APPENDIX B

QUALITY ASSURANCE ASSESSMENTS:
GEOSOILS, INC. FAULT/SEISMIC INVESTIGATION
LYTLE CREEK RANCH, NEIGHBORHOODS II AND III
CITY OF RIALTO, SAN BERNARDINO COUNTY, CALIFORNIA
BY DR. ROY J. SHLEMON

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Quaternary Geology
Economic Geomorphology
Soil Stratigraphy
Geoarchaeology

APPENDIX B

QUALITY ASSURANCE ASSESSMENTS: GEOSOILS, INC., FAULT/SEISMIC INVESTIGATION, LYTLE CREEK RANCH, NEIGHBORHOODS II AND III, CITY OF RIALTO, SAN BERNARDINO COUNTY, CALIFORNIA

INTRODUCTION

This Appendix summarizes field observations and document review concerning the age of sediments and faults exposed in trenches emplaced and logged by GeoSoils, Inc. (GSI) at the proposed "Neighborhoods II and III" development at Lytle Creek Ranch in the City of Rialto. The specific investigations (Planning Areas) are shown on GSI Plate I. The main GSI focus was to locate and assess the relative activity of possibly onsite stands of the San Jacinto fault zone. Accordingly, as documented in the GSI report, the level of investigation varied depending on proposed, site-specific land use.

The main purposes of these QA observations were three-fold:

1. To provide internal quality assurance (QA) on behalf of the Lytle Creek Development Company (Ontario);

2. To assist GSI in dating site sediments and faults based mainly on soil (pedogenic) and geomorphic field observations; and

3. To critique the GSI draft report and graphics for documentation adequacy and reasonableness of technical interpretation.

The field observations were carried out periodically in August and September 2006 based on availability of trench exposures. Logistical support was kindly provided by the GSI staff, particularly R. Boehmer, J. Franklin and P. McClay. Pertinent location and geological maps, trench logs and literature are provided in the GSI report and hence are referred to, but not replicated in this Appendix. Soil terminology follows that of the U. S. Natural Resources

Conservation Service (Soil Survey Division Staff, 1993; Soil Survey Staff, 1975); and application of soil-stratigraphic dating techniques to engineering geology are summarized in Shlemon (1985), Birkeland (1999), Birkeland and others (1991), Noller and others (2000) and Schaetzl and Anderson (2005).

GSI INVESTIGATION PROCEDURES

GSI investigated potential on-site faulting using traditional and well-accepted procedures: initial review of pertinent literature; aerial-photographic lineament analyses; geological mapping; trench emplacement across previous inferred faults and suspect lineaments; trench logging and documentation of sediment age using soil-stratigraphic methods; assessment of fault age, recurrence and relation to the regional tectonic setting; and technical interpretation and final-report documentation. These procedures are spelled out in the GSI report and associated graphics.

FAULT-DATING STRATIGRAPHIC MARKERS

Part of the proposed Lytle Creek development lies within a State of California-designated "Earthquake Hazard Zone" associated with the San Jacinto fault system. Almost the entire site lies on late Holocene channel and overbank deposits laid down by Lytle Creek. Accordingly, there is little or no obvious geomorphic expression of on-site faulting. Nevertheless, the 20 to 25-ft deep GSI trenches encountered two discrete fault zones informally designated Zone 1 and 2 on the south and north sides of the site, respectively (GSI Plate 1).

Owing to the lack of detrital charcoal or other materials suitable for unequivocal numeric dating, GSI assessed sediment and fault age primarily by the relative development of two buried paleosols that form almost continuous stratigraphic markers across the site (GSI FT-1). As documented on the GSI logs, the upper paleosol is "slightly developed," characterized mainly by a brownish yellow (10YR 6/8) to yellowish brown (10YR 5/4), several-inch thick cambic horizon (Bwb). The paleosol is locally truncated by high-energy, fluvial gravels, but is sufficiently preserved to reasonably constrain the last time of fault displacement. Based on relative development, the upper soil reflects an estimated ~1.0 -1.5 ka of weathering.

The lower buried paleosol is slightly more strongly developed. It locally bears a brown (7.5YR 5/4), incipient argillic horizon (Btjb) best expressed on overbank silts that tend to impede downward migration of gravitational water.

Characteristic are the few, thin and patchy clay films that line ped faces and fill root pores. This paleosol represents an estimated ~4 to 5 ka of weathering and is displaced both by Fault Zones 1 and 2 (see GSI logs). Last displacement of site faults therefore occurred after ~4 to 5 ka, but prior to ~1.0 to 1.5 ka ago. Neither buried paleosol preserves an original organic horizon, which most likely was oxidized or truncated during deposition of overlying channel sediments. Based on the cumulative age of the two paleosols, the ~20 to 25-ft deep GSI trenches expose sediments no older than about ~5 or 6 ka.

ON-SITE FAULT CHARACTERISTICS

GSI identifies Fault Zone 1 (FZ 1) as several subparallel splays in the extreme southern boundary of the East Village project area (Plate 1). Although without geomorphic expression, the faults cut the lower of the two Holocene buried paleosols, display recurrence, have a component of horizontal slip, increase in offset to the south, and are generally not continuous slip surfaces, but rather local, en-echelon step-over displacements. GSI interprets FZ-1 displacement as indicative of at least 2, post-4 to 5 ka, but pre ~1.5 ka events. Because last displacement demonstrably occurred during middle and late Holocene time, GSI properly establishes a 50-ft setback zone for habitable structures (Plate 1)

GSI encountered Fault Zone 2 (FZ-2) in the northern part of the proposed development, as exposed in Trenches FT-3 and FT-5 (see GSI logs). Here, too, the lower, ~4 to 5 ka paleosol is displaced, but the overlying ~1.0 to 1.5 paleosol is unbroken. GSI notes that at least three distinct slip events most likely took place between ~5 to 6 ka and ~ 1.5 ka. Owing to cover by active floodplain deposits in Lytle Creek, FZ-2 has no obvious geomorphic expression. Nevertheless, GSI conservatively establishes a 50-ft setback zone based on trench exposures and on reasonable extrapolation of fault trend (Plate 1).

The GSI site trenches, in particular T-1 (Plate 1), show that ~4 to 5 ka sediments between FZ-1 and -2 are demonstrably unbroken. Further, because FZ-1 apparent slip increases to the south and FZ-2 offset increases to the north, GSI logically concludes that the two fault zones represent a broad right step in this section of the San Jacinto fault system. In contrast with the Glen Helen and other known active, "main" traces of the San Jacinto system, FZ-1 and -2 are not through-going structures. Moreover, based on literature review, GSI points out that San Jacinto main-trace faults have estimated Holocene recurrence of ~100 to 300 years, almost an order of magnitude more frequent than on-site, Fault Zones 1 and 2. Accordingly, as a reasonable working hypothesis, FZ-1 and -2

are probably not primary seismogenic structures, but rather are secondary displacements that coseismically react to ~M7+ events on nearby main traces of the San Jacinto system.

OTHER GEOTECHNICAL CONSTRAINTS

GSI reports the presence of local, sand-filled dikes and similar features suggestive of on-site paleo-liquefaction. Reasonably, therefore, liquefaction assessments should be carried out particularly in light of potential perched water stemming from future landscape irrigation and other anthropic-induced runoff.

Owing to proximity of the San Jacinto fault system, the potential for local, seismically induced ground shaking is very high, perhaps reaching or exceeding ~1g (horizontal). Therefore, in addition to liquefaction, dry sand settlement may also induce ground deformation. GSI thus justifiably recommends an appropriate geotechnical engineering analysis, and probable mitigation in the form of strengthened foundations, over-excavation and placement of well designed geotextiles.

SUMMARY AND CONCLUSIONS

GSI completed a fault-activity assessment for the proposed development of Neighborhoods II and III of the Lytle Creek Ranch in the City of Rialto. GSI investigations levels appropriately varied according to proposed land-use and conformed to present standards of practice for the area.

Trenching across aerial-photographic lineaments and a State of California-designated "Earth Hazard Zone," GSI exposed two discrete fault zones deemed 1 and 2, respectively. The faults were dated by relationship to soil-stratigraphic markers; namely a demonstrably offset, slightly developed, lower buried paleosol and an unbroken, upper incipient soil. Based on estimated paleosol age, Fault Zone 1 records two discrete displacement events occurring after ~4 to 5 ka but prior to ~1.0 to 1.5 ka. Fault Zone 2 displays 3 such events within the same time period. Although having no obvious geomorphic or aerial-photographic expression, both faults warrant ~50-ft wide, structural setback zones based on trench exposures and on extrapolation uncertainties of fault trend.

The GSI trenches demonstrably expose unbroken, middle Holocene sediments between the two on-site fault zones. Additionally, based on

deformation style compared with San Jacinto main-trace faults, on-site Zones 1 and 2 are probably not seismogenic structures, but rather more likely co-seismically respond to ~M7+ events on nearby, through-going faults. Nevertheless, owing to San Jacinto fault proximity, the entire development is likely subject to high ground acceleration, perhaps even exceeding ~1g (horizontal). Other related geotechnical constraints also warrant appropriate analysis; viz., potential ground deformation owing to liquefaction and dry sand settlement. Reasonable and well accepted mitigation for these potential impacts are strengthened foundations, over-excavation and installation of geotextiles.

REFERENCES CITED

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Roy J. Shlemon, Ph.D.
April 2007

PG: 2867
CPG: 1766
CPESC: 2167

APPENDIX C

SEISMIC ANALYSIS

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ESTIMATION OF
PEAK ACCELERATION FROM
CALIFORNIA EARTHQUAKE CATALOGS

JOB NUMBER: 5049-A2-SC

DATE: 10-06-2006

JOB NAME: LYTLE DEVELOPMENT COMPANY

EARTHQUAKE-CATALOG-FILE NAME: ALLQUAKE.DAT

SITE COORDINATES:
SITE LATITUDE: 34.1720
SITE LONGITUDE: 117.4174

SEARCH DATES:
START DATE: 1800
END DATE: 2006

SEARCH RADIUS:
100.0 mi
160.9 km

ATTENUATION RELATION: 10) Bozorgnia Campbell Niazi (1999) Hor.-Holocene Soil-Cor.
UNCERTAINTY (M=Median, S=Sigma): S Number of Sigmas: 1.0
ASSUMED SOURCE TYPE: SS [SS=Strike-slip, DS=Reverse-slip, BT=Blind-thrust]
SCOND: 0 Depth Source: A
Basement Depth: 1.00 km Campbell SSR: 0 Campbell SHR: 0
COMPUTE PEAK HORIZONTAL ACCELERATION

MINIMUM DEPTH VALUE (km): 3.0

EARTHQUAKE SEARCH RESULTS

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FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	34.2000	117.4000	07/22/1899	046 0.0	0.0	5.50	0.387	X	2.2(3.5)
MGI	34.1000	117.3000	07/15/1905	2041 0.0	0.0	5.30	0.167	VIII	8.3(13.4)
DMG	34.2700	117.5400	09/12/1970	143053.0	8.0	5.40	0.156	VIII	9.7(15.7)
DMG	34.3000	117.5000	07/22/1899	2032 0.0	0.0	6.50	0.302	IX	10.0(16.1)
MGI	34.0000	117.5000	12/16/1858	10 0 0.0	0.0	7.00	0.326	IX	12.8(20.6)
DMG	34.3000	117.6000	07/30/1894	512 0.0	0.0	6.00	0.167	VIII	13.7(22.0)
DMG	34.0000	117.2500	07/23/1923	73026.0	0.0	6.25	0.175	VIII	15.2(24.5)
GSP	34.1400	117.7000	02/28/1990	234336.6	5.0	5.20	0.085	VII	16.3(26.2)
DMG	34.2000	117.1000	09/20/1907	154 0.0	0.0	6.00	0.125	VII	18.2(29.3)
DMG	34.3700	117.6500	12/08/1812	15 0 0.0	0.0	7.00	0.226	IX	19.0(30.7)
DMG	33.9000	117.2000	12/19/1880	0 0 0.0	0.0	6.00	0.101	VII	22.5(36.2)
DMG	34.2670	116.9670	08/29/1943	34513.0	0.0	5.50	0.062	VI	26.5(42.7)
DMG	34.2000	117.9000	08/28/1889	215 0.0	0.0	5.50	0.060	VI	27.6(44.5)
MGI	33.8000	117.6000	04/22/1918	2115 0.0	0.0	5.00	0.044	VI	27.7(44.6)
GSP	34.2900	116.9460	02/10/2001	210505.8	9.0	5.10	0.046	VI	28.1(45.2)
DMG	34.1800	116.9200	01/16/1930	02433.9	0.0	5.20	0.049	VI	28.4(45.7)
DMG	34.1800	116.9200	01/16/1930	034 3.6	0.0	5.10	0.046	VI	28.4(45.7)
GSP	34.3400	116.9000	11/27/1992	160057.5	1.0	5.30	0.046	VI	31.7(51.0)
GSP	34.1950	116.8620	08/17/1992	204152.1	11.0	5.30	0.046	VI	31.8(51.1)
GSP	34.1630	116.8550	06/28/1992	144321.0	6.0	5.30	0.045	VI	32.1(51.7)
DMG	33.7000	117.4000	05/15/1910	1547 0.0	0.0	6.00	0.069	VI	32.6(52.5)
DMG	33.7000	117.4000	05/13/1910	620 0.0	0.0	5.00	0.038	V	32.6(52.5)
DMG	33.7000	117.4000	04/11/1910	757 0.0	0.0	5.00	0.038	V	32.6(52.5)
GSP	34.3690	116.8970	12/04/1992	020857.5	3.0	5.30	0.045	VI	32.7(52.6)
DMG	33.6990	117.5110	05/31/1938	83455.4	10.0	5.50	0.050	VI	33.1(53.3)
GSP	34.2390	116.8370	07/09/1992	014357.6	0.0	5.30	0.044	VI	33.5(53.8)
GSN	34.2030	116.8270	06/28/1992	150530.7	5.0	6.70	0.104	VII	33.8(54.4)
GSG	34.3100	116.8480	02/22/2003	121910.6	1.0	5.20	0.041	V	33.9(54.5)
GSP	34.2620	118.0020	06/28/1991	144354.5	11.0	5.40	0.045	VI	33.9(54.6)
DMG	33.8000	117.0000	12/25/1899	1225 0.0	0.0	6.40	0.082	VII	35.1(56.4)
MGI	34.0000	118.0000	12/25/1903	1745 0.0	0.0	5.00	0.035	V	35.4(56.9)
DMG	34.1000	116.8000	10/24/1935	1448 7.6	0.0	5.10	0.036	V	35.6(57.3)
DMG	33.9500	116.8500	09/28/1946	719 9.0	0.0	5.00	0.034	V	35.9(57.8)
DMG	33.7500	117.0000	04/21/1918	223225.0	0.0	6.80	0.099	VII	37.7(60.6)
DMG	33.7500	117.0000	06/06/1918	2232 0.0	0.0	5.00	0.032	V	37.7(60.6)
PAS	34.0610	118.0790	10/01/1987	144220.0	9.5	5.90	0.054	VI	38.6(62.1)
MGI	34.1000	118.1000	07/11/1855	415 0.0	0.0	6.30	0.068	VI	39.3(63.3)
PAS	34.0730	118.0980	10/04/1987	105938.2	8.2	5.30	0.037	V	39.5(63.6)
DMG	34.1000	116.7000	02/07/1889	520 0.0	0.0	5.30	0.035	V	41.3(66.5)
DMG	33.9760	116.7210	06/12/1944	104534.7	10.0	5.10	0.031	V	42.1(67.7)
DMG	33.9940	116.7120	06/12/1944	111636.0	10.0	5.30	0.034	V	42.2(67.9)
DMG	33.7100	116.9250	09/23/1963	144152.6	16.5	5.00	0.028	V	42.6(68.5)
PAS	33.9980	116.6060	07/08/1986	92044.5	11.7	5.60	0.036	V	47.9(77.1)
DMG	33.7500	118.0830	03/11/1933	910 0.0	0.0	5.10	0.027	V	48.0(77.2)
DMG	33.7500	118.0830	03/11/1933	230 0.0	0.0	5.10	0.027	V	48.0(77.2)
DMG	33.7500	118.0830	03/13/1933	131828.0	0.0	5.30	0.030	V	48.0(77.2)
DMG	33.7500	118.0830	03/11/1933	2 9 0.0	0.0	5.00	0.025	V	48.0(77.2)

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DMG	33.7500	118.0830	03/11/1933	323 0.0	0.0	5.00	0.025	V	48.0(77.2)
MGI	34.0800	118.2600	07/16/1920	1818 0.0	0.0	5.00	0.025	V	48.6(78.2)
DMG	33.7830	118.1330	10/02/1933	91017.6	0.0	5.40	0.031	V	49.0(78.8)
T-A	34.0000	118.2500	09/23/1827	0 0 0.0	0.0	5.00	0.025	V	49.1(79.0)
T-A	34.0000	118.2500	01/10/1856	0 0 0.0	0.0	5.00	0.025	V	49.1(79.0)
T-A	34.0000	118.2500	03/26/1860	0 0 0.0	0.0	5.00	0.025	V	49.1(79.0)

