EXISTING CULVERT OUTLET

EXISTING STORM DRAIN PIPES (X3)

PROPERTY LINE

PROPOSED LOT LINE

19' RETAINING WALL
2:1 SLOPE

SEE DETAIL ON SHEET 3

PROPOSED RIGHT OF WAY

PROPOSED CURB & GUTTER

CENTERLINE

EXISTING RIGHT OF WAY

CONSTRUCTION NOTES

1. CONSTRUCT 8" CURB AND GUTTER
2. CONSTRUCT 8" CURB ONLY
3. CONSTRUCT V-GUTTER
4. CONSTRUCT AC PAVEMENT
5. CONSTRUCT HIGH STRENGTH PCC
6. INSTALL NEW STORM DRAIN INLET/CATCH BASIN
7. CONSTRUCT DETENTION/WATER QUALITY BASIN
8. CONSTRUCT RETAINING WALL, HEIGHT PER PLAN

N

scale 1" = 80' — 80 0 80 160 feet

WestLAND Group, Inc. — Land Surveyors — Civil Engineers — GIS
4130 CONCOURS STREET, SUITE 100, ONTARIO, CA 91730
PHONE: (909) 989-9789 FAX: (909) 989-9660

PREPARED UNDER THE SUPERVISION OF:

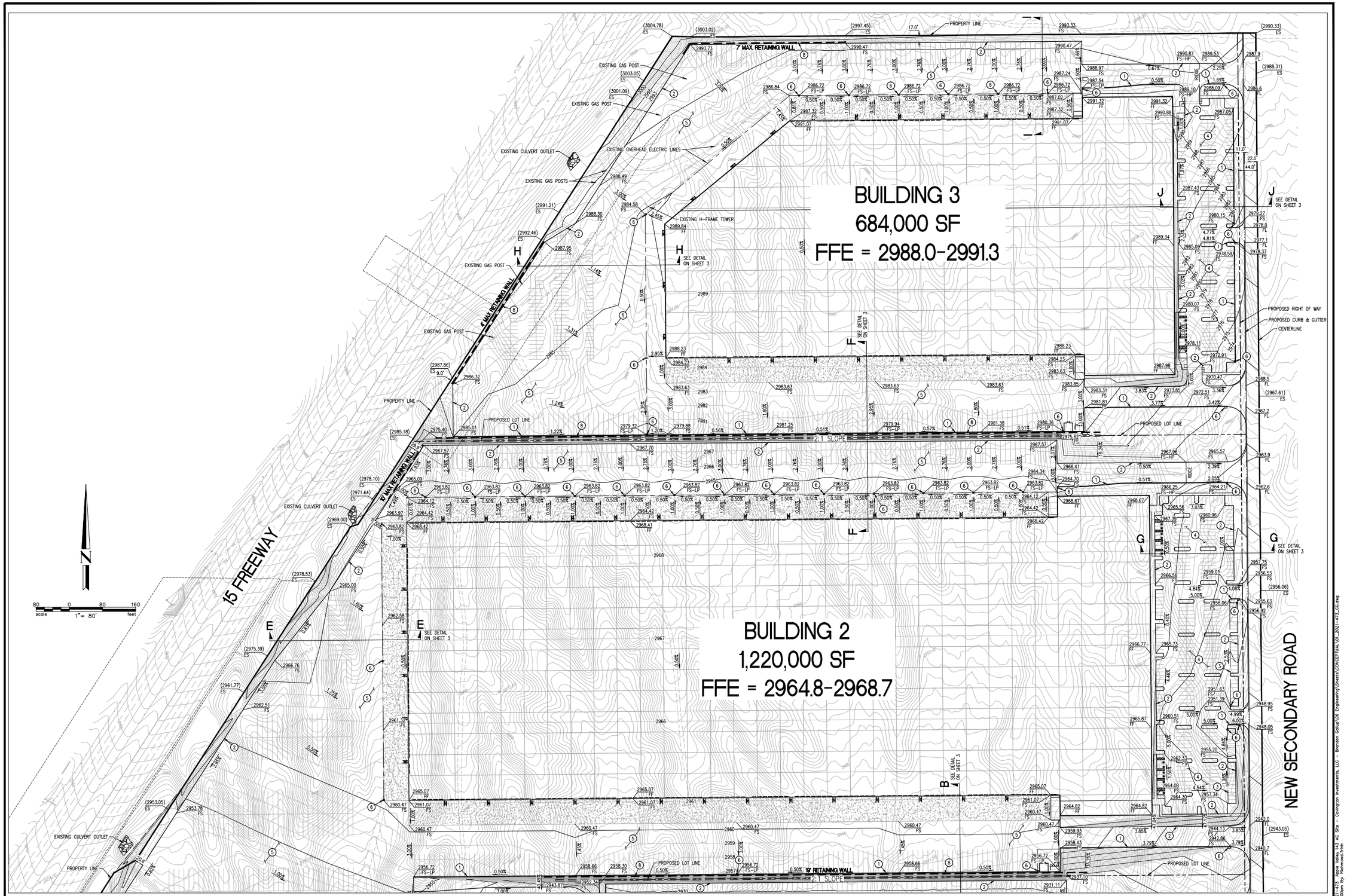
GLENN M. CHUNG, P.E.	62974	8/16/2022
NAME OF ENGINEER	R.C.E.	DATE:

CITY OF APPLE VALLEY
STODDARD WELLS ROAD

APPLE VALLEY 146 AC SITE
CONCEPTUAL GRADING PLAN

DRAWN BY:	SCALE:
WLG	1"=80'
DESIGNED BY:	DATE:
WLG	8/18/2022
CHECKED BY:	SHT NO.:
WLG	1 OF 5

Drawing Name: P:\Yrs\2021\2021-473 Apple Valley 146 AC Site - Covington Investments, LLC - Brandon Gollup\06 Engineering\Sheets\CONCEPTUAL\01_2021-473_GC.dwg
Last Opened: Aug 18, 2022 - 4:39pm By: Richmond.Trinh



CONSTRUCTION NOTES

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4. CONSTRUCT AC PAVEMENT
5. CONSTRUCT HIGH STRENGTH PCC
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WestLAND Group, Inc. Landscape - Civil Engineers - GIS
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PREPARED UNDER THE SUPERVISION OF:

GLENN M. CHUNG, P.E.	62974	8/16/2022
NAME OF ENGINEER	R.C.E.	DATE:

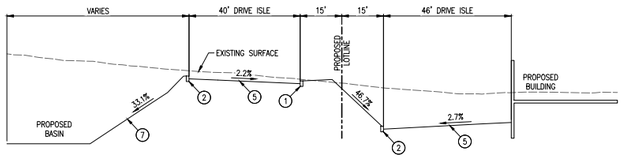
CITY OF APPLE VALLEY

STODDARD WELLS ROAD

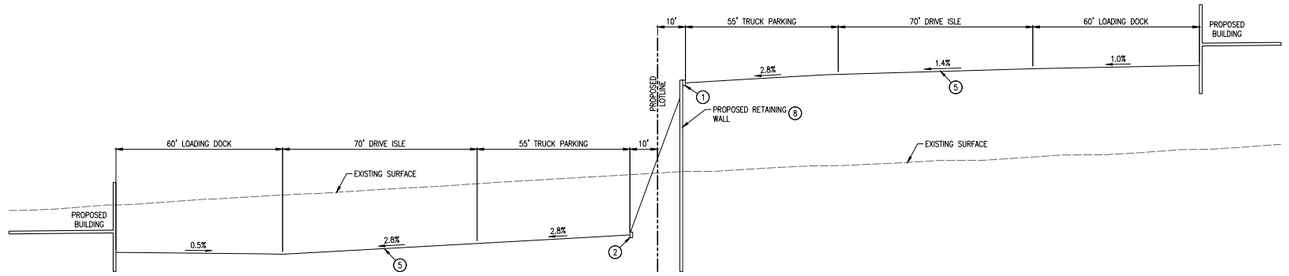
APPLE VALLEY 146 AC SITE
CONCEPTUAL GRADING PLAN

DRAWN BY:	SCALE:
WLG	1"=80'
DESIGNED BY:	DATE:
WLG	8/18/2022
CHECKED BY:	SHT NO.:
WLG	2 OF 5

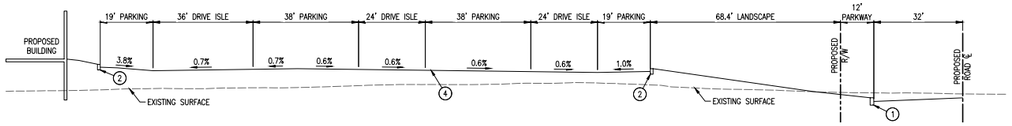
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Last Opened: Aug 16, 2022 - 5:00pm By: Richmond.Trinh



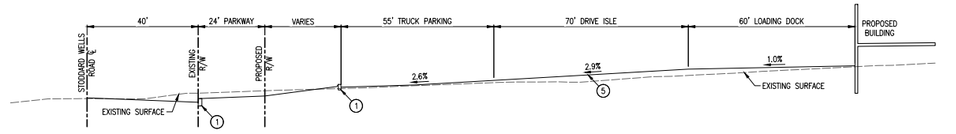
SECTION A-A
SCALE: 1"=20'



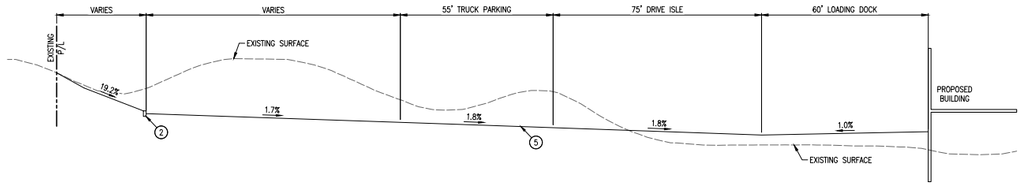
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SCALE: 1"=20'



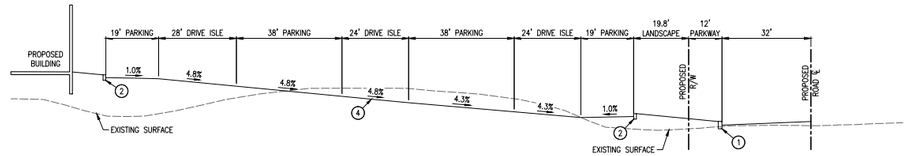
SECTION C-C
SCALE: 1"=20'



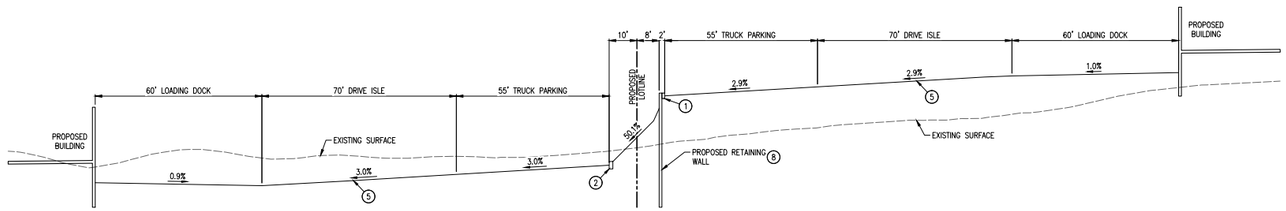
SECTION D-D
SCALE: 1"=20'