EARTHQUAKE SEARCH RESULTS

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FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	33.7000	118.0670	03/11/1933	51022.0	0.0	5.10	0.026	V	49.5(79.6)
DMG	33.7000	118.0670	03/11/1933	85457.0	0.0	5.10	0.026	V	49.5(79.6)
DMG	33.6830	118.0500	03/11/1933	658 3.0	0.0	5.50	0.032	V	49.5(79.7)
DMG	33.6170	117.9670	03/11/1933	154 7.8	0.0	6.30	0.053	VI	49.6(79.8)
DMG	34.5190	118.1980	08/23/1952	10 9 7.1	13.1	5.00	0.024	IV	50.5(81.3)
DMG	33.6170	118.0170	03/14/1933	19 150.0	0.0	5.10	0.025	V	51.5(82.8)
MGI	34.0000	118.3000	09/03/1905	540 0.0	0.0	5.30	0.027	V	51.8(83.4)
GSP	34.3410	116.5290	06/28/1992	124053.5	6.0	5.20	0.026	V	52.0(83.7)
DMG	33.5750	117.9830	03/11/1933	518 4.0	0.0	5.20	0.026	V	52.4(84.4)
DMG	33.8500	118.2670	03/11/1933	1425 0.0	0.0	5.00	0.022	IV	53.5(86.0)
DMG	34.0170	116.5000	07/24/1947	221046.0	0.0	5.50	0.030	V	53.5(86.1)
DMG	34.0170	116.5000	07/26/1947	24941.0	0.0	5.10	0.024	IV	53.5(86.1)
DMG	34.0170	116.5000	07/25/1947	61949.0	0.0	5.20	0.025	V	53.5(86.1)
DMG	34.0170	116.5000	07/25/1947	04631.0	0.0	5.00	0.022	IV	53.5(86.1)
DMG	33.7830	118.2500	11/14/1941	84136.3	0.0	5.40	0.028	V	54.7(88.0)
GSP	34.3320	116.4620	07/01/1992	074029.9	9.0	5.40	0.027	V	55.6(89.5)
GSN	34.2010	116.4360	06/28/1992	115734.1	1.0	7.60	0.115	VII	56.1(90.3)
GSP	34.1390	116.4310	06/28/1992	123640.6	10.0	5.10	0.022	IV	56.4(90.8)
PAS	34.3270	116.4450	03/15/1979	21 716.5	2.5	5.20	0.024	IV	56.5(90.9)
PAS	34.5160	116.4950	06/01/1975	13849.2	4.5	5.20	0.023	IV	57.7(92.8)
GSP	34.1080	116.4040	06/29/1992	141338.8	9.0	5.40	0.026	V	58.1(93.5)
GSP	34.2680	116.4020	06/16/1994	162427.5	3.0	5.00	0.020	IV	58.3(93.9)
DMG	34.4110	118.4010	02/09/1971	14 1 8.0	8.0	5.80	0.033	V	58.5(94.1)
DMG	34.4110	118.4010	02/09/1971	141028.0	8.0	5.30	0.024	V	58.5(94.1)
DMG	34.4110	118.4010	02/09/1971	14 041.8	8.4	6.40	0.048	VI	58.5(94.1)
DMG	34.4110	118.4010	02/09/1971	14 244.0	8.0	5.80	0.033	V	58.5(94.1)
DMG	34.3080	118.4540	02/09/1971	144346.7	6.2	5.20	0.022	IV	59.9(96.4)
GSP	34.2310	118.4750	03/20/1994	212012.3	13.0	5.30	0.023	IV	60.5(97.4)
GSP	34.0640	116.3610	09/15/1992	084711.3	9.0	5.20	0.022	IV	60.8(97.9)
DMG	33.9330	116.3830	12/04/1948	234317.0	0.0	6.50	0.049	VI	61.4(98.9)
DMG	34.0670	116.3330	05/18/1940	72132.7	0.0	5.00	0.019	IV	62.4(100.4)
DMG	34.0670	116.3330	05/18/1940	55120.2	0.0	5.20	0.021	IV	62.4(100.4)
MGI	34.0000	118.5000	11/19/1918	2018 0.0	0.0	5.00	0.019	IV	63.0(101.4)
DMG	34.0000	118.5000	08/04/1927	122410.0	0.0	5.00	0.019	IV	63.0(101.4)
GSP	34.0290	116.3210	08/21/1993	014638.4	9.0	5.00	0.019	IV	63.5(102.1)
GSP	34.2130	118.5370	01/17/1994	123055.4	18.0	6.70	0.053	VI	64.0(103.0)
DMG	34.7120	116.5030	09/25/1965	174344.1	10.6	5.20	0.021	IV	64.0(103.1)
DMG	34.0830	116.3000	05/18/1940	5 358.5	0.0	5.40	0.023	IV	64.2(103.2)
GSP	33.9610	116.3180	04/23/1992	045023.0	12.0	6.10	0.036	V	64.5(103.9)
GSP	34.9700	116.8190	03/18/1997	152447.7	1.0	5.10	0.019	IV	64.8(104.2)
GSP	33.5290	116.5720	06/12/2005	154146.5	14.0	5.20	0.020	IV	65.7(105.8)
GSB	34.3010	118.5650	01/17/1994	204602.4	9.0	5.20	0.020	IV	66.1(106.4)
GSP	34.3050	118.5790	01/29/1994	112036.0	1.0	5.10	0.019	IV	66.9(107.7)

GSP	33.9020	116.2840	07/24/1992	181436.2	9.0	5.00	0.018	IV	67.5(108.6)
DMG	34.3000	118.6000	04/04/1893	1940 0.0	0.0	6.00	0.032	V	68.1(109.6)
DMG	34.8300	116.5200	09/26/1929	201022.7	0.0	5.10	0.018	IV	68.3(110.0)
GSP	34.5830	116.3190	07/05/1992	211827.1	0.0	5.40	0.022	IV	68.7(110.6)
GSP	33.8760	116.2670	06/29/1992	160142.8	1.0	5.20	0.019	IV	68.9(110.9)
GSP	33.5080	116.5140	10/31/2001	075616.6	15.0	5.10	0.018	IV	69.2(111.3)
GSP	34.4420	116.2480	10/16/1999	125721.0	1.0	5.70	0.026	V	69.2(111.4)
PAS	33.5010	116.5130	02/25/1980	104738.5	13.6	5.50	0.023	IV	69.5(111.9)
GSP	34.3780	118.6180	01/19/1994	211144.9	11.0	5.10	0.018	IV	70.0(112.6)
DMG	33.5000	116.5000	09/30/1916	211 0.0	0.0	5.00	0.017	IV	70.1(112.9)

EARTHQUAKE SEARCH RESULTS

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	33.9500	118.6320	08/31/1930	04036.0	0.0	5.20	0.019	IV	71.1(114.5)
PAS	33.9190	118.6270	01/19/1989	065328.8	11.9	5.00	0.017	IV	71.4(114.9)
GSG	34.5940	116.2710	10/16/1999	094644.1	0.0	7.10	0.063	VI	71.5(115.1)
DMG	34.2500	116.1670	03/20/1945	2155 7.0	0.0	5.00	0.016	IV	71.6(115.2)
GSP	34.8000	116.4100	10/21/1999	015435.0	1.0	5.00	0.016	IV	71.9(115.7)
GSP	34.3690	118.6720	04/26/1997	103730.7	16.0	5.10	0.017	IV	72.9(117.3)
GSP	34.3940	118.6690	06/26/1995	084028.9	13.0	5.00	0.016	IV	73.0(117.5)
DMG	34.9500	116.5330	04/10/1947	171822.0	0.0	5.00	0.016	IV	73.6(118.4)
GSP	34.6800	116.2800	10/16/1999	095935.0	8.0	5.80	0.026	V	73.7(118.5)
DMG	34.9670	116.5500	04/11/1947	747 0.0	0.0	5.00	0.016	IV	73.8(118.7)
DMG	34.9670	116.5500	04/10/1947	16 3 0.0	0.0	5.10	0.017	IV	73.8(118.7)
GSP	34.3260	118.6980	01/17/1994	233330.7	9.0	5.60	0.023	IV	73.9(118.8)
PAS	33.9440	118.6810	01/01/1979	231438.9	11.3	5.00	0.016	IV	74.0(119.0)
GSP	34.3770	118.6980	01/18/1994	004308.9	11.0	5.20	0.018	IV	74.4(119.8)
GSP	34.8600	116.4100	10/22/1999	160848.0	1.0	5.00	0.016	IV	74.4(119.8)
DMG	34.9830	116.5500	04/10/1947	1558 6.0	0.0	6.20	0.033	V	74.6(120.1)
GSB	34.3790	118.7110	01/19/1994	210928.6	14.0	5.50	0.021	IV	75.2(121.0)
GSP	34.8600	116.3900	10/21/1999	015738.0	4.0	5.00	0.016	IV	75.3(121.2)
DMG	33.2000	116.7000	01/01/1920	235 0.0	0.0	5.00	0.015	IV	78.8(126.7)
GSP	35.2100	118.0660	07/11/1992	181416.2	10.0	5.70	0.022	IV	80.6(129.7)
DMG	33.0000	117.3000	11/22/1800	2130 0.0	0.0	6.50	0.036	V	81.2(130.7)
MGI	33.2000	116.6000	10/12/1920	1748 0.0	0.0	5.30	0.017	IV	81.9(131.8)
DMG	34.0000	116.0000	04/03/1926	20 8 0.0	0.0	5.50	0.019	IV	81.9(131.8)
DMG	34.0000	116.0000	09/05/1928	1442 0.0	0.0	5.00	0.014	IV	81.9(131.8)
DMG	33.4000	116.3000	02/09/1890	12 6 0.0	0.0	6.30	0.031	V	83.4(134.2)
DMG	33.3430	116.3460	04/28/1969	232042.9	20.0	5.80	0.022	IV	84.0(135.2)
MGI	33.0000	117.0000	09/21/1856	730 0.0	0.0	5.00	0.014	IV	84.4(135.8)
DMG	33.4080	116.2610	03/25/1937	1649 1.8	10.0	6.00	0.025	V	84.8(136.4)
DMG	34.5330	115.9830	07/18/1946	142758.0	0.0	5.60	0.019	IV	85.5(137.6)
PAS	32.9710	117.8700	07/13/1986	1347 8.2	6.0	5.30	0.016	IV	86.9(139.9)
DMG	34.7110	116.0270	09/26/1965	7 0 1.7	8.3	5.00	0.013	III	87.5(140.8)
T-A	34.8300	118.7500	11/27/1852	0 0 0.0	0.0	7.00	0.047	VI	88.4(142.2)
MGI	34.0000	119.0000	12/14/1912	0 0 0.0	0.0	5.70	0.019	IV	91.3(146.9)
DMG	34.0000	119.0000	09/24/1827	4 0 0.0	0.0	7.00	0.045	VI	91.3(146.9)
PAS	34.9430	118.7430	06/10/1988	23 643.0	6.8	5.40	0.016	IV	92.3(148.5)
DMG	34.0650	119.0350	02/21/1973	144557.3	8.0	5.90	0.021	IV	92.8(149.3)
DMG	34.3330	115.8000	12/22/1943	155028.0	0.0	5.50	0.017	IV	93.0(149.6)
DMG	33.2830	116.1830	03/19/1954	102117.0	0.0	5.50	0.017	IV	93.8(150.9)
DMG	33.2830	116.1830	03/23/1954	41450.0	0.0	5.10	0.013	III	93.8(150.9)

DMG	33.2830	116.1830	03/19/1954	95429.0	0.0	6.20	0.026	V	93.8(150.9)
DMG	33.2830	116.1830	03/19/1954	95556.0	0.0	5.00	0.012	III	93.8(150.9)
DMG	34.0000	115.7500	03/03/1942	1 324.0	0.0	5.00	0.012	III	96.1(154.6)
MGI	32.8000	117.1000	05/25/1803	0 0 0.0	0.0	5.00	0.012	III	96.5(155.3)
DMG	35.1500	118.6330	01/27/1954	141948.0	0.0	5.00	0.012	III	96.6(155.4)
DMG	35.2330	118.5330	07/21/1952	174244.0	0.0	5.10	0.013	III	96.8(155.8)
DMG	33.2000	116.2000	05/28/1892	1115 0.0	0.0	6.30	0.026	V	96.9(156.0)
DMG	34.7000	119.0000	10/23/1916	254 0.0	0.0	5.50	0.016	IV	97.2(156.4)
DMG	34.9000	118.9000	10/23/1916	244 0.0	0.0	6.00	0.021	IV	98.2(158.0)
DMG	34.9500	118.8670	07/21/1952	121936.0	0.0	5.30	0.014	IV	98.4(158.3)
DMG	34.8670	118.9330	09/21/1941	1953 7.2	0.0	5.20	0.013	III	98.7(158.8)
DMG	35.0000	118.8330	07/23/1952	75319.0	0.0	5.40	0.015	IV	98.7(158.8)
DMG	35.0000	118.8330	07/23/1952	181351.0	0.0	5.20	0.013	III	98.7(158.8)
DMG	33.0000	116.4330	06/04/1940	1035 8.3	0.0	5.10	0.012	III	98.8(158.9)

EARTHQUAKE SEARCH RESULTS

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	35.1830	118.6500	07/21/1952	151358.0	0.0	5.10	0.012	III	98.8(159.1)
DMG	33.2170	116.1330	08/15/1945	175624.0	0.0	5.70	0.018	IV	98.9(159.2)
DMG	34.0170	115.6830	05/02/1949	112547.0	0.0	5.90	0.020	IV	99.7(160.5)
DMG	35.3110	118.4990	07/25/1952	1313 8.2	2.8	5.00	0.012	III	99.7(160.5)
T-A	34.9200	118.9200	05/23/1857	0 0 0.0	0.0	5.00	0.012	III	99.8(160.7)
T-A	34.9200	118.9200	01/20/1857	0 0 0.0	0.0	5.00	0.012	III	99.8(160.7)
DMG	35.3170	118.4940	07/25/1952	19 944.6	5.5	5.70	0.017	IV	99.9(160.8)

****

-END OF SEARCH- 166 EARTHQUAKES FOUND WITHIN THE SPECIFIED SEARCH AREA.

TIME PERIOD OF SEARCH: 1800 TO 2006

LENGTH OF SEARCH TIME: 207 years

THE EARTHQUAKE CLOSEST TO THE SITE IS ABOUT 2.2 MILES (3.5 km) AWAY.

LARGEST EARTHQUAKE MAGNITUDE FOUND IN THE SEARCH RADIUS: 7.6

LARGEST EARTHQUAKE SITE ACCELERATION FROM THIS SEARCH: 0.387 g

COEFFICIENTS FOR GUTENBERG & RICHTER RECURRENCE RELATION:
a-value= 1.646
b-value= 0.397
beta-value= 0.915

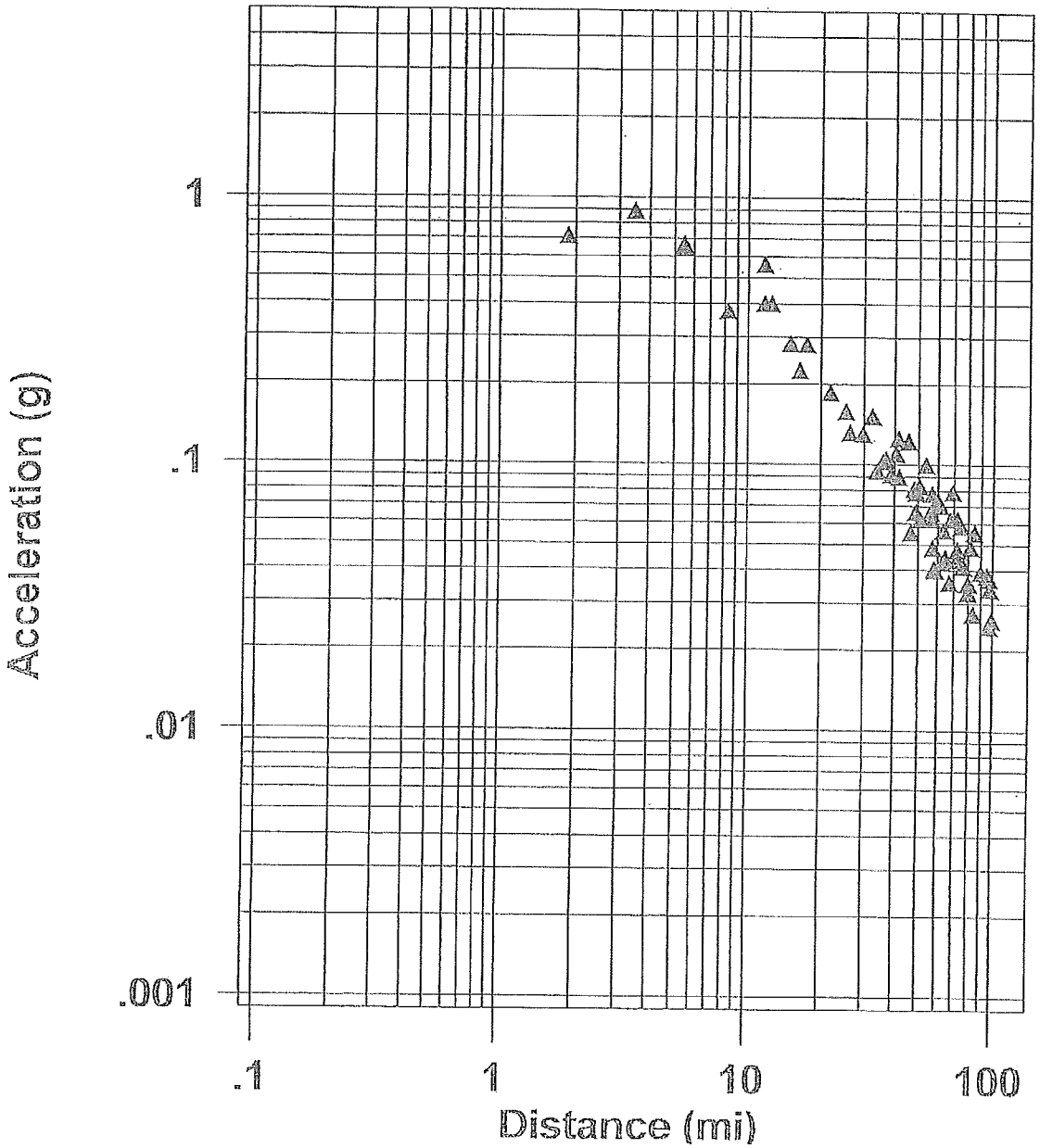
TABLE OF MAGNITUDES AND EXCEEDANCES:

Earthquake Magnitude	Number of Times Exceeded	Cumulative No. / Year
4.0	166	0.80583

4.5	166	0.80583
5.0	166	0.80583
5.5	56	0.27184
6.0	29	0.14078
6.5	12	0.05825
7.0	6	0.02913
7.5	1	0.00485

MAXIMUM EARTHQUAKES

LYTLE DEVELOPMENT COMPANY

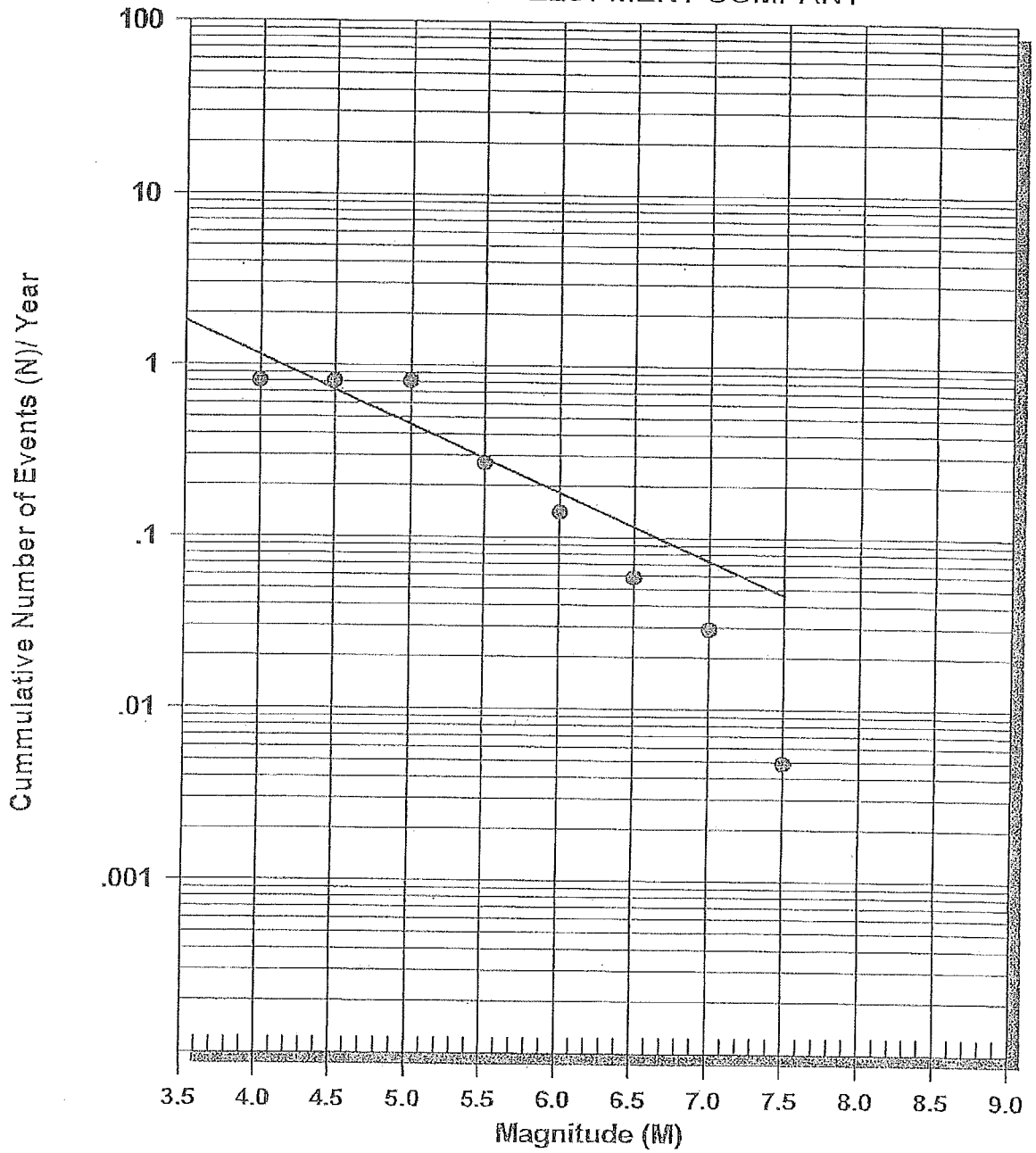


W.O. 5049–A2–SC

Plate C–7

EARTHQUAKE RECURRENCE CURVE

LYTLE DEVELOPMENT COMPANY

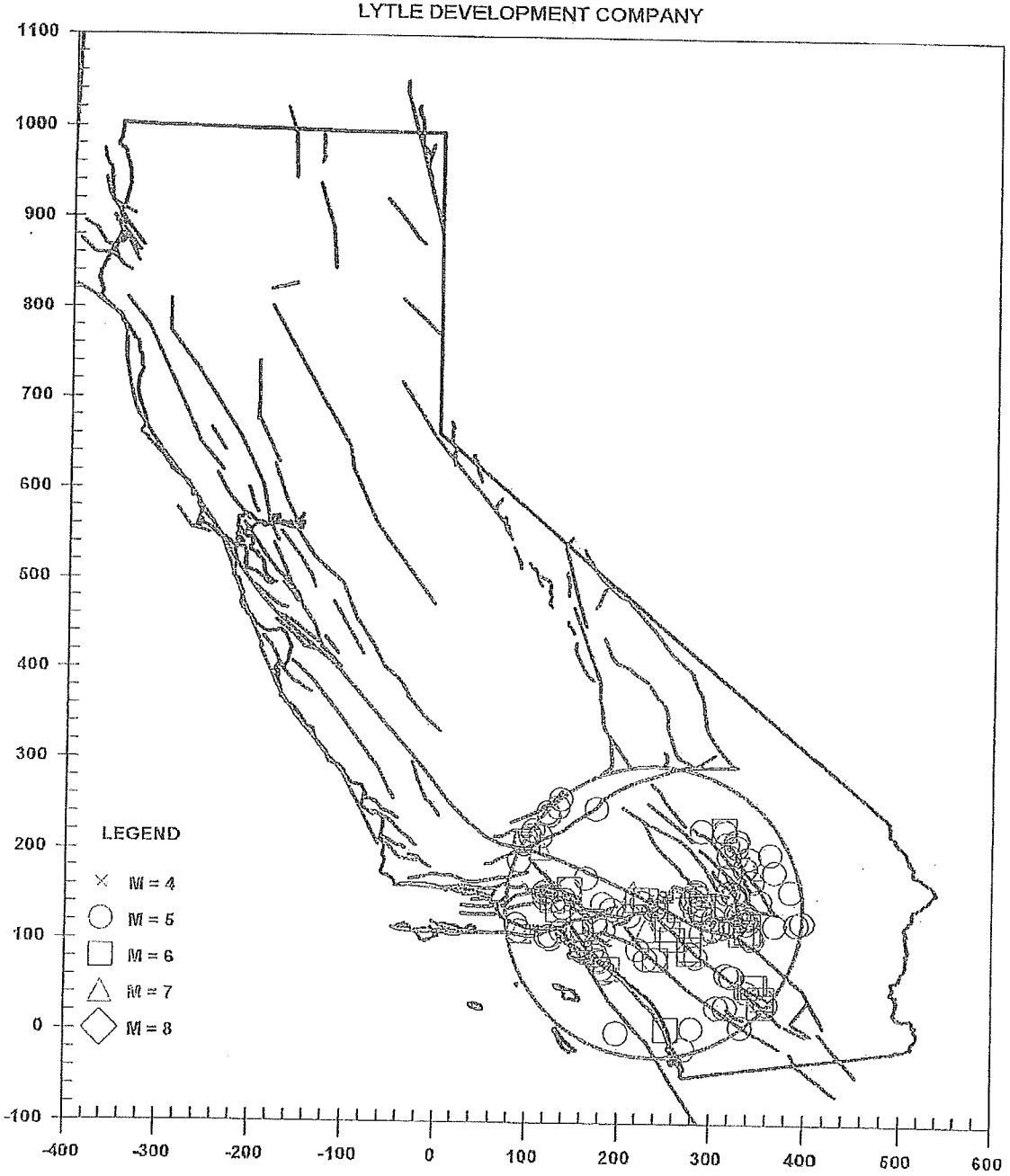


W.O. 5049-A2-SC

Plate C-8

EARTHQUAKE EPICENTER MAP

LYTLE DEVELOPMENT COMPANY

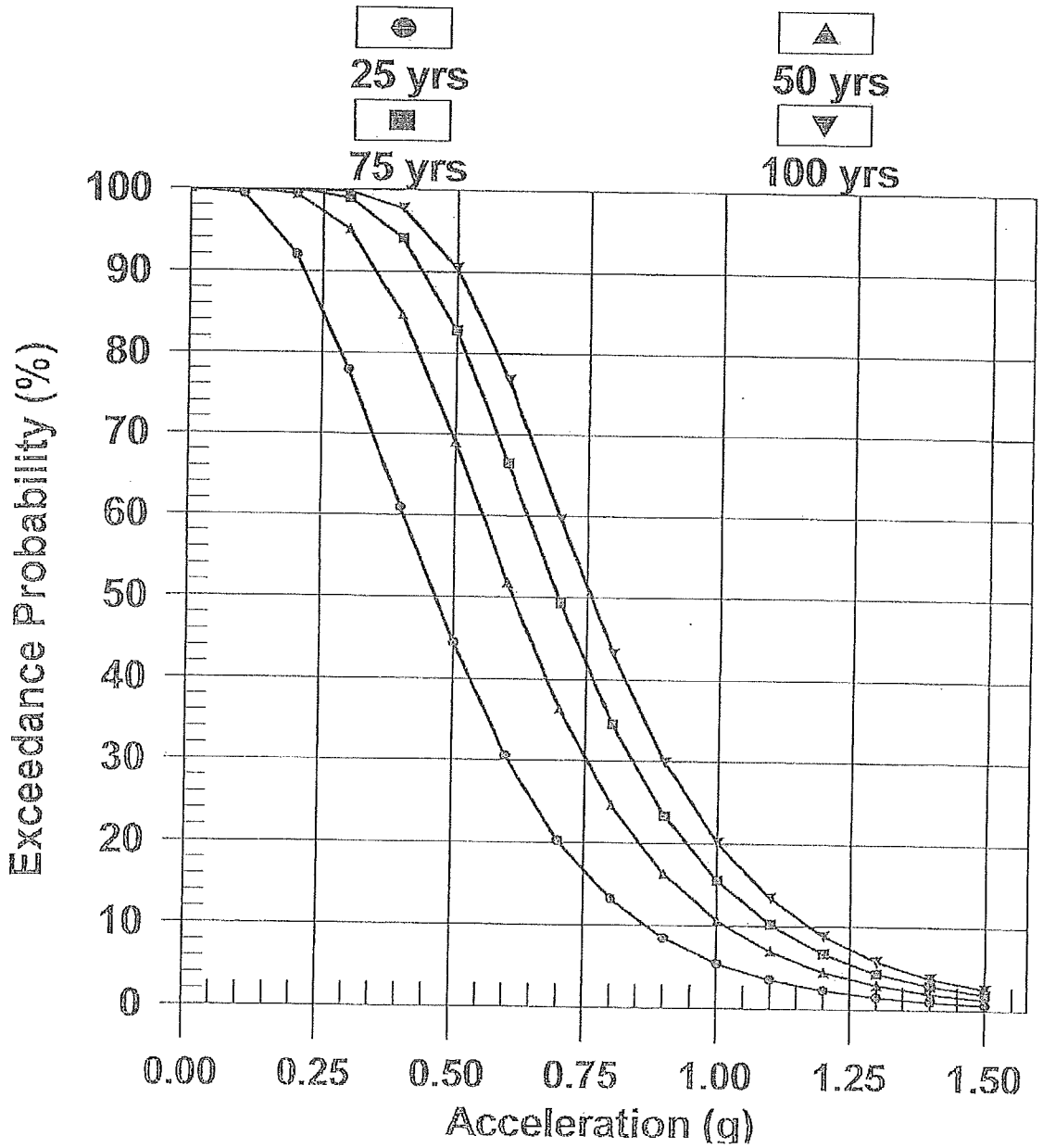


W.O. 5049–A2–SC

Plate C–9

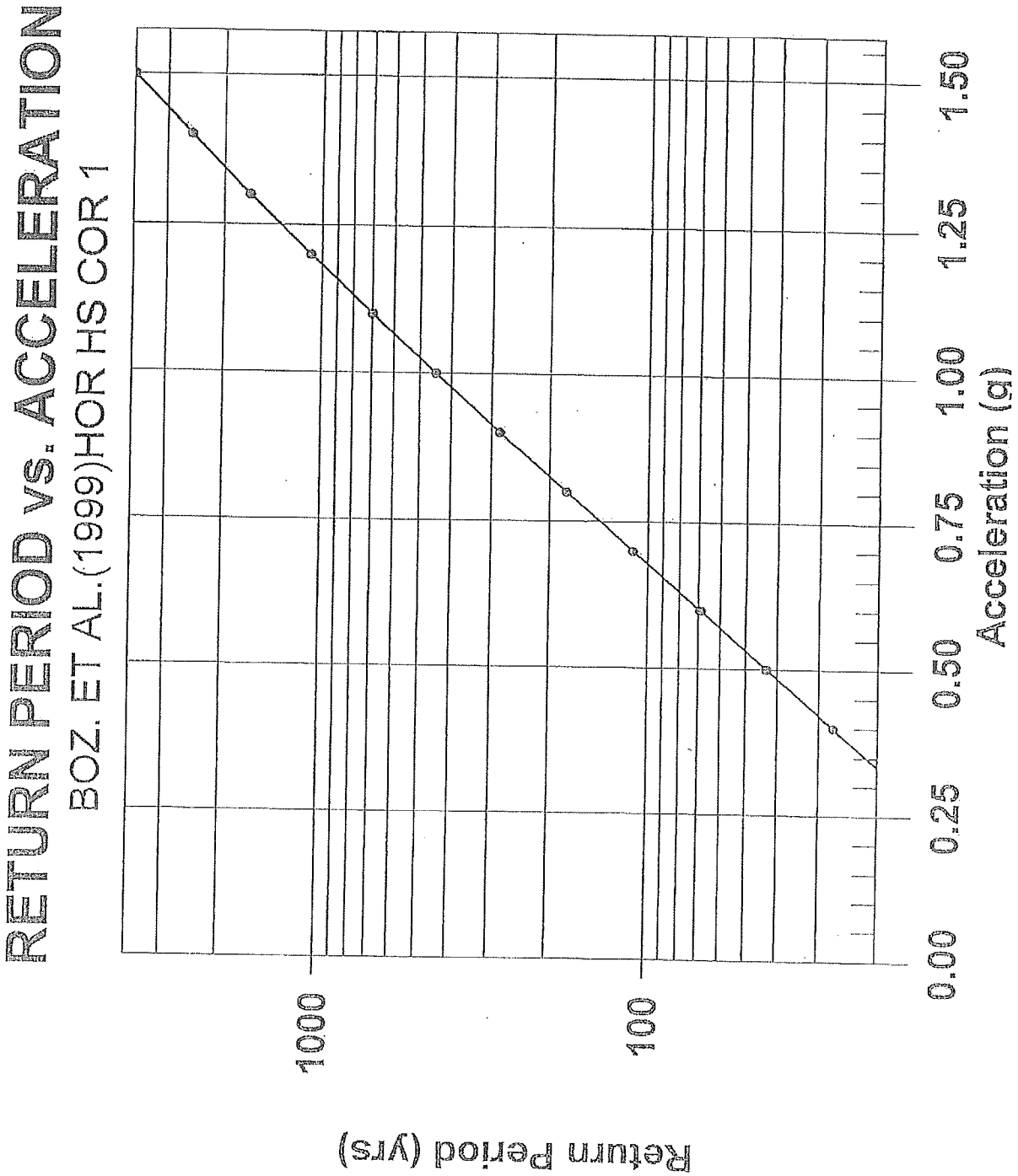
PROBABILITY OF EXCEEDANCE

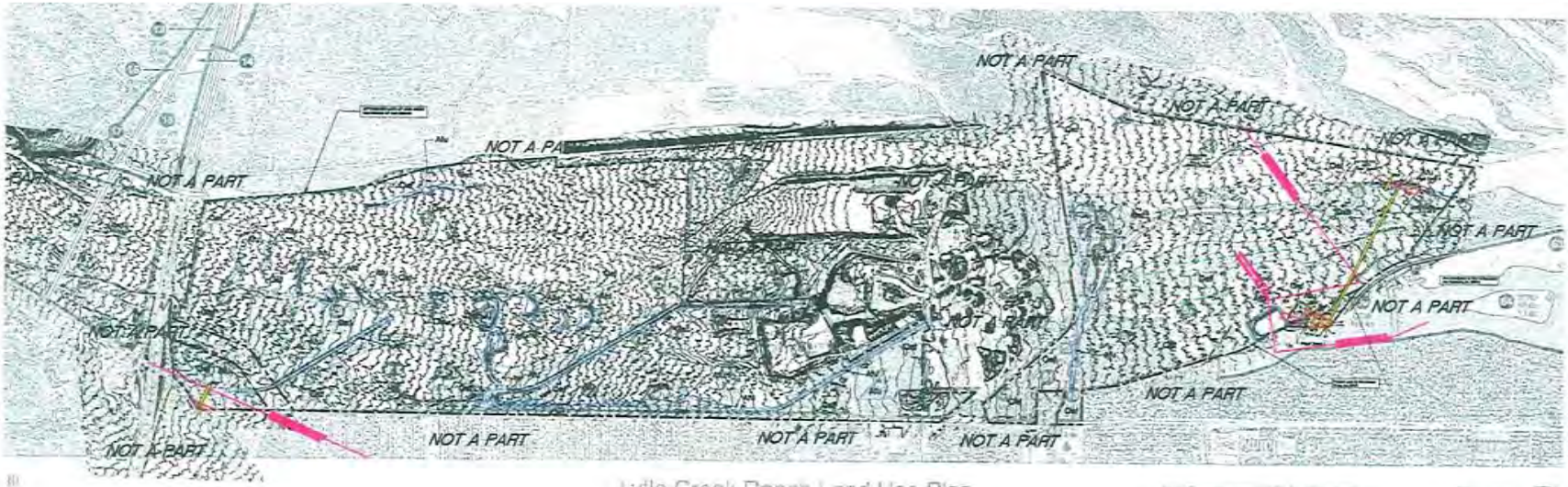
BOZ. ET AL.(1999)HOR HS COR 1



W.O. 5049–A2–SC

Plate C–10


RETURN PERIOD vs. ACCELERATION
BOZ. ET AL.(1999)HOR HS COR 1
1000
100
Return Period (yrs)
0.00
0.25
0.50
0.75
1.00
1.25
1.50
Acceleration (g)



Lytle Creek Ranch Land Use Plan

Rialto, California

LEGEND

Alu

Qal

SFR1 Single Family Residential 1 (2-5 du/ac)

SFR2 Single Family Residential 2 (3-6 du/ac)

SFR3 Single Family Residential 3 (6-14 du/ac)

MFR Multi-Family Residential (14-28 du/ac)