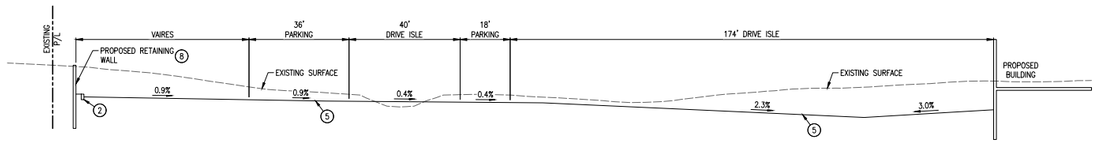
SECTION E-E
SCALE: 1"=20'



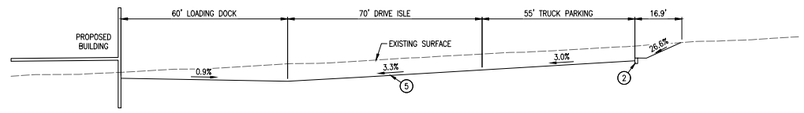
SECTION G-G
SCALE: 1"=20'



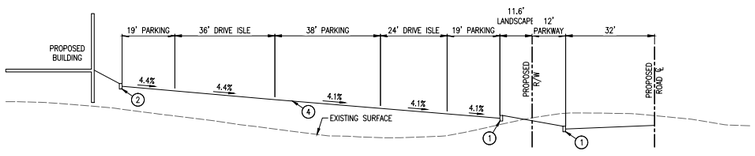
SECTION F-F
SCALE: 1"=20'



SECTION H-H
SCALE: 1"=20'



SECTION I-I
SCALE: 1"=20'



SECTION J-J
SCALE: 1"=20'

CONSTRUCTION NOTES

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PREPARED UNDER THE SUPERVISION OF:

GLENN M. CHUNG, P.E.	62974	8/16/2022
NAME OF ENGINEER	R.C.E.	DATE:

CITY OF APPLE VALLEY

STODDARD WELLS ROAD

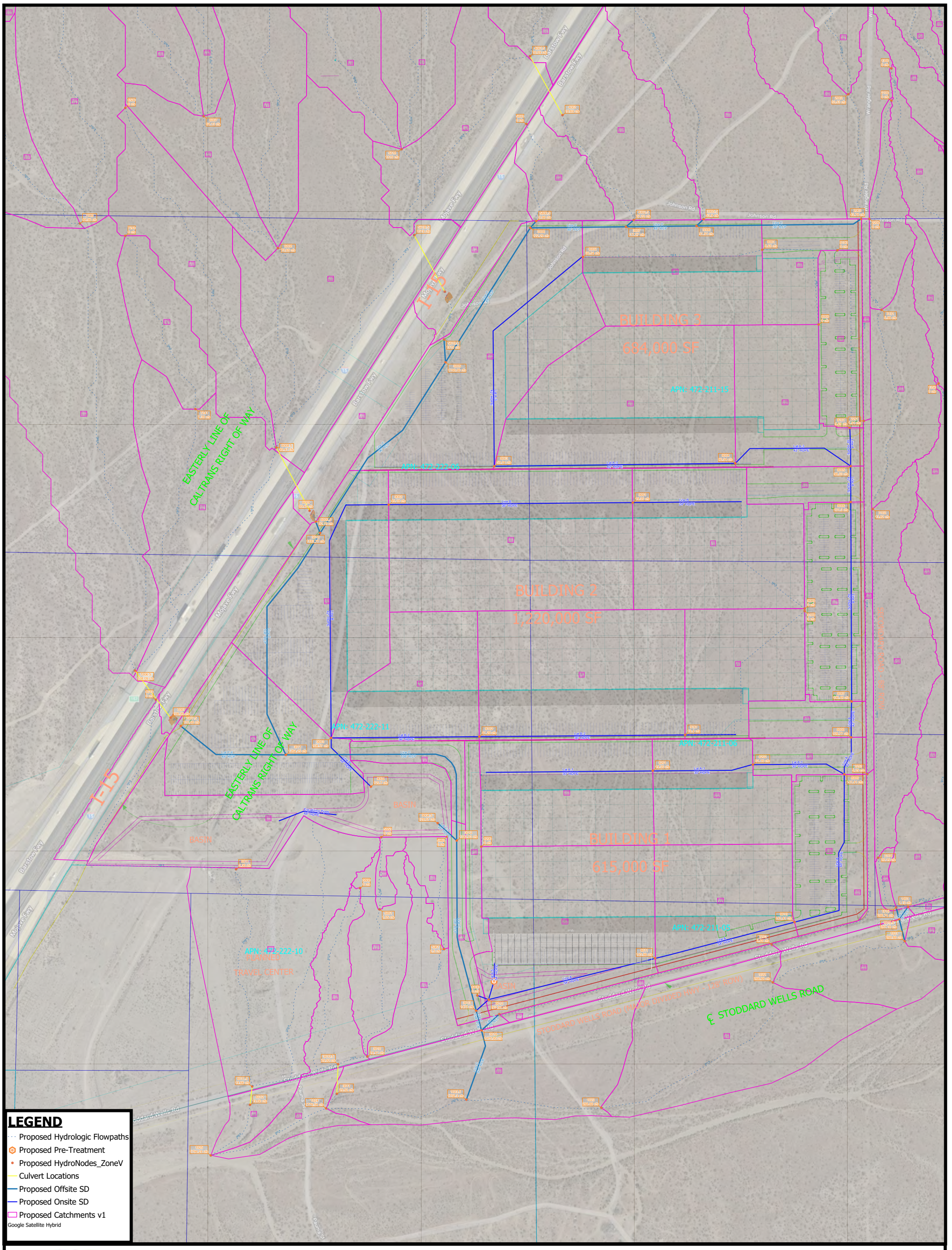
APPLE VALLEY 146 AC SITE
CROSS SECTIONS

DRAWN BY: WLG	SCALE: 1"=80'
DESIGNED BY: WLG	DATE: 8/18/2022
CHECKED BY: WLG	SHT NO.: 3 OF 5

Drawing Name: P:\Year-2021\2021-473 Apple Valley 143 AC Site - Covington Investments, LLC - Brandon Gilkey\06 Engineering\Sheets\CONCEPTUAL\07-2021-473_CC.dwg
Last Opened: Aug 16, 2022 - 4:56pm By: Richmond.Trinh