MU Mixed-Use

ES Elementary School

ES/MS Elementary / Middle School

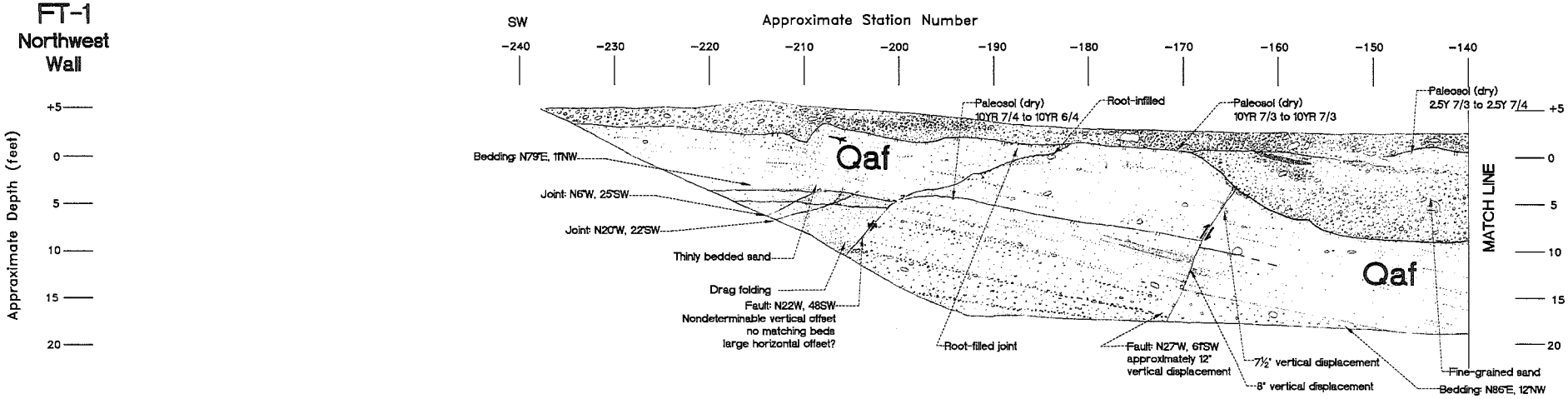
OS/R Open Space / Recreation

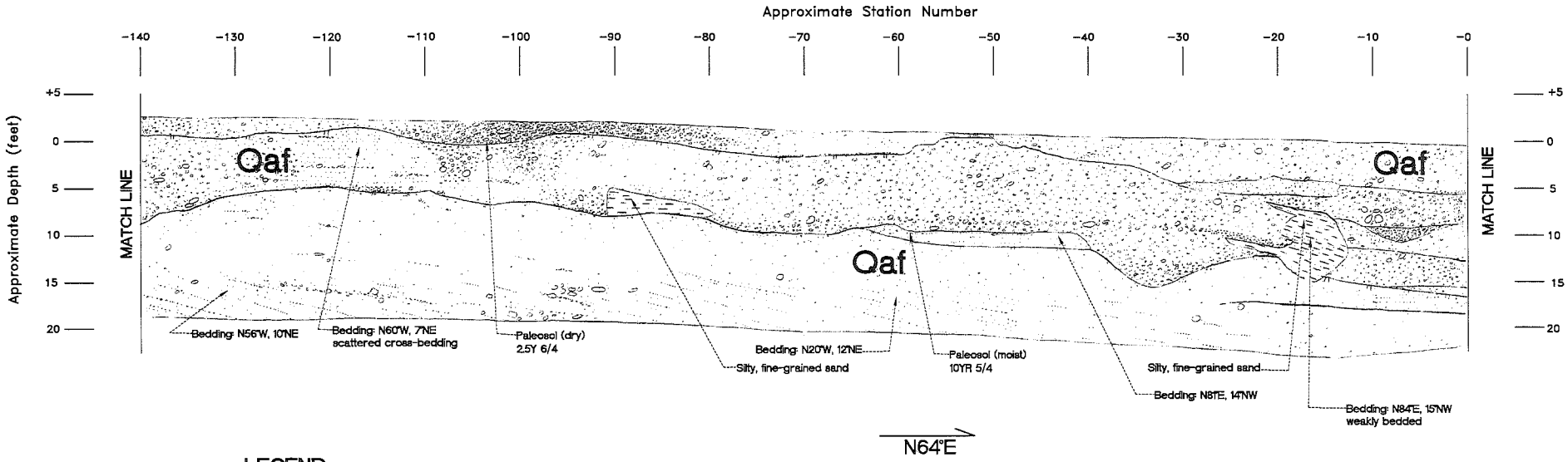
OS Open Space

GeoSoils, Inc.

GEOLOGIC MAP

FT-1
Northwest Wall





LEGEND

Qaf — Undifferentiated Quaternary alluvial fan deposits/Quaternary alluvium: Well graded, sandy gravel to gravelly sand to fine- to coarse- grained sand to silty sand/sandy silt (overbank deposits), few to locally abundant subrounded to subangular pebble- to cobble-sized and scarce boulder-sized igneous and metamorphic clasts (source rock includes tonalite, diorite, and schist), gray to grayish brown, dry to moist, poorly indurated grading to moderately indurated with depth; thinly to thickly bedded, few cross-beds (topset and forset), locally lenticular, fining upward sequences discontinuous, regional paleosols (cambic horizons Bwb and Btj)

Approximate location of paleosol

0 5 10 20
Scale Feet

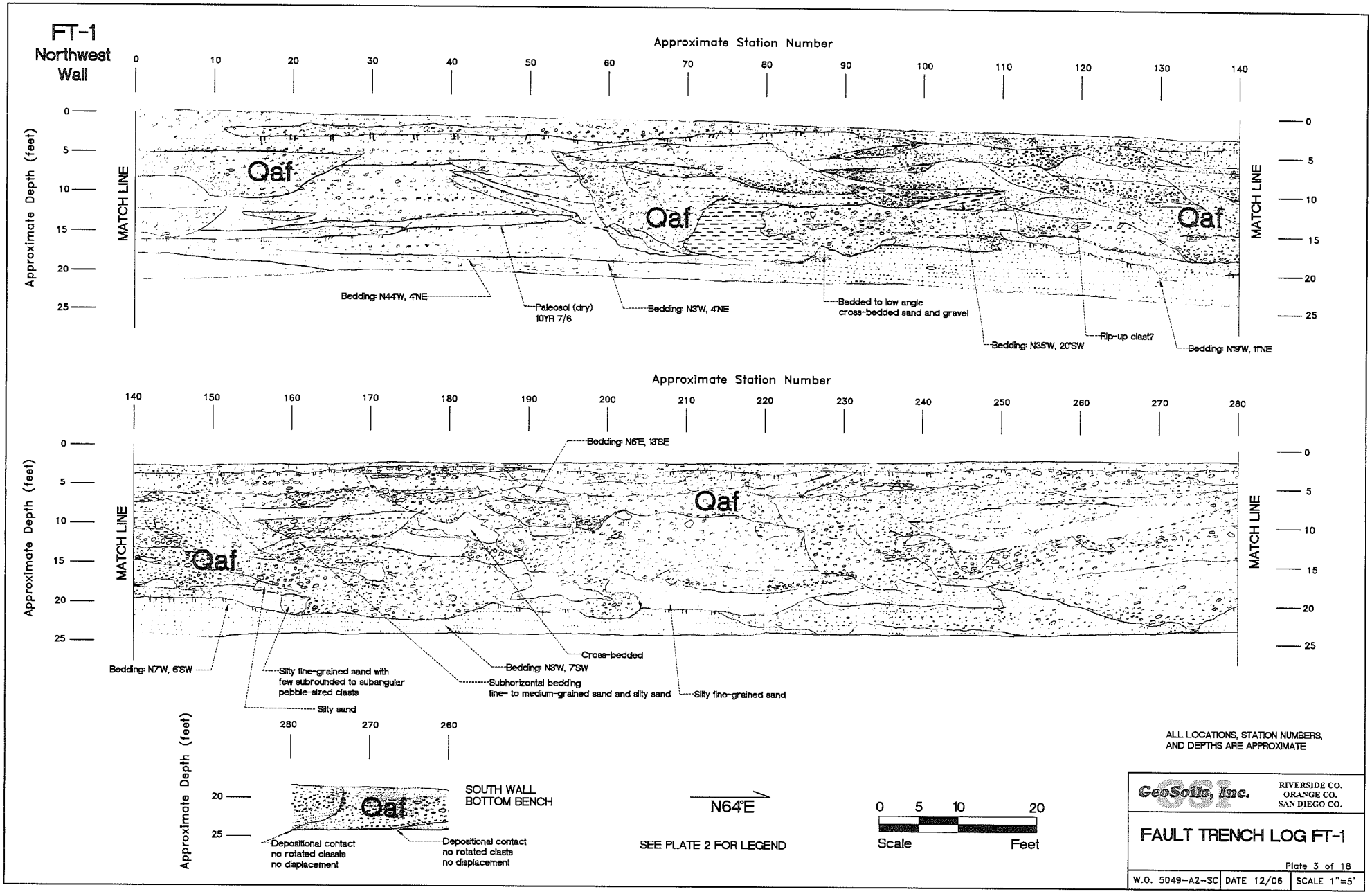
ALL LOCATIONS, STATION NUMBERS, AND DEPTHS ARE APPROXIMATE

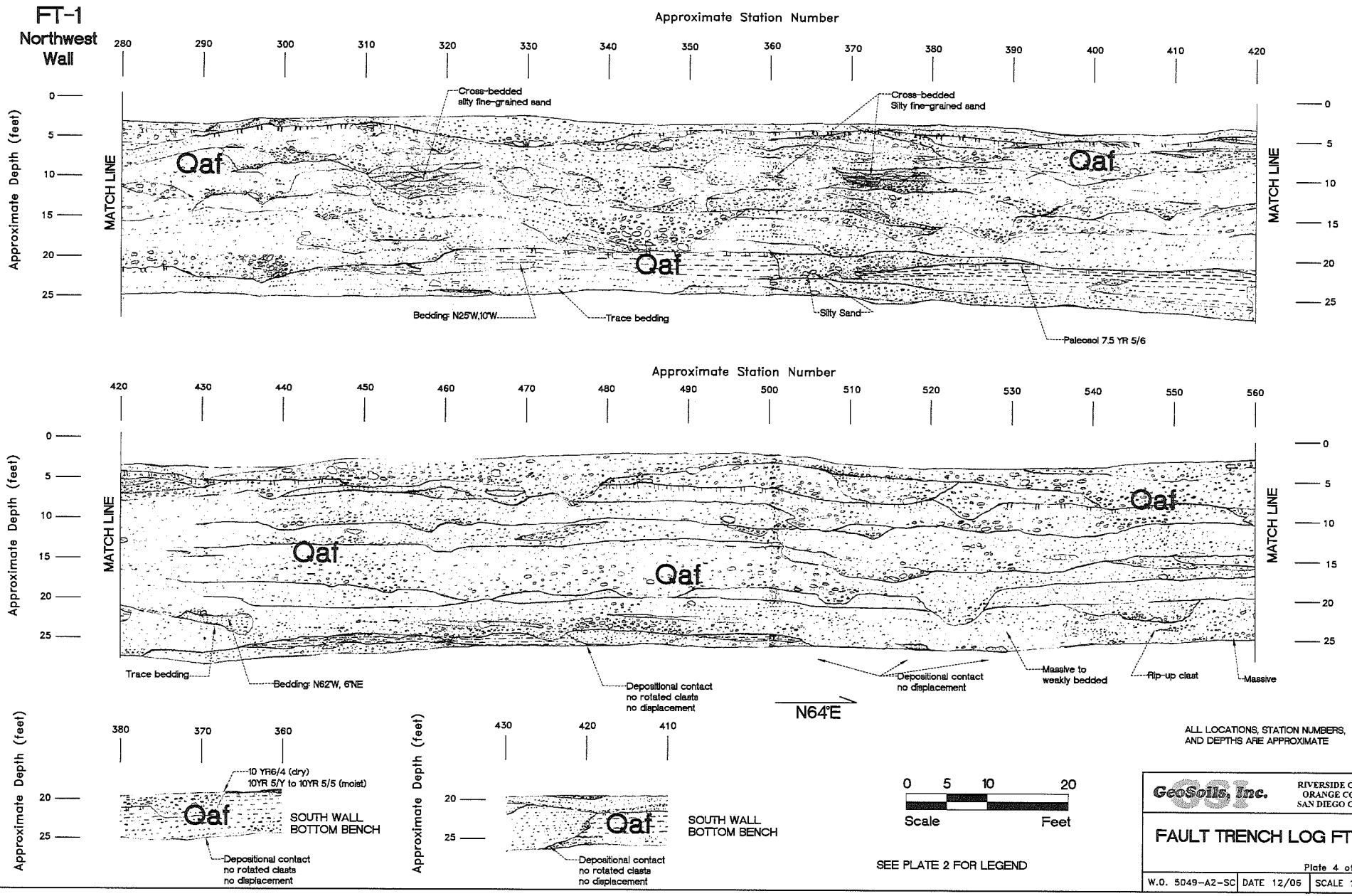
GeoSoils, Inc.
RIVERSIDE CO.
ORANGE CO.
SAN DIEGO CO.

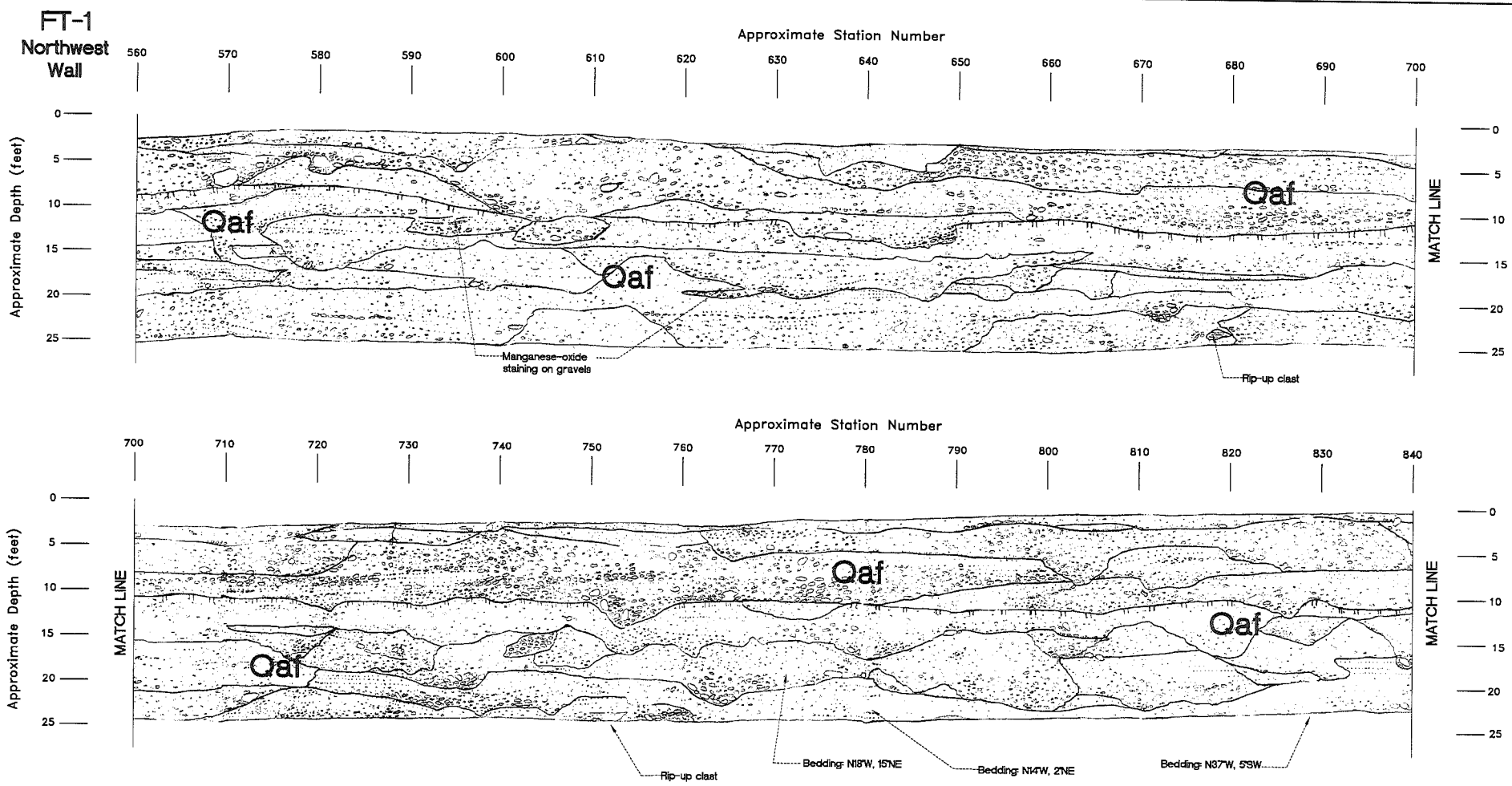
FAULT TRENCH LOG FT-1

Plate 2 of 18

W.O. 5049-A2-SC	DATE 12/06	SCALE 1"=5'


FT-1
Northwest Wall
Approximate Station Number
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140
Approximate Depth (feet)
0 5 10 15 20 25
MATCH LINE
Qaf
Bedding: N44°W, 4°NE
Paleosol (dry)
10YR 7/6
Bedding: N3°W, 4°NE
Bedded to low angle
cross-bedded sand and gravel
Bedding: N35°W, 20°SW
Rip-up clast?
Bedding: N15°W, 11°NE
Approximate Station Number
140 150 160 170 180 190 200 210 220 230 240 250 260 270 280
Bedding: N6°E, 13°SE
Bedding: N7°W, 6°SW
Silty fine-grained sand with
few subrounded to subangular
pebble-sized clasts
Silty sand
Subhorizontal bedding
fine- to medium-grained sand and silty sand
Bedding: N3°W, 7°SW
Cross-bedded
Silty fine-grained sand
280 270 260
Depositional contact
no rotated clasts
no displacement
SOUTH WALL
BOTTOM BENCH
N64°E
SEE PLATE 2 FOR LEGEND
0 5 10 20
Scale
Feet
ALL LOCATIONS, STATION NUMBERS,
AND DEPTHS ARE APPROXIMATE
GeoSoils, Inc.
RIVERSIDE CO.
ORANGE CO.
SAN DIEGO CO.
FAULT TRENCH LOG FT-1
Plate 3 of 18
W.O. 5049-A2-SC
DATE 12/06
SCALE 1"=5'