Appendix K

Conceptual Hydraulic Computations


I-15
Mojave Fwy
Barstow Fwy
Johnson Rd
Wrangler Rd
BUILDING 3
684,000 SF
APN: 472-211-15
APN: 472-222-06
BUILDING 2
1,220,000 SF
APN: 472-222-11
APN: 472-211-06
BUILDING 1
615,000 SF
APN: 472-211-05
APN: 472-222-10
PLANNED
TRAVEL CENTER
BASIN
EASTERLY LINE OF CALTRANS RIGHT OF WAY
STODDARD WELLS ROAD (MAJOR DIVIDED HWY - 128' ROW)
STODDARD WELLS ROAD
Stoddard Wells Rd
Palmdale Rd
Burbank Blvd
Lucerne Blvd
Lucerne Dr
Palmdale Rd
Lucerne Dr
Lucerne Blvd
Burbank Blvd
Palmdale Rd
Stoddard Wells Rd
Stoddard Wells Rd
Stoddard Wells

Hydraulic Analysis Report

Project Data

Project Title: Line A - Conceptual 100-YR hydraulics

Designer:

Project Date: Friday, September 23, 2022

Project Units: U.S. Customary Units

Notes:

Channel Analysis: LatA-3_8004_8005

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 3.50 ft

Longitudinal Slope: 0.0150 ft/ft

Manning's n: 0.0130

Flow 91.1600 cfs

Result Parameters

Depth 2.2402 ft

Area of Flow 6.5035 ft^2

Wetted Perimeter 6.4915 ft

Hydraulic Radius 1.0019 ft

Average Velocity 14.0170 ft/s

Top Width 3.3599 ft

Froude Number: 1.7755

Critical Depth 2.9600 ft

Critical Velocity 10.5043 ft/s

Critical Slope: 0.0078 ft/ft

Critical Top Width 2.53 ft

Calculated Max Shear Stress 2.0968 lb/ft^2

Calculated Avg Shear Stress 0.9377 lb/ft^2

Channel Analysis: LineA_8101_8005

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 1.50 ft

Longitudinal Slope: 0.0150 ft/ft

Manning's n: 0.0130

Flow 9.6900 cfs

Result Parameters

Depth 0.9721 ft

Area of Flow 1.2118 ft^2

Wetted Perimeter 2.8072 ft

Hydraulic Radius 0.4317 ft

Average Velocity 7.9962 ft/s

Top Width 1.4327 ft

Froude Number: 1.5322

Critical Depth 1.2012 ft

Critical Velocity 6.3878 ft/s

Critical Slope: 0.0089 ft/ft

Critical Top Width 1.20 ft

Calculated Max Shear Stress 0.9099 lb/ft^2

Calculated Avg Shear Stress 0.4041 lb/ft^2

Channel Analysis: LineA_8005_8006

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 3.50 ft

Longitudinal Slope: 0.0150 ft/ft

Manning's n: 0.0130

Flow 101.0300 cfs

Result Parameters

Depth 2.4116 ft

Area of Flow 7.0697 ft^2

Wetted Perimeter 6.8547 ft

Hydraulic Radius 1.0314 ft

Average Velocity 14.2906 ft/s

Top Width 3.2403 ft

Froude Number: 1.7049

Critical Depth 3.0796 ft

Critical Velocity 11.2678 ft/s

Critical Slope: 0.0091 ft/ft

Critical Top Width 2.28 ft

Calculated Max Shear Stress 2.2572 lb/ft^2

Calculated Avg Shear Stress 0.9654 lb/ft^2

Channel Analysis: LineA_8006_8007

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 3.50 ft

Longitudinal Slope: 0.0150 ft/ft

Manning's n: 0.0130

Flow 106.4800 cfs

Result Parameters

Depth 2.5111 ft

Area of Flow 7.3880 ft^2

Wetted Perimeter 7.0727 ft

Hydraulic Radius 1.0446 ft

Average Velocity 14.4126 ft/s

Top Width 3.1516 ft

Froude Number: 1.6589

Critical Depth 3.1377 ft

Critical Velocity 11.7083 ft/s

Critical Slope: 0.0099 ft/ft

Critical Top Width 2.13 ft

Calculated Max Shear Stress 2.3504 lb/ft^2

Calculated Avg Shear Stress 0.9777 lb/ft^2

Channel Analysis: LineA_8007_8008

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 3.50 ft

Longitudinal Slope: 0.0150 ft/ft

Manning's n: 0.0130

Flow 109.7700 cfs

Result Parameters

Depth 2.5737 ft

Area of Flow 7.5833 ft^2

Wetted Perimeter 7.2131 ft

Hydraulic Radius 1.0513 ft

Average Velocity 14.4752 ft/s

Top Width 3.0880 ft

Froude Number: 1.6278

Critical Depth 3.1685 ft

Critical Velocity 11.9853 ft/s

Critical Slope: 0.0104 ft/ft

Critical Top Width 2.05 ft

Calculated Max Shear Stress 2.4090 lb/ft^2

Calculated Avg Shear Stress 0.9840 lb/ft^2

Channel Analysis: LineA_8008_8009

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 3.50 ft

Longitudinal Slope: 0.0150 ft/ft

Manning's n: 0.0130

Flow 109.7700 cfs

Result Parameters

Depth 2.5737 ft

Area of Flow 7.5833 ft^2

Wetted Perimeter 7.2131 ft

Hydraulic Radius 1.0513 ft

Average Velocity 14.4752 ft/s

Top Width 3.0880 ft

Froude Number: 1.6278

Critical Depth 3.1685 ft

Critical Velocity 11.9853 ft/s

Critical Slope: 0.0104 ft/ft

Critical Top Width 2.05 ft

Calculated Max Shear Stress 2.4090 lb/ft^2

Calculated Avg Shear Stress 0.9840 lb/ft^2

Channel Analysis: LatA-1_8202_8009

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 2.50 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0130

Flow 33.2100 cfs

Result Parameters

Depth 1.7065 ft

Area of Flow 3.5697 ft^2

Wetted Perimeter 4.8616 ft

Hydraulic Radius 0.7343 ft

Average Velocity 9.3033 ft/s

Top Width 2.3273 ft

Froude Number: 1.3238

Critical Depth 1.9604 ft

Critical Velocity 8.0419 ft/s

Critical Slope: 0.0071 ft/ft

Critical Top Width 2.06 ft

Calculated Max Shear Stress 1.0649 lb/ft^2

Calculated Avg Shear Stress 0.4582 lb/ft^2

Channel Analysis: LineA_8009_8010

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 4.00 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0130

Flow 141.4100 cfs

Result Parameters

Depth 3.2236 ft

Area of Flow 10.8524 ft^2

Wetted Perimeter 8.9166 ft

Hydraulic Radius 1.2171 ft

Average Velocity 13.0303 ft/s

Top Width 3.1640 ft

Froude Number: 1.2399

Critical Depth 3.5234 ft

Critical Velocity 12.0645 ft/s

Critical Slope: 0.0087 ft/ft

Critical Top Width 2.59 ft

Calculated Max Shear Stress 2.0116 lb/ft^2

Calculated Avg Shear Stress 0.7595 lb/ft^2

Channel Analysis: LineA_8010_8011

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 4.00 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0130

Flow 145.9800 cfs

Result Parameters

Depth 3.3406 ft

Area of Flow 11.2112 ft^2

Wetted Perimeter 9.2216 ft

Hydraulic Radius 1.2158 ft

Average Velocity 13.0209 ft/s

Top Width 2.9684 ft

Froude Number: 1.1807

Critical Depth 3.5625 ft

Critical Velocity 12.3497 ft/s

Critical Slope: 0.0092 ft/ft

Critical Top Width 2.50 ft

Calculated Max Shear Stress 2.0845 lb/ft^2

Calculated Avg Shear Stress 0.7586 lb/ft^2

Channel Analysis: LineA_8011_8012

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 4.50 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0130

Flow 161.9800 cfs

Result Parameters

Depth 3.1112 ft

Area of Flow 11.7308 ft^2

Wetted Perimeter 8.8361 ft

Hydraulic Radius 1.3276 ft

Average Velocity 13.8080 ft/s

Top Width 4.1573 ft

Froude Number: 1.4486

Critical Depth 3.7178 ft

Critical Velocity 11.5264 ft/s

Critical Slope: 0.0067 ft/ft

Critical Top Width 3.41 ft

Calculated Max Shear Stress 1.9414 lb/ft^2

Calculated Avg Shear Stress 0.8284 lb/ft^2

Channel Analysis: LatA-4_8400_8012

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 2.00 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0130

Flow 15.4000 cfs

Result Parameters

Depth 1.2104 ft

Area of Flow 1.9885 ft^2

Wetted Perimeter 3.5656 ft

Hydraulic Radius 0.5577 ft

Average Velocity 7.7445 ft/s

Top Width 1.9552 ft

Froude Number: 1.3533

Critical Depth 1.4141 ft

Critical Velocity 6.4853 ft/s

Critical Slope: 0.0064 ft/ft

Critical Top Width 1.82 ft

Calculated Max Shear Stress 0.7553 lb/ft^2

Calculated Avg Shear Stress 0.3480 lb/ft^2

Channel Analysis: LineA_8012_80125

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 4.50 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0130

Flow 167.9400 cfs

Result Parameters

Depth 3.1987 ft

Area of Flow 12.0910 ft^2

Wetted Perimeter 9.0272 ft

Hydraulic Radius 1.3394 ft

Average Velocity 13.8896 ft/s

Top Width 4.0805 ft

Froude Number: 1.4220

Critical Depth 3.7771 ft

Critical Velocity 11.7834 ft/s

Critical Slope: 0.0070 ft/ft

Critical Top Width 3.30 ft

Calculated Max Shear Stress 1.9960 lb/ft^2

Calculated Avg Shear Stress 0.8358 lb/ft^2

Channel Analysis: LineA_8012_3013

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 4.50 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0130

Flow 167.9400 cfs

Result Parameters

Depth 3.1987 ft

Area of Flow 12.0910 ft^2

Wetted Perimeter 9.0272 ft

Hydraulic Radius 1.3394 ft

Average Velocity 13.8896 ft/s

Top Width 4.0805 ft

Froude Number: 1.4220

Critical Depth 3.7771 ft

Critical Velocity 11.7834 ft/s

Critical Slope: 0.0070 ft/ft

Critical Top Width 3.30 ft

Calculated Max Shear Stress 1.9960 lb/ft^2

Calculated Avg Shear Stress 0.8358 lb/ft^2

Hydraulic Analysis Report

Project Data

Project Title: Line B - Conceptual 100-YR hydraulics

Designer:

Project Date: Friday, September 23, 2022

Project Units: U.S. Customary Units

Notes:

Channel Analysis: LineB_90005_9001

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 2.00 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0130

Flow 19.3500 cfs

Result Parameters

Depth 1.4234 ft

Area of Flow 2.3915 ft^2

Wetted Perimeter 4.0160 ft

Hydraulic Radius 0.5955 ft

Average Velocity 8.0910 ft/s

Top Width 1.8119 ft

Froude Number: 1.2411

Critical Depth 1.5820 ft

Critical Velocity 7.2599 ft/s

Critical Slope: 0.0078 ft/ft

Critical Top Width 1.63 ft

Calculated Max Shear Stress 0.8882 lb/ft^2

Calculated Avg Shear Stress 0.3716 lb/ft^2

Channel Analysis: LineB_9001_9002

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 3.00 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0130