FT-1
Northwest Wall
Approximate Station Number
280 290 300 310 320 330 340 350 360 370 380 390 400 410 420
Approximate Depth (feet)
0 5 10 15 20 25
MATCH LINE
Qaf
Cross-bedded silty fine-grained sand
Cross-bedded Silty fine-grained sand
Bedding: N25°W,10°W
Trace bedding
Silty Sand
Paleosol 7.5 YR 5/6
Approximate Station Number
420 430 440 450 460 470 480 490 500 510 520 530 540 550 560
Trace bedding
Bedding: N62°W, 6°NE
Depositional contact no rotated clasts no displacement
Depositional contact no displacement
Massive to weakly bedded
Rip-up clast
Massive
N64°E
380 370 360
10 YR6/4 (dry)
10YR 5/Y to 10YR 5/5 (moist)
SOUTH WALL BOTTOM BENCH
Depositional contact no rotated clasts no displacement
430 420 410
SOUTH WALL BOTTOM BENCH
Depositional contact no rotated clasts no displacement
0 5 10 20
Scale Feet
SEE PLATE 2 FOR LEGEND
ALL LOCATIONS, STATION NUMBERS, AND DEPTHS ARE APPROXIMATE
GeoSoils, Inc.
RIVERSIDE CO.
ORANGE CO.
SAN DIEGO CO.
FAULT TRENCH LOG FT-1
Plate 4 of 18
W.O. 5049-A2-SC
DATE 12/06
SCALE 1"=5'



ALL LOCATIONS, STATION NUMBERS, AND DEPTHS ARE APPROXIMATE

N64°E

0 5 10 20
Scale Feet

SEE PLATE 2 FOR LEGEND

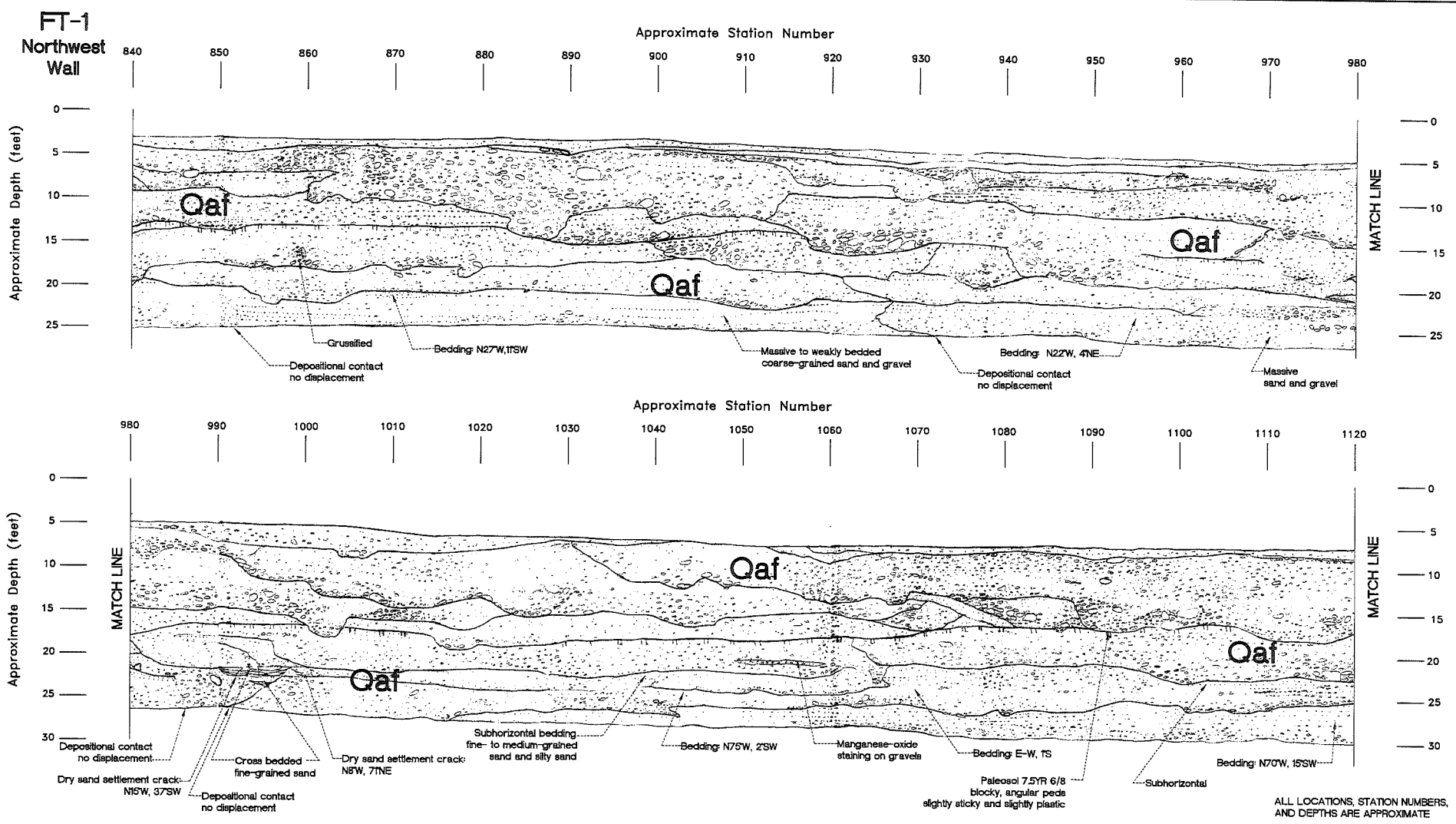
GeoSoils, Inc.

RIVERSIDE CO.
ORANGE CO.
SAN DIEGO CO.

FAULT TRENCH LOG FT-1

Plate 5 of 18

W.O. 5049-A2-SC	DATE 12/06	SCALE 1"=5'



SEE PLATE 2 FOR LEGEND

GeoSoils, Inc.

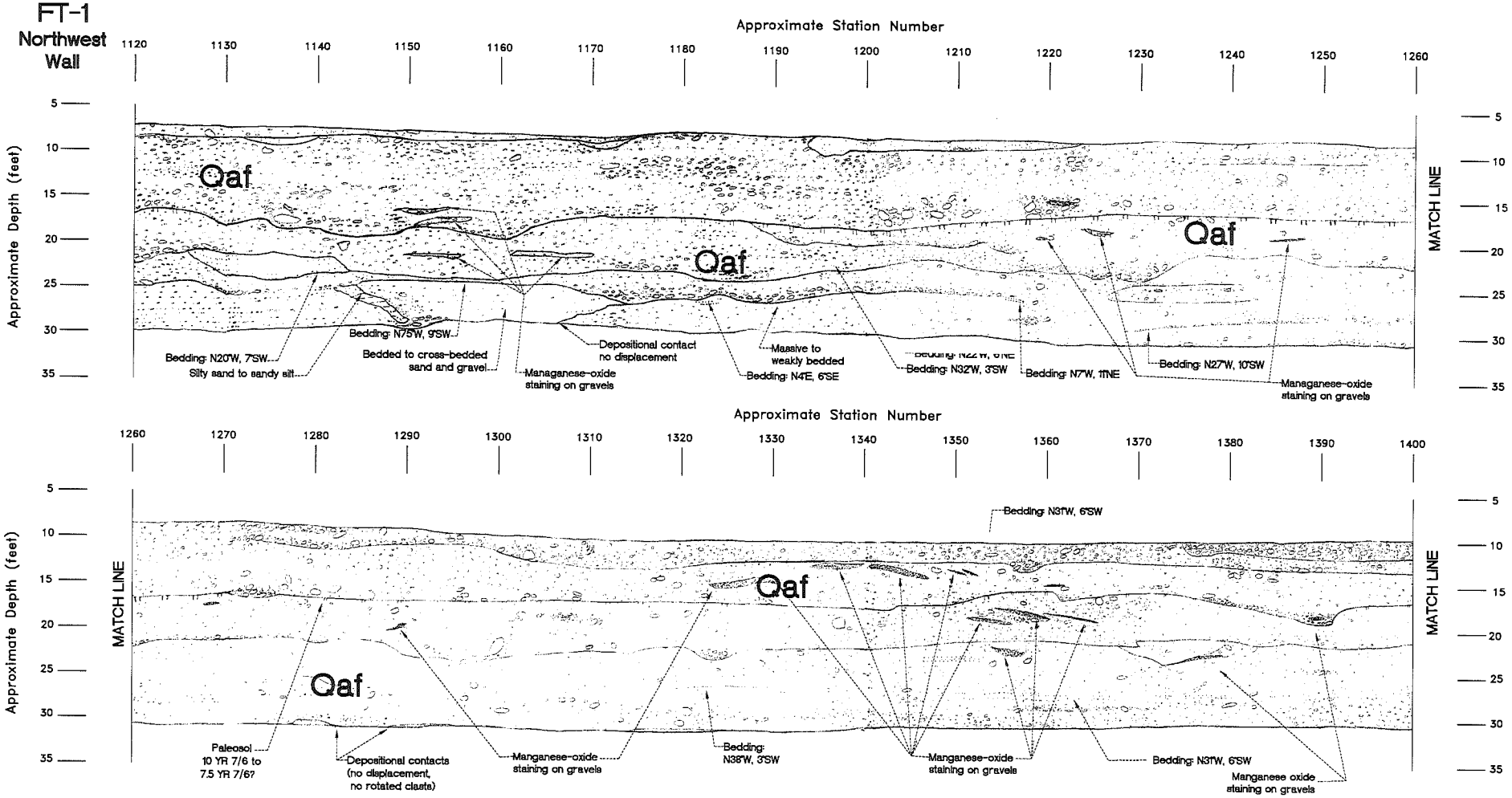
RIVERSIDE CO.
ORANGE CO.
SAN DIEGO CO.

FAULT TRENCH LOG FT-1

Plate 6 of 18

W.O. 5049-A2-SC	DATE 12/06	SCALE 1"=5'

FT-1
Northwest Wall



ALL LOCATIONS, STATION NUMBERS, AND DEPTHS ARE APPROXIMATE

N64°E

0 5 10 20
Scale Feet

SEE PLATE 2 FOR LEGEND

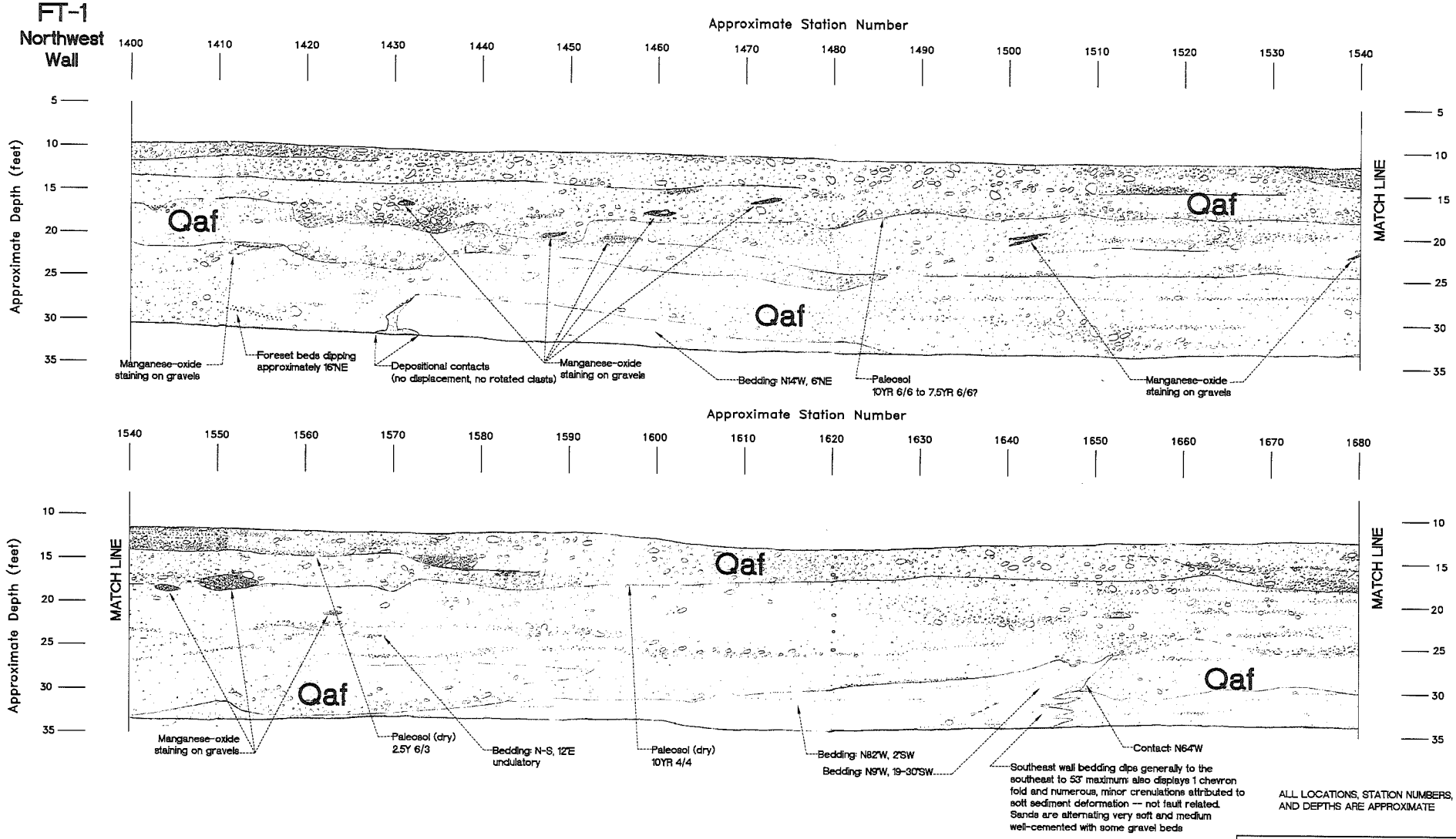
GeoSoils, Inc.
RIVERSIDE CO.
ORANGE CO.
SAN DIEGO CO.

FAULT TRENCH LOG FT-1

Plate 7 of 18

W.O. 5049-A2-SC	DATE 12/06	SCALE 1"=5'

FT-1
Northwest Wall



ALL LOCATIONS, STATION NUMBERS, AND DEPTHS ARE APPROXIMATE

N64°E

0 5 10 20
Scale Feet

SEE PLATE 2 FOR LEGEND

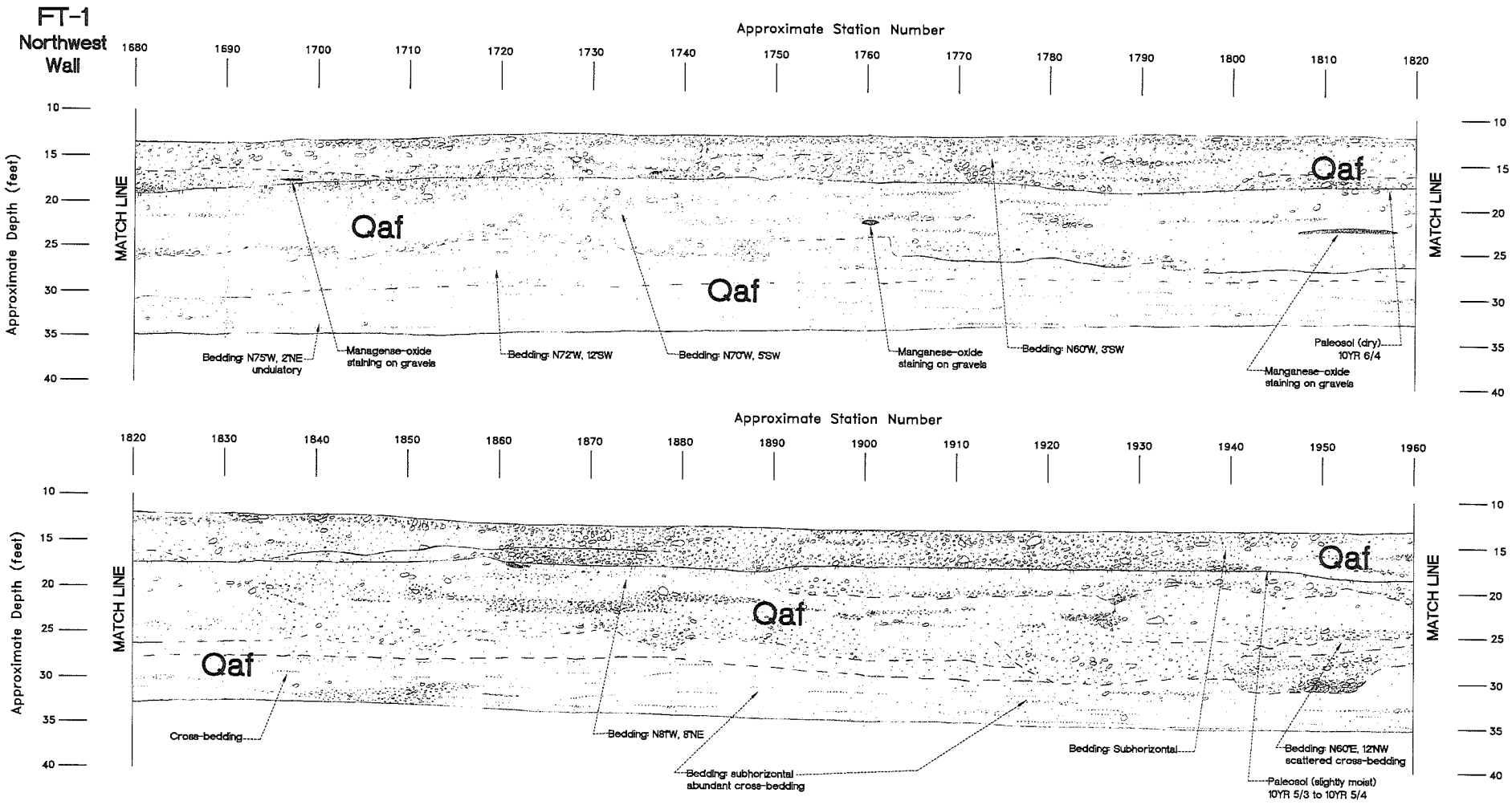
GeoSoils, Inc.

RIVERSIDE CO.
ORANGE CO.
SAN DIEGO CO.

FAULT TRENCH LOG FT-1

Plate 8 of 18

W.O. 5049-A2-SC	DATE 12/06	SCALE 1"=5'



ALL LOCATIONS, STATION NUMBERS, AND DEPTHS ARE APPROXIMATE

N64°E

0 5 10 20
Scale Feet

SEE PLATE 2 FOR LEGEND

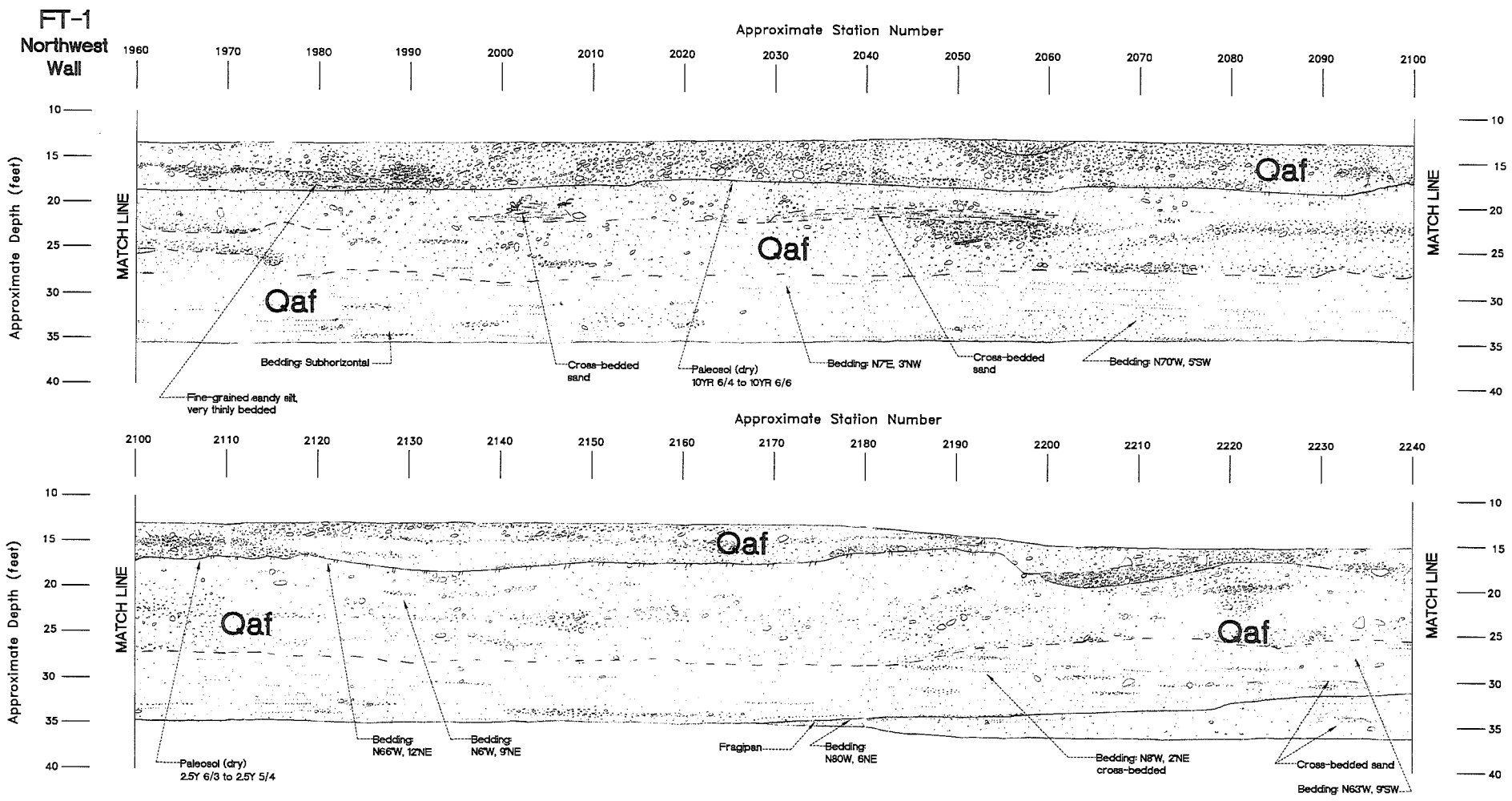
GeoSoils, Inc.

RIVERSIDE CO.
ORANGE CO.
SAN DIEGO CO.

FAULT TRENCH LOG FT-1

Plate 9 of 18

W.O. 5049-A2-SC	DATE 12/06	SCALE 1"=5'



ALL LOCATIONS, STATION NUMBERS, AND DEPTHS ARE APPROXIMATE

SEE PLATE 2 FOR LEGEND

N64°E

0 5 10 20
Scale Feet

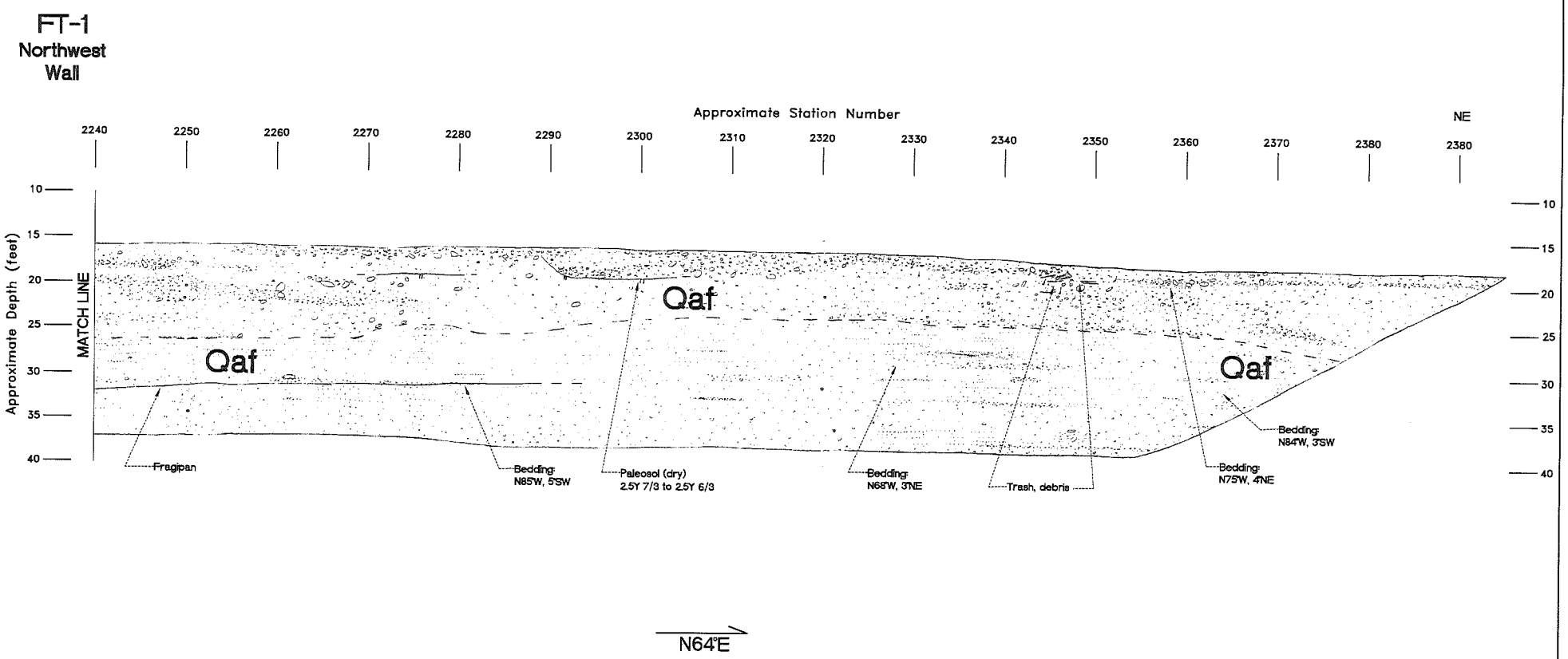
GeoSoils, Inc.

RIVERSIDE CO.
ORANGE CO.
SAN DIEGO CO.

FAULT TRENCH LOG FT-1

Plate 10 of 18

W.O. 5049-A2-SC	DATE 12/06	SCALE 1"=5'



ALL LOCATIONS, STATION NUMBERS, AND DEPTHS ARE APPROXIMATE

SEE PLATE 2 FOR LEGEND

0 5 10 20
Scale Feet

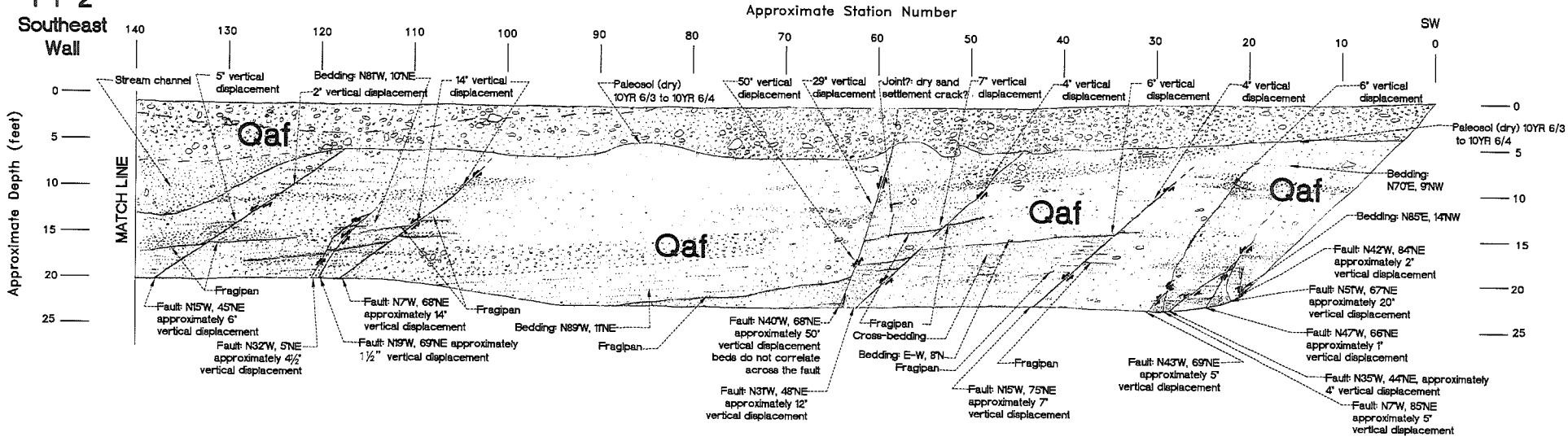
GeoSoils, Inc.
RIVERSIDE CO.
ORANGE CO.
SAN DIEGO CO.

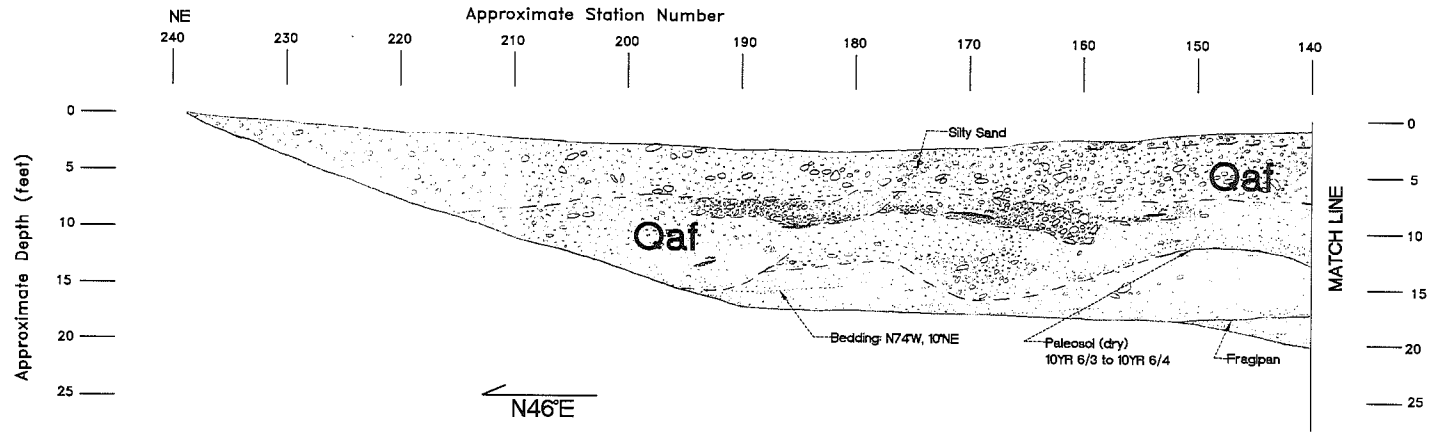
FAULT TRENCH LOG FT-1

Plate 11 of 18

W.O. 5049-A2-SC	DATE 12/06	SCALE 1"=5'

FT-2
Southeast Wall





LEGEND

Qaf — Undifferentiated Quaternary alluvial fan deposits/Quaternary alluvium: Well graded, fine- to medium-grained sand with few to locally abundant subangular to subrounded pebble- to cobble-sized and scarce boulder-sized igneous and metamorphic clasts (source rock includes tonalite, diorite, and schist), few silty fine-grained sand and fine-grained sand lenses (overbank deposits), gray to grayish brown, dry to moist, poorly indurated grading to moderately indurated with depth; thinly bedded (bedding thickness ranges from less than 1/16-inch to 3 inches), few cross-beds, discontinuous regional paleosol (cambic horizon Bwb)

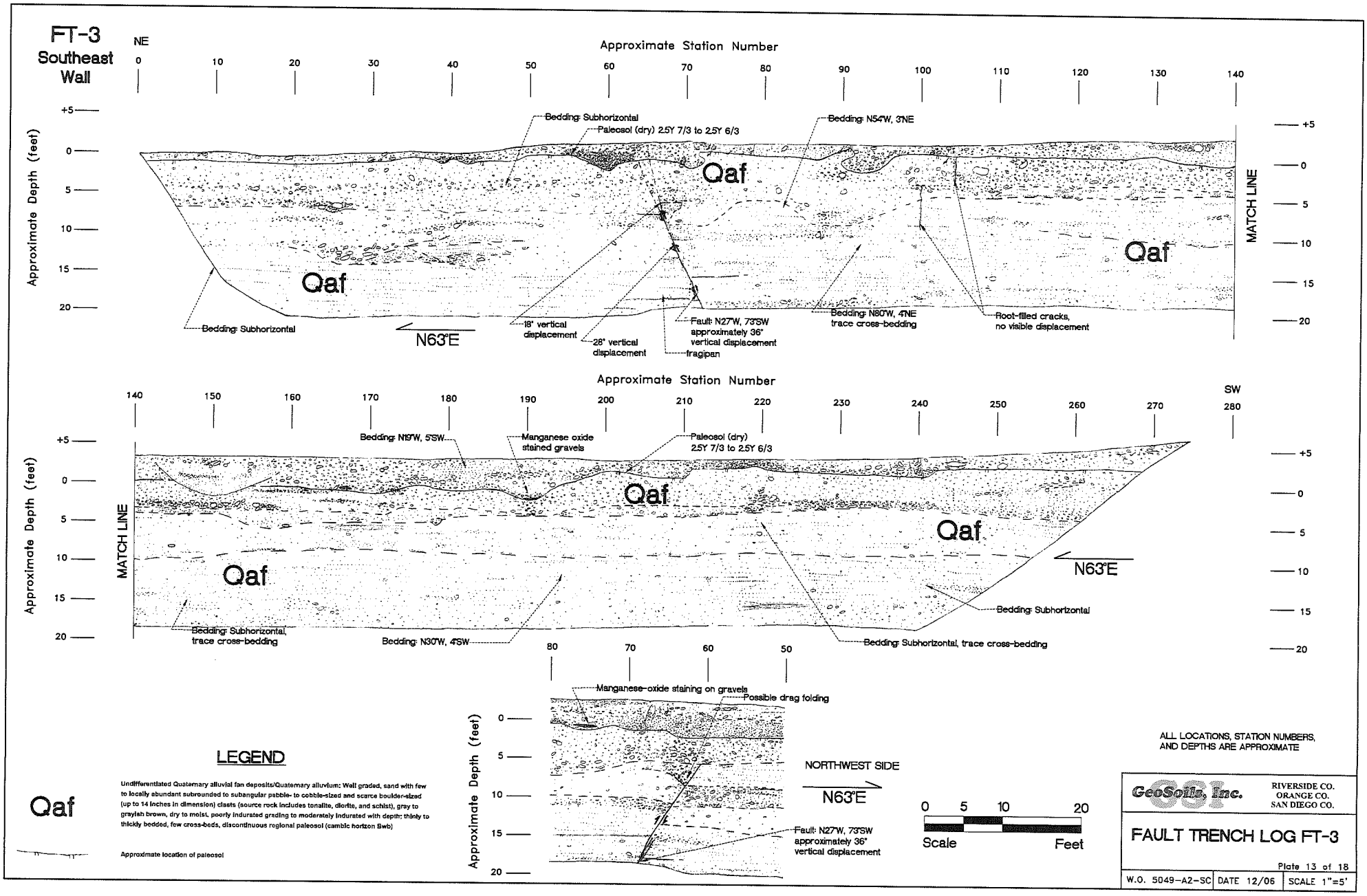
Approximate location of paleosol

0 5 10 20
Scale Feet

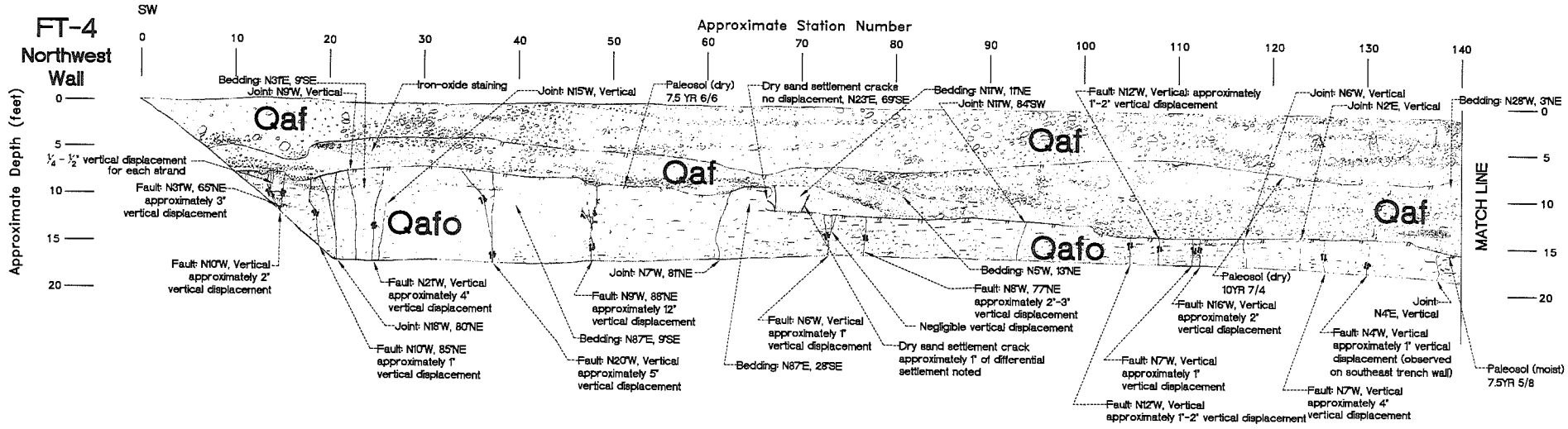
GeoSoils, Inc.
RIVERSIDE CO.
ORANGE CO.
SAN DIEGO CO.