Flow 45.1800 cfs

Result Parameters

Depth 1.8097 ft

Area of Flow 4.4568 ft^2

Wetted Perimeter 5.3363 ft

Hydraulic Radius 0.8352 ft

Average Velocity 10.1373 ft/s

Top Width 2.9354 ft

Froude Number: 1.4498

Critical Depth 2.1885 ft

Critical Velocity 8.1778 ft/s

Critical Slope: 0.0059 ft/ft

Critical Top Width 2.67 ft

Calculated Max Shear Stress 1.1293 lb/ft^2

Calculated Avg Shear Stress 0.5212 lb/ft^2

Channel Analysis: LineB_9002_9003

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 3.50 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0130

Flow 61.0300 cfs

Result Parameters

Depth 1.9674 ft

Area of Flow 5.5695 ft^2

Wetted Perimeter 5.9337 ft

Hydraulic Radius 0.9386 ft

Average Velocity 10.9579 ft/s

Top Width 3.4729 ft

Froude Number: 1.5249

Critical Depth 2.4473 ft

Critical Velocity 8.4943 ft/s

Critical Slope: 0.0053 ft/ft

Critical Top Width 3.21 ft

Calculated Max Shear Stress 1.2277 lb/ft^2

Calculated Avg Shear Stress 0.5857 lb/ft^2

Channel Analysis: LineB_9003_9004

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 4.00 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0130

Flow 108.5700 cfs

Result Parameters

Depth 2.5986 ft

Area of Flow 8.6414 ft^2

Wetted Perimeter 7.4990 ft

Hydraulic Radius 1.1523 ft

Average Velocity 12.5640 ft/s

Top Width 3.8166 ft

Froude Number: 1.4715

Critical Depth 3.1523 ft

Critical Velocity 10.2203 ft/s

Critical Slope: 0.0062 ft/ft

Critical Top Width 3.27 ft

Calculated Max Shear Stress 1.6215 lb/ft^2

Calculated Avg Shear Stress 0.7191 lb/ft^2

Channel Analysis: LatB-2_9102_9003

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 3.00 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0130

Flow 41.2800 cfs

Result Parameters

Depth 1.7077 ft

Area of Flow 4.1553 ft^2

Wetted Perimeter 5.1291 ft

Hydraulic Radius 0.8102 ft

Average Velocity 9.9342 ft/s

Top Width 2.9711 ft

Froude Number: 1.4803

Critical Depth 2.0918 ft

Critical Velocity 7.8442 ft/s

Critical Slope: 0.0055 ft/ft

Critical Top Width 2.76 ft

Calculated Max Shear Stress 1.0656 lb/ft^2

Calculated Avg Shear Stress 0.5055 lb/ft^2

Channel Analysis: LatB-3_90045_3012

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 4.00 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0130

Flow 128.6700 cfs

Result Parameters

Depth 2.9550 ft

Area of Flow 9.9526 ft^2

Wetted Perimeter 8.2744 ft

Hydraulic Radius 1.2028 ft

Average Velocity 12.9282 ft/s

Top Width 3.5145 ft

Froude Number: 1.3539

Critical Depth 3.3965 ft

Critical Velocity 11.3123 ft/s

Critical Slope: 0.0076 ft/ft

Critical Top Width 2.86 ft

Calculated Max Shear Stress 1.8439 lb/ft^2

Calculated Avg Shear Stress 0.7506 lb/ft^2

Hydraulic Analysis Report

Project Data

Project Title: Line C - Conceptual 100-YR hydraulics

Designer:

Project Date: Friday, September 23, 2022

Project Units: U.S. Customary Units

Notes:

Channel Analysis: LineC_2003_3006

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 3.00 ft

Longitudinal Slope: 0.0150 ft/ft

Manning's n: 0.0130

Flow 43.7800 cfs

Result Parameters

Depth 1.5632 ft

Area of Flow 3.7239 ft^2

Wetted Perimeter 4.8389 ft

Hydraulic Radius 0.7696 ft

Average Velocity 11.7565 ft/s

Top Width 2.9973 ft

Froude Number: 1.8587

Critical Depth 2.1562 ft

Critical Velocity 8.0503 ft/s

Critical Slope: 0.0057 ft/ft

Critical Top Width 2.70 ft

Calculated Max Shear Stress 1.4632 lb/ft^2

Calculated Avg Shear Stress 0.7203 lb/ft^2

Channel Analysis: LatC-1_30055_3006

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 3.50 ft

Longitudinal Slope: 0.0150 ft/ft

Manning's n: 0.0130

Flow 53.9000 cfs

Result Parameters

Depth 1.6195 ft

Area of Flow 4.3543 ft^2

Wetted Perimeter 5.2366 ft

Hydraulic Radius 0.8315 ft

Average Velocity 12.3786 ft/s

Top Width 3.4903 ft

Froude Number: 1.9531

Critical Depth 2.2969 ft

Critical Velocity 8.0532 ft/s

Critical Slope: 0.0049 ft/ft

Critical Top Width 3.32 ft

Calculated Max Shear Stress 1.5159 lb/ft^2

Calculated Avg Shear Stress 0.7783 lb/ft^2

Channel Analysis: LineC_3006_3007

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 4.00 ft

Longitudinal Slope: 0.0150 ft/ft

Manning's n: 0.0130

Flow 91.9100 cfs

Result Parameters

Depth 2.0527 ft

Area of Flow 6.4938 ft^2

Wetted Perimeter 6.3885 ft

Hydraulic Radius 1.0165 ft

Average Velocity 14.1534 ft/s

Top Width 3.9986 ft

Froude Number: 1.9572

Critical Depth 2.9062 ft

Critical Velocity 9.3977 ft/s

Critical Slope: 0.0053 ft/ft

Critical Top Width 3.57 ft

Calculated Max Shear Stress 1.9213 lb/ft^2

Calculated Avg Shear Stress 0.9514 lb/ft^2

Channel Analysis: LatC-2_40025_3007

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 3.00 ft

Longitudinal Slope: 0.0150 ft/ft

Manning's n: 0.0130

Flow 27.2200 cfs

Result Parameters

Depth 1.1927 ft

Area of Flow 2.6188 ft^2

Wetted Perimeter 4.0933 ft

Hydraulic Radius 0.6398 ft

Average Velocity 10.3942 ft/s

Top Width 2.9364 ft

Froude Number: 1.9396

Critical Depth 1.6860 ft

Critical Velocity 6.6537 ft/s

Critical Slope: 0.0045 ft/ft

Critical Top Width 2.98 ft

Calculated Max Shear Stress 1.1163 lb/ft^2

Calculated Avg Shear Stress 0.5988 lb/ft^2

Channel Analysis: LineC_3007_3008

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 4.00 ft

Longitudinal Slope: 0.0150 ft/ft

Manning's n: 0.0130

Flow 117.2700 cfs

Result Parameters

Depth 2.3878 ft

Area of Flow 7.8244 ft^2

Wetted Perimeter 7.0636 ft

Hydraulic Radius 1.1077 ft

Average Velocity 14.9877 ft/s

Top Width 3.9241 ft

Froude Number: 1.8705

Critical Depth 3.2656 ft

Critical Velocity 10.6766 ft/s

Critical Slope: 0.0067 ft/ft

Critical Top Width 3.10 ft

Calculated Max Shear Stress 2.2349 lb/ft^2

Calculated Avg Shear Stress 1.0368 lb/ft^2

Channel Analysis: LatC-3_58005_3008

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 1.50 ft

Longitudinal Slope: 0.0150 ft/ft

Manning's n: 0.0130

Flow 9.9800 cfs

Result Parameters

Depth 0.9925 ft

Area of Flow 1.2409 ft^2

Wetted Perimeter 2.8502 ft

Hydraulic Radius 0.4354 ft

Average Velocity 8.0422 ft/s

Top Width 1.4194 ft

Froude Number: 1.5157

Critical Depth 1.2173 ft

Critical Velocity 6.4972 ft/s

Critical Slope: 0.0092 ft/ft

Critical Top Width 1.17 ft

Calculated Max Shear Stress 0.9290 lb/ft^2

Calculated Avg Shear Stress 0.4075 lb/ft^2

Channel Analysis: LineC_3008_3009

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 4.00 ft

Longitudinal Slope: 0.0150 ft/ft

Manning's n: 0.0130

Flow 122.2900 cfs

Result Parameters

Depth 2.4545 ft

Area of Flow 8.0855 ft^2

Wetted Perimeter 7.2003 ft

Hydraulic Radius 1.1229 ft

Average Velocity 15.1246 ft/s

Top Width 3.8953 ft

Froude Number: 1.8500

Critical Depth 3.3242 ft

Critical Velocity 10.9555 ft/s

Critical Slope: 0.0071 ft/ft

Critical Top Width 3.00 ft

Calculated Max Shear Stress 2.2974 lb/ft^2

Calculated Avg Shear Stress 1.0511 lb/ft^2

Channel Analysis: LatC-4_50195_3009

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 8.00 ft

Longitudinal Slope: 0.0150 ft/ft

Manning's n: 0.0130

Flow 1019.0000 cfs

Result Parameters

Depth 6.0020 ft

Area of Flow 40.4523 ft^2

Wetted Perimeter 16.7598 ft

Hydraulic Radius 2.4137 ft

Average Velocity 25.1901 ft/s

Top Width 6.9259 ft

Froude Number: 1.8368

Critical Depth 7.5508 ft

Critical Velocity 20.7327 ft/s

Critical Slope: 0.0108 ft/ft

Critical Top Width 3.68 ft

Calculated Max Shear Stress 5.6179 lb/ft^2

Calculated Avg Shear Stress 2.2592 lb/ft^2

Channel Analysis: LineC_3009_3010

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 8.00 ft

Longitudinal Slope: 0.0150 ft/ft

Manning's n: 0.0130

Flow 1106.0600 cfs

Result Parameters

Depth 6.4865 ft

Area of Flow 43.6569 ft^2

Wetted Perimeter 17.9330 ft

Hydraulic Radius 2.4344 ft

Average Velocity 25.3353 ft/s

Top Width 6.2665 ft

Froude Number: 1.6915

Critical Depth 7.6660 ft

Critical Velocity 22.3236 ft/s

Critical Slope: 0.0128 ft/ft

Critical Top Width 3.20 ft

Calculated Max Shear Stress 6.0714 lb/ft^2

Calculated Avg Shear Stress 2.2786 lb/ft^2

Channel Analysis: LatC-5_60095_3010

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 4.00 ft

Longitudinal Slope: 0.0150 ft/ft