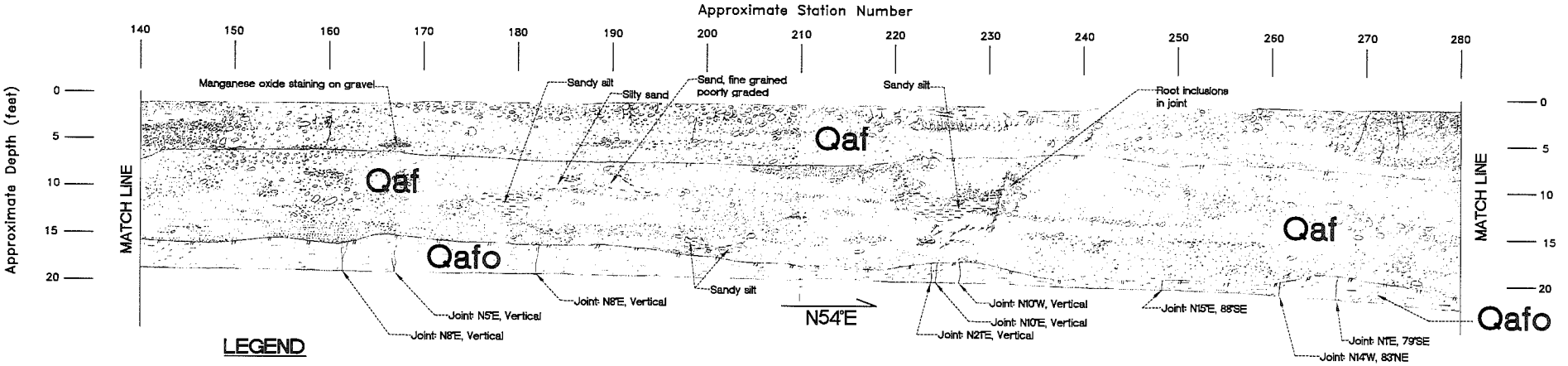
FAULT TRENCH LOG FT-2

W.O. 5049-A2-SC | DATE 12/06 | SCALE 1"=5'


FT-3
Southeast Wall
NE
Approximate Station Number
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
Approximate Depth (feet)
+5
0
5
10
15
20
Bedding: Subhorizontal
Paleosol (dry) 2.5Y 7/3 to 2.5Y 6/3
Bedding: N54°W, 3°NE
Qaf
Qaf
Qaf
MATCH LINE
Bedding: Subhorizontal
N63°E
18" vertical displacement
28" vertical displacement
Fault: N27°W, 73°SW approximately 36" vertical displacement
fragipan
Bedding: N80°W, 4°NE trace cross-bedding
Root-filled cracks, no visible displacement
Approximate Station Number
140
150
160
170
180
190
200
210
220
230
240
250
260
270
280
SW
Bedding: N19°W, 5°SW
Manganese oxide stained gravels
Paleosol (dry) 2.5Y 7/3 to 2.5Y 6/3
Qaf
Qaf
Qaf
MATCH LINE
N63°E
Bedding: Subhorizontal
Bedding: Subhorizontal, trace cross-bedding
Bedding: N30°W, 4°SW
Bedding: Subhorizontal, trace cross-bedding
80
70
60
50
Manganese-oxide staining on gravels
Possible drag folding
Approximate Depth (feet)
NORTHWEST SIDE
N63°E
Fault: N27°W, 73°SW approximately 36" vertical displacement
0
5
10
20
Scale
Feet
ALL LOCATIONS, STATION NUMBERS, AND DEPTHS ARE APPROXIMATE
LEGEND
Qaf
Undifferentiated Quaternary alluvial fan deposits/Quaternary alluvium: Well graded, sand with few to locally abundant subrounded to subangular pebble- to cobble-sized and scarce boulder-sized (up to 14 inches in dimension) clasts (source rock includes tonalite, diorite, and schist), gray to grayish brown, dry to moist, poorly indurated grading to moderately indurated with depth; thinly to thickly bedded, few cross-beds, discontinuous regional paleosol (cambic horizon Bwb)
Approximate location of paleosol
GeoSoils, Inc.
RIVERSIDE CO.
ORANGE CO.
SAN DIEGO CO.
FAULT TRENCH LOG FT-3
Plate 13 of 18
W.O. 5049-A2-SC
DATE 12/06
SCALE 1"=5'

FT-4 Northwest Wall



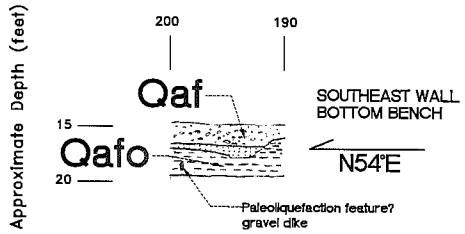


LEGEND

Qaf — Undifferentiated Quaternary alluvial fan deposits/Quaternary alluvium: Well graded, fine- to coarse-grained sand with few to locally abundant pebble- to cobble-sized clasts and scarce boulder-sized (up to 24 inches in dimension) clasts (source rock includes tonalite, diorite, and schist), scarce cross-bedded fine- to coarse-grained sand and pebbles (undifferentiated aeolian/fluvial deposits), gray to grayish brown, dry to moist, poorly indurated grading to moderately indurated with depth; thinly bedded (bedding thickness is on the order of 1/16 inch to 4 inches), continuous, regional paleosol (cambic horizon Bwb)

Qafo — Undifferentiated older Quaternary alluvial fan deposits/older alluvium: Silty fine-grained sand to fine-grained sandy silt with fine- to coarse-grained sand and pebble lenses to clayey silt/silty clay, brownish yellow to reddish brown, dry to moist, moderately to highly indurated; generally massive to weakly bedded (bedding thickness is on the order of less than 3 inches where discernable), few to locally abundant root intrusions), continuous paleosol along upper contact

Approximate location of paleosol



0 5 10 20
Scale Feet

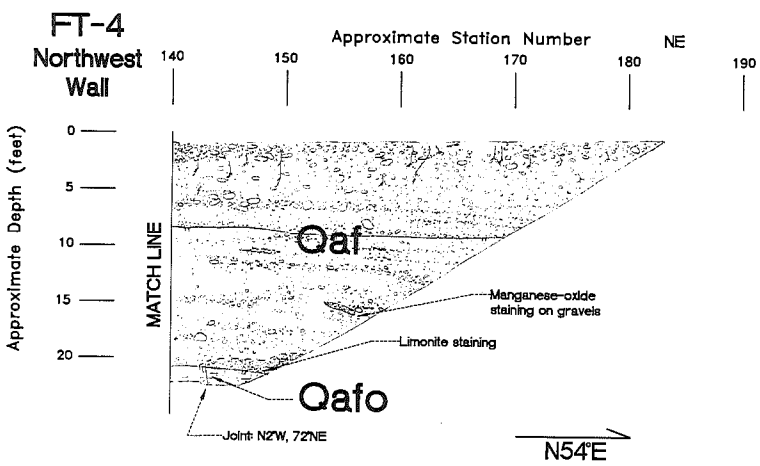
ALL LOCATIONS, STATION NUMBERS, AND DEPTHS ARE APPROXIMATE

GeoSoils, Inc.
RIVERSIDE CO.
ORANGE CO.
SAN DIEGO CO.

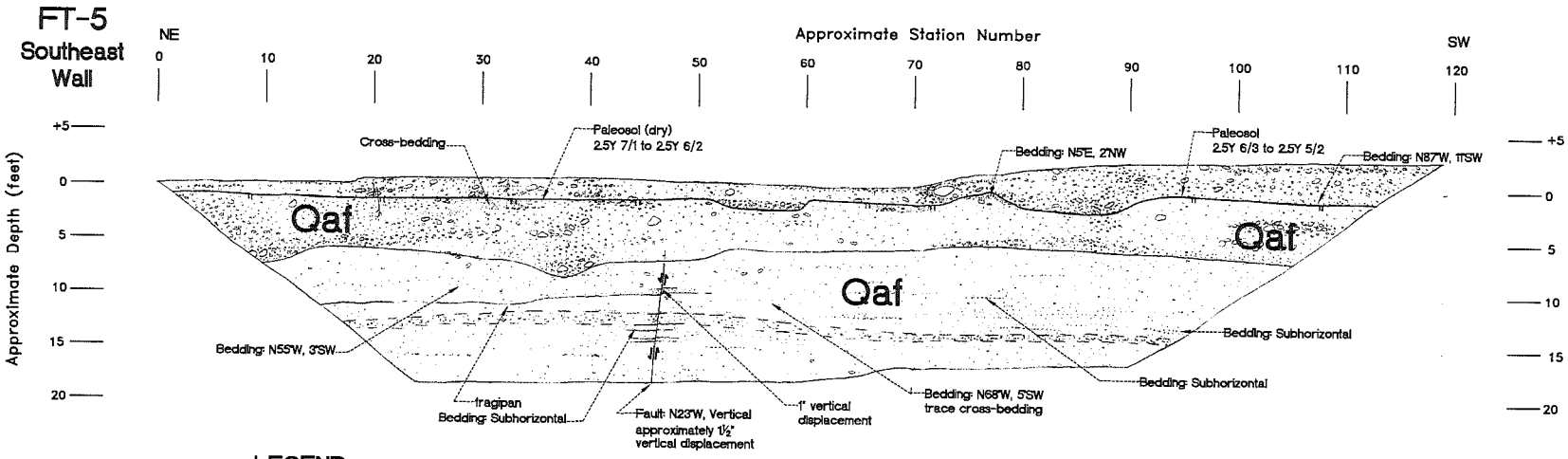
FAULT TRENCH LOG FT-4

Plate 14 of 18

W.O. 5049-A2-SC	DATE 12/06	SCALE 1"=5'



SEE PLATE 14 FOR LEGEND FOR FT-4



ALL LOCATIONS, STATION NUMBERS, AND DEPTHS ARE APPROXIMATE

LEGEND
FOR FT-5

Qaf Undifferentiated Quaternary alluvial fan deposits/Quaternary alluvium: Well graded sand with few to locally abundant subrounded to subangular pebble- to cobble-sized and scarce boulder-sized (up to 14 inches in dimension) clasts (source rock includes tonalite, diorite, and schist), gray to grayish brown, dry to moist, poorly indurated grading to moderately indurated with depth; thinly to thickly bedded, few cross-beds, discontinuous regional paleosol (cambic horizon Bwb)

Approximate location of paleosol

0 5 10 20
Scale Feet

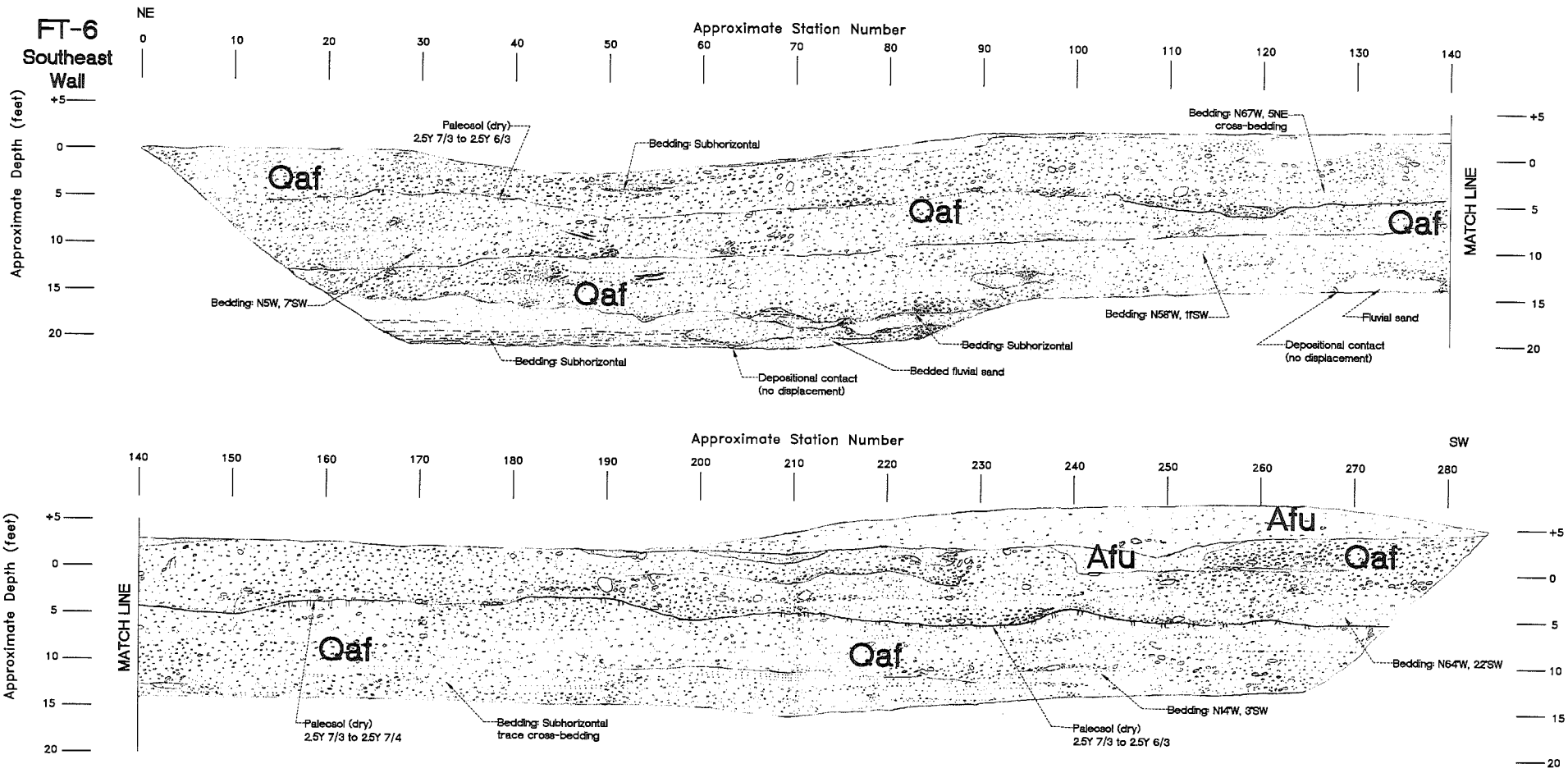
GeoSoils, Inc.
RIVERSIDE CO.
ORANGE CO.
SAN DIEGO CO.

FAULT TRENCH LOG
FT-4 / FT-5

Plate 15 of 18

W.O. 5049-A2-SC	DATE 12/06	SCALE 1"=5'

FT-6
Southeast Wall



LEGEND

Afu — Artificial fill (Undocumented): Silty sand with pebble- to cobble-sized clasts, light gray to brown, dry, loose; few rootlets

Qaf — Undifferentiated Quaternary alluvial fan deposits/Quaternary alluvium: Fine- to coarse-grained sand with few to locally abundant subangular to subrounded pebble- to cobble-sized and scarce boulder-sized (up to 16 inches in dimension) clasts (source rock includes tonalite, diorite, and schist), to sandy silt with fine-grained sand lenses (overbank/fluvial deposits), gray to grayish brown, dry to moist, poorly indurated grading to moderately indurated with depth; generally massive to weakly bedded, scarce cross-beds

Approximate location of paleosol

N58°E

0 5 10 20
Scale Feet

ALL LOCATIONS, STATION NUMBERS, AND DEPTHS ARE APPROXIMATE

GeoSoils, Inc.
RIVERSIDE CO.
ORANGE CO.
SAN DIEGO CO.

FAULT TRENCH LOG FT-6

Plate 16 of 18

W.O. 5049-A2-SC	DATE 12/06	SCALE 1"=5'

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Appendix III-B

MINERAL RESOURCE EVALUATION

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LYTLE CREEK RANCH

EVALUATION FOR POTENTIAL LOSS OF MINERAL RESOURCES

CITY OF RIALTO

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YUCAIPA, CA 92399

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Steve C. Cortner
Land Use Consulting
12890 Fremont Street
Yucaipa, CA 92399

Evaluation for Potential Loss of Mineral Resources Resulting from the Development of Lytle Creek Ranch, City of Rialto

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Introduction and Purpose

The Lytle Creek Ranch Project ("Project") proposes to develop 2,447.3 acres with mixed residential, commercial and light industrial uses. The property includes mineral resources (construction aggregates) that have been classified by the Department of Conservation, Division of Mines and Geology ("DMG") under the Surface Mining and Reclamation Act of 1975 ("SMARA") as a Mineral Resource Zone-2 ("MRZ-2"). The project has also been designated by the State Mining and Geology Board (SMGB) as containing aggregates of regional significance.

The purpose of this report is to provide the technical information needed for the City of Rialto ("City") to analyze the impact of the Project on those mineral resources for the Environmental Impact Report ("EIR") as required under California Environmental Quality Act ("CEQA"). The specific questions asked under CEQA include whether the project would:

- Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state.

- Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan.

The Project is generally situated north and south of the I-15 freeway corridor in the Lytle Creek Wash area and lies generally north and northeasterly of Riverside Avenue and the El Rancho Verde Golf Course. The project extends from the El Rancho Verde Golf Course to the Sierra Avenue and I-15 freeway intersection. Additionally, portions of the Project extend north of the I-15 freeway along Lytle Creek Road and also northeasterly along the I-15 freeway corridor to the intersection of Glen Helen Parkway and I-15 freeway.

Executive Summary

SMARA has created, among other things, a method to classify aggregate resources within the State of California by using a regional approach method. The classification program assists the local decision makers to understand aggregate resource availability, its geographic location and how to value its use relative to other potential uses. The Project lies within the San Bernardino Production Consumption ("P-C") Region (the "Region")

that has classified 10.5 billion tons of aggregate resources available under the MRZ-2 classification. The DMG has identified and classified an abundance of resources in the San Bernardino P-C Region and, if permitted, will provide ample aggregate supply to this region. The body of this report will describe the State's aggregate classification procedure and analyze the potential impacts of the Project on mineral resources in the Region. This report concludes that the elimination of resources caused by this project will be less than significant when considering the constraints on permitted mining in this area and the availability of aggregate resources elsewhere in the Region.

The report will also evaluate the constraints of permitting aggregate reserves in the absence of the Project. Significant urbanization in this area has changed the character of the Project area and the land uses thereof. The report will identify the rapid pace of development which requires changes to truck hauling and the availability of aggregate resources coupled with county planning and development code issues. The San Bernardino P-C Region is one of the fastest growing areas in the greater Los Angeles metropolitan areas. However, this region has some of the largest aggregate resources available in the State.

Aggregate Resources Utilization

Construction aggregate resources are the competent sand, gravel and rock that are used to develop required infrastructure for society's needs. Construction aggregate resources are located in various areas such as river beds, alluvial fans, older river terrace areas, and in certain hillsides and mountains. Hillsides and mountains are primarily rock with little to no sand. Riverine systems contain largely sand and gravels. These resources are only found in natural occurring areas that posses the necessary criteria to be considered competent or meet the test criteria using the American Society for Testing Materials ("ASTM") standards. Additional test standards include, but are not limited to, Association of State Highway Officials (ASHO) which set standards for aggregate cleanliness, hardness and non-reactivity.

Construction aggregate are used in the manufacture of, but not limited to, ready mixed concrete, asphaltic concrete, road base, filtration rock, roofing tiles, tiles and block, well filtration packing, stucco, sub-base, fill material, engineered compacted fills and gravel roads.

Construction aggregate is the leading non-fuel mineral commodity produced in California, as well as in the nation. Valued at $1.63 billion, aggregate made up 44 percent of California's $3.72 billion non-fuel mineral production in 2005. California is

the nation's leading producer of construction aggregate with a total production of 235 million tons in 2005.[1]

Mining Regulations

The State of California enacted SMARA in 1976 to regulate mining activities. The Act, as amended, provides for local lead agencies to control their own local land use issues (home rule) with respect to mining activities. SMARA requires any mining operation that is currently operating to have a valid mining and reclamation plan. The permitting of the surface mining plan, which include all operational issues, is the sole responsibility of the local lead agency or agency of land use authority. However, the reclamation plan can only be approved by a lead agency (which is defined by SMARA as a City, a County or the San Francisco Bay Authority). The State has delegated its authority to the local lead agency, and requires the lead agency to adopt the SMARA ordinance, or create an ordinance that will meet or exceed SMARA requirements. The State has review provisions of the SMARA reclamation plan and is listed as a beneficiary in conjunction with the lead agency on the surety instrument (required of the operator which guarantee's reclamation performance).

Other State agencies may have State regulatory control over mining operations and the permitting thereof. Some of the agencies that could have potential input or authority over mining permit issues are the California Department of Fish and Game ("CDFG") and the Regional Water Quality Control Board, Santa Ana Region ("RWQCB"). Under certain instances the CDFG will require permits in conjunction with the approval of mining and reclamation plans. The RWQCB may require certain conditions of approval to be implemented into a mining and reclamation permit.

Aggregate Locations and Classifications

Portions of the Project are located within an area identified by the DMG as potential for construction aggregates resources (Miller, 1987). Under California Code of Regulations, Title 14, Article 6, section 3676 requires that *"prior to a lead agency approving a use that would be otherwise incompatible with mineral extraction there needs to be a determination of a significant land use conflict."* As the Project has the potential to eliminate the availability of the Project site for mineral resource recovery in developed for a mix of residential and commercial uses, this report will evaluate the Project's potential impacts on potential aggregate resource loss and the affected loss to the market region over the next 50 year period.

---

[1] Aggregate Availability In California, Map Sheet 52 (Updated 2006)

The DMG has realized that in urban developing areas such as the greater Los Angeles area, land use decisions need to be made with full recognition of the natural resources of the area. Mineral resources, including aggregate, are limited within a given region and accordingly, the DMG created a series of land classifications for sand and gravel resource areas. Areas classified are divided into different regions of the state and are called Special Reports ("SR"). The San Bernardino Production Consumption ("P-C") Region, as included in SR 143 Part VII Report, covers 1,098 square miles and includes the large urbanizing portions of southwestern San Bernardino County and northwestern Riverside County (Miller, 1987). This particular report presents a classification of the land in the San Bernardino P-C Region by Mineral Resource Zones ("MRZs") based upon guidelines adopted by the State Mining and Geology Board ("SMGB"). The Special Reports were designed to classify mineral resources to assist the SMGB at such time it decides to designate lands that contain regionally significant aggregate resources pursuant to SMARA. The SR 143 VII Report remains the valid reference document when referring to land classification areas and appropriate zone definitions. The San Bernardino P-C Region is part of the greater Los Angeles metropolitan area, and this metropolitan area is the largest urbanized area in California. The San Bernardino P-C Region includes the southern part of Los Angeles County and parts of San Bernardino, Riverside, and Orange Counties. The SR 143 VII Report states that, *"the DMG has classified 855 square miles of urbanizing lands within the San Bernardino P-C Region according to the presence or absence of significant sand, gravel or rock deposits that are suitable for the use in Portland Cement Concrete ("P.C.C.") grade aggregates."* This report further indicates that *"if a deposit contained more than $5 million worth (in 1978 dollars) of suitable material and could be extracted and marketed profitably under present technologic conditions, or those which could be estimated to exist in the foreseeable future, the deposit was classified MRZ-2."* Although substantial parts of the Los Angeles area are developed, this report indicates that widespread urbanization is still occurring at a rapid rate.

The DMG categorizes aggregate materials in two different ways. Reserves are aggregate materials where there is a valid permit to excavate and remove those materials. Resources are the total amount of (un-permitted) available aggregate within the area, including any reserves. The estimated aggregate resources within the San Bernardino P-C Region amount to 10.5 billion tons. Of this, 430 million tons are identified by SR 143 VII Report as reserves (permitted aggregates) available for mining at the end of 1981. According to this report, the 430 million tons identified covers only 10 square miles, which represent 1 percent of the total classified area. In addition, over 99 percent of these resources lie in the San Bernardino Valley and the San Gorgonio Pass areas (in the northern and eastern parts of the region) in alluvial fan and river deposits. The remaining (less than 1 percent) resources lie in two alluvial deposits located in the far southwestern part of the region near Lake Elsinore.

SR 143 Part VII Report indicates that, "The *principal objective of this project is to classify land in the Los Angeles area into Mineral Resource Zone (MRZs) based on guidelines adopted by the California State Mining and Geology Board. This classification project will assist the Board in the event the Board contemplates designation of lands containing regionally significant aggregate resources pursuant to the Surface Mining and Reclamation Act of 1975 (SMARA)."*

SR 143 Part VII Report presents classification information in six parts, one for each P-C Region that was identified in the greater Los Angeles metropolitan area. The object of the SR 143 Part VII Report is to provide information concerning the aggregate resources of the San Bernardino P-C Region and the expected needs for resources in the next 50 years. The report further indicates that, "*For many years the San Bernardino area has had adequate quantities of relatively low-cost aggregate materials locally available. However, as more areas become urbanized, suitable sand and gravel deposits are being lost through urban development and are being diminished yearly by mining."*

In the San Bernardino P-C Region classification by the DMG is depicted in the form of Mineral Resource Zones on 26 U.S. Geological Survey topographic quadrangles that is referred to in the appendix as Plates 7.1-7.26. The SR 143 Part VII Report indicates, "*These zones were established on the basis of sand, gravel, and rock resource appraisal that included: a study of geologic reports and maps, field investigations of outcrops and active and inactive pits, and an analysis of water well logs and drill records. Nine major areas were determined to contain significant aggregate deposits within the San Bernardino P-C Region and were classified MRZ-2."* In total, this area covers 116 square miles (14 percent of the total classified area). DMG additionally indicates that, *"there were other areas that contained aggregate resources, but their significance could not be evaluated from available data; these areas were classified MRZ-3."*

In addition, the SMGB has, subsequent to this resource classification, designated the resources from the proposed project as "regionally significant". SMARA Section 2726 states "(*Area of regional significance) means an area designated by the board pursuant to Section 2790 which is known to contain a deposit of minerals, the extraction of which is judged to be of prime importance in meeting future needs for minerals in a particular region of the state within which the minerals are located and which, if prematurely developed for alternative incompatible land uses, could result in the permanent loss of minerals that are of more than local significance."*

MAP 52

Map Sheet 52, updated in 2006 ("Map 52") is an update of the original version published in 2002 (Kohler, 2002). A copy of Map 52 is attached to this Report. Map 52 summarizes data from reports compiled by the California Geological Survey (CGS) for 31 aggregate study areas throughout the state. Map 52 is a statewide map showing a

compilation of data about aggregate availability collected over a period of about 28 years through January 1, 2006. The purpose of this map is to compare projected aggregate demand for the next 50 years with currently permitted aggregate resources in 31 regions of the state. Data regarding aggregate resources and projected aggregate demand shown on Map 52 are updated from a series of mineral land classification reports published as Special Reports (SR) and Open-File Reports (OFR) by CGS between 1981 and 2005.[2]

Map 52 does not supersede or change SR 143 VII Report relevant to areas classified, nor does it change MRZ areas. Map 52 was developed to update the permitted aggregate reserves and update the demand forecast over the next 50 years.

Mineral land classification studies completed before 1989 used P-C Regions as the study boundary. The San Bernardino P-C Region was created prior to 1989 leaving this P-C Region in-tact with Map 52. The SMGB in 1989 changed the scope of the mineral classification studies from P-C Regions to countywide studies because counties are one of the primary users of the reports.

San Bernardino County Development Code

San Bernardino County has two sets of criteria driving the use and development of mineral resources. One criterion is in the Mineral Resources (MR) Overlay in the Development Code and the other is found within the County of San Bernardino General Plan, Section V-Conservation Element.

In the San Bernardino County Development Code, Chapter 82.17010 MR Overlay discusses the Counties (a) purpose and (b) objectives. The purpose expresses that, 1) *the extraction of mineral resources is essential to the economic well being of the County and need of the society, and,* 2) *certain privately owned land areas of the County contain significant amounts of mineral resources. MR Overlays are created to protect these resources for present and future extractions. Since mineral extraction must take place on the physical site where minerals naturally occur, special controls are needed to minimize conflicts with other land uses. The MR Overlay functions as a "holding district" since the land will be re-designated and reclaimed for other land uses when mining operations cease. Also, the district will insure that land disturbances are minimized through regulations and through the prohibition of any other land uses in these districts that are incompatible with mining,* and, 3) *Once the mining activity ceases, the mined lands shall be reclaimed for new uses in order to prevent or minimize adverse effects on the environment and to protect the public health, safety and welfare.*

[2] Aggregate Availability In California, Map Sheet 52 (Updated 2006)

The objectives are, 1) *prevent or minimize all adverse environmental effects,* and, 2) *reclaim mined lands to a usable condition that is readily adaptable for alternative land uses, and,* 3) *encourage the production and conservation of minerals while preserving areas relating to environmental and recreational amenities if such are located within the mining locale,* and, 4) *eliminate residual hazards to the public health and safety.*

The "Location" Requirements under Chapter 82.17.020 apply MR Overlays to areas that surface mining activities currently exist or where mining activities are expected to take place in the future. The MR Overlay also applies to areas adjacent to current or proposed mining activity to prohibit the intrusion of incompatible uses.

The Counties Development Standards under 82.17.040 require MR Overlays to be free from any land use that is incompatible with mining. Additionally, incompatible land uses shall be suitably buffered from mining activity. The standards under this section provide for appropriate transition measures that must be taken in order to insure compatibility between mining activity and the surrounding land uses.

The County General Plan recognizes the importance of mineral resources within the County. The County recognizes the State of California's Mineral Classifications and the MRZ zones respectively. The General Plan discusses land use conflicts as to appropriate buffer areas between mining and other land use conflicts as well. The County's General Plan Policy generally sets out policy that states, *"In areas containing valuable mineral resources, establish and implement conditions, criteria, and standards that are designed to protect the access to, and economic use of, these resources, provided that the mineral extraction does not result in significant adverse environmental effects, and that open space uses have been considered for the area once mining operations cease."*

The Mineral Resources Policy serves to protect and encourage the exploitation of mineral extraction while maintaining reasonable safeguards toward incompatible uses and mining operations. Clearly County policies have discouraged encroachment of incompatible land uses on or near their MR Overlay areas. However, it appears clear that encroachment has occurred to a significant degree.

Existing Setting

Large portions of the Project are located within an area identified by the DMG, SR 143 VII Report, plates, sectors B-1 and B-5 **(**see Exhibit 1**).** SR 143 VII Report identifies these areas as *"having a high potential as an aggregate resource and is classified as a MRZ-2 zone, (Miller, SR 143 VII, 1987, Plate 7.2)"*. The DMG has classified large areas in MRZs relative to their understanding of the quality and potential quantity of the aggregate resources. Designation is another step taken by the SMGB to propose certain areas classified as MRZ-2 zones as regionally significant and have a greater significance

identified to the specific zone. This Project lies within an area that is classified and is designated as being of regional significance.

The DMG "sector" concept was developed to organize the volume calculations of aggregate resources which identify areas within the classification of MRZ-2 that is non-urbanized and judged to be somewhat uniform in geological and mineral make up and which construction aggregate resources can be estimated with some degree of certainty (Miller, SR 143 VII Report 1987). Subsequent to the SR 143 VII Report many geographic, economic and physical changes have occurred in the Project and the surrounding areas.

Sector B includes the present course of Lytle Creek Wash from about 5 miles upstream of the mouth of the Lytle Creek Canyon to the Santa Ana River, an area of about 10.7 square miles. The depth of suitable material ranges from 90 feet thick in the northern or upstream part of the wash and thins to about 50 feet thick in the southern portion (Miller, SR 143 VII, Report 1987).

The majority of the Project lies within Sector B-1 and B-5 of the SR 143 VII Report. Since SR 143 Vll Report was published in 1987, the character and landscape of the area in which the Project is located has dramatically changed. Significant development of housing has and continues to occur to the west and north by northeast of the Project area. To the east by northeast is the Glen Helen Amphitheater and bisected by the I-15 freeway (not present when SR 143 VII Report was created) in the north, to the south exists housing development, golf course and the new extension of the I-210 Freeway.

Would the Project result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State?

The proposed Project consists of 2447.3 acres most of which are within MRZ-2, Sectors B-1 and B-5 of SR 143 VII Report. Therefore, Exhibits 2 and 3 represent mine plans that depict the reasonable recovery for construction grade aggregate and the possible elimination of 41 million tons of aggregate resources from the Project within Sector B of SR 143 VII Report absent the proposed Project. The proposed Project will not reduce ***reserves (permitted)*** the DMG has inventoried for this P-C Region or within Sectors B-1 and B5; however the project will effectively reduce the overall ***resources (non-permitted)*** in Sector B-1 and B-5 of the San Bernardino P-C Region. The amount of resources that would be impacted by this Project is approximately 41 million tons.

The Project has engineered and analyzed two different mine plans within the proposed Project area which contain approximately 300 acres in Exhibit 2 and approximately 240 acres in Exhibit 3. These mine plans represent reasonable and feasible areas that could be mined absent the Project. These areas are out of the active floodway and do not conflict with current environmental preserves for the protection of certain sensitive plant and

animal species. The mine plans conform to reasonable regulatory constraints are in general conformity to standard conditions that would be imposed by the County of San Bernardino for necessary flood protection relative to flood control practices and normal and standard mining buffer and setback requirements. Additionally, there exist areas zoned MRZ-2 that have already been encroached upon by conflicting land uses. Some of the conflicting encroachments are the I-15 Freeway Bridge and its supporting infrastructure, fuel pipelines, industrial buildings and related activity.

The SR 143 VII Report identifies 10.5 billion tons of MRZ-2 resources in the San Bernardino P-C Region. The MRZ-2 resources as well as all other MRZ zones are depicted in Plates 7.1 through 7.38. When comparing the approximate 10.5 billion tons of resources (non-permitted) identified in the SR 143 VII Report to the potential 41 million tons of aggregate resources potentially removed from the MRZ-2 zone by the proposed Project, the Project represents 0.4 percent of the total estimate of the MRZ-2 resource identified in the SR 143 VII Report. The 10.5 billion resources only include MRZ-2 zone resources. If MRZ-3 resources were identified and calculated the overall impact would be significantly less.

Aggregate resources are currently being mined and developed adjacent to this proposed Project in the Lytle Creek Wash, the Cajon Creek Wash areas and in the City of Rialto. All the above areas are in close proximity to the proposed Project. Other major operations exist in the Santa Ana River in the Redlands and Highland area. There also exists another large operation in the Cabazon area.

Map 52 has updated the demand and the total reserves (permitted) for the San Bernardino P-C Region. Map 52 indicates there exist 262 million tons of reserves (permitted) in the San Bernardino P-C Region. Map 52 indicates that 24 percent of the reserves (permitted) required to provide an adequate 50 year aggregate reserve currently exist in the San Bernardino P-C Region. The demand update by Map 52 indicates that the San Bernardino P-C Region in total requires around 21,480,000 tons of construction aggregate per annum. Map 52 further depicts a 50 year demand of 1,074 million tons of construction aggregates. SR 143 VII Report estimates the San Bernardino P-C Region has over 10 billion tons of aggregate resources existing within this region containing the MRZ-2 classification.

Map 52 reports in its "Conclusions and Recommendations" that, *"Only six percent of the total aggregate resources identified within the 31 study areas are currently permitted."* It appears clear that the projected aggregate supply in relation to its 50-year demand is an inability to permit the necessary