Manning's n: 0.0130

Flow 92.1500 cfs

Result Parameters

Depth 2.0559 ft

Area of Flow 6.5067 ft^2

Wetted Perimeter 6.3950 ft

Hydraulic Radius 1.0175 ft

Average Velocity 14.1622 ft/s

Top Width 3.9984 ft

Froude Number: 1.9564

Critical Depth 2.9102 ft

Critical Velocity 9.4089 ft/s

Critical Slope: 0.0053 ft/ft

Critical Top Width 3.56 ft

Calculated Max Shear Stress 1.9243 lb/ft^2

Calculated Avg Shear Stress 0.9524 lb/ft^2

Channel Analysis: LineC_3010_3011

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 9.00 ft

Longitudinal Slope: 0.0150 ft/ft

Manning's n: 0.0130

Flow 1183.7700 cfs

Result Parameters

Depth 5.9462 ft

Area of Flow 44.5971 ft^2

Wetted Perimeter 17.0819 ft

Hydraulic Radius 2.6108 ft

Average Velocity 26.5436 ft/s

Top Width 8.5225 ft

Froude Number: 2.0449

Critical Depth 8.1870 ft

Critical Velocity 19.4808 ft/s

Critical Slope: 0.0079 ft/ft

Critical Top Width 5.16 ft

Calculated Max Shear Stress 5.5657 lb/ft^2

Calculated Avg Shear Stress 2.4437 lb/ft^2

Channel Analysis: LatC-6_70075_3011

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 4.00 ft

Longitudinal Slope: 0.0150 ft/ft

Manning's n: 0.0130

Flow 110.4800 cfs

Result Parameters

Depth 2.2980 ft

Area of Flow 7.4709 ft^2

Wetted Perimeter 6.8815 ft

Hydraulic Radius 1.0857 ft

Average Velocity 14.7881 ft/s

Top Width 3.9553 ft

Froude Number: 1.8962

Critical Depth 3.1758 ft

Critical Velocity 10.3260 ft/s

Critical Slope: 0.0063 ft/ft

Critical Top Width 3.24 ft

Calculated Max Shear Stress 2.1510 lb/ft^2

Calculated Avg Shear Stress 1.0162 lb/ft^2

Channel Analysis: LineC_3011_3012

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 9.00 ft

Longitudinal Slope: 0.0150 ft/ft

Manning's n: 0.0130

Flow 1264.2500 cfs

Result Parameters

Depth 6.2396 ft

Area of Flow 47.0656 ft^2

Wetted Perimeter 17.7094 ft

Hydraulic Radius 2.6577 ft

Average Velocity 26.8614 ft/s

Top Width 8.3003 ft

Froude Number: 1.9879

Critical Depth 8.3408 ft

Critical Velocity 20.5488 ft/s

Critical Slope: 0.0089 ft/ft

Critical Top Width 4.69 ft

Calculated Max Shear Stress 5.8402 lb/ft^2

Calculated Avg Shear Stress 2.4876 lb/ft^2

Channel Analysis: LineC_3012_3013

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 9.00 ft

Longitudinal Slope: 0.0200 ft/ft

Manning's n: 0.0130

Flow 1342.0300 cfs

Result Parameters

Depth 5.8693 ft

Area of Flow 43.9396 ft^2

Wetted Perimeter 16.9199 ft

Hydraulic Radius 2.5969 ft

Average Velocity 30.5426 ft/s

Top Width 8.5732 ft

Froude Number: 2.3775

Critical Depth 8.4595 ft

Critical Velocity 21.6259 ft/s

Critical Slope: 0.0100 ft/ft

Critical Top Width 4.28 ft

Calculated Max Shear Stress 7.3249 lb/ft^2

Calculated Avg Shear Stress 3.2409 lb/ft^2

Channel Analysis: LineC_3013_3014

Notes:

Input Parameters

Channel Type: Rectangular

Channel Width 9.00 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0130

Flow 1470.0900 cfs

Result Parameters

Depth 7.2369 ft

Area of Flow 65.1321 ft^2

Wetted Perimeter 23.4738 ft

Hydraulic Radius 2.7747 ft

Average Velocity 22.5709 ft/s

Top Width 9.0000 ft

Froude Number: 1.4786

Critical Depth 9.3925 ft

Critical Velocity 17.3908 ft/s

Critical Slope: 0.0053 ft/ft

Critical Top Width 9.00 ft

Calculated Max Shear Stress 4.5158 lb/ft^2

Calculated Avg Shear Stress 1.7314 lb/ft^2

Channel Analysis: LatC-8_2204_3014

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 1.50 ft

Longitudinal Slope: 0.0150 ft/ft

Manning's n: 0.0130

Flow 12.3800 cfs

Result Parameters

Depth 1.1815 ft

Area of Flow 1.4930 ft^2

Wetted Perimeter 3.2756 ft

Hydraulic Radius 0.4558 ft

Average Velocity 8.2918 ft/s

Top Width 1.2269 ft

Froude Number: 1.3246

Critical Depth 1.3286 ft

Critical Velocity 7.4788 ft/s

Critical Slope: 0.0124 ft/ft

Critical Top Width 0.95 ft

Calculated Max Shear Stress 1.1058 lb/ft^2

Calculated Avg Shear Stress 0.4266 lb/ft^2

Channel Analysis: LineC_3014_10235

Notes:

Input Parameters

Channel Type: Rectangular

Channel Width 9.00 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0130

Flow 1475.9500 cfs

Result Parameters

Depth 7.2598 ft

Area of Flow 65.3385 ft^2

Wetted Perimeter 23.5197 ft

Hydraulic Radius 2.7780 ft

Average Velocity 22.5893 ft/s

Top Width 9.0000 ft

Froude Number: 1.4774

Critical Depth 9.4175 ft

Critical Velocity 17.4139 ft/s

Critical Slope: 0.0053 ft/ft

Critical Top Width 9.00 ft

Calculated Max Shear Stress 4.5301 lb/ft^2

Calculated Avg Shear Stress 1.7335 lb/ft^2

Hydraulic Analysis Report

Project Data

Project Title: Line D - Conceptual 100-YR hydraulics

Designer:

Project Date: Friday, September 23, 2022

Project Units: U.S. Customary Units

Notes:

Channel Analysis: LineD_1019_10195

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter 6.00 ft

Longitudinal Slope: 0.0100 ft/ft

Manning's n: 0.0130

Flow 286.7400 cfs

Result Parameters

Depth 3.6183 ft

Area of Flow 17.8203 ft^2

Wetted Perimeter 10.6702 ft

Hydraulic Radius 1.6701 ft

Average Velocity 16.0906 ft/s

Top Width 5.8712 ft

Froude Number: 1.6276

Critical Depth 4.6318 ft

Critical Velocity 12.2427 ft/s

Critical Slope: 0.0052 ft/ft

Critical Top Width 5.03 ft

Calculated Max Shear Stress 2.2578 lb/ft^2

Calculated Avg Shear Stress 1.0421 lb/ft^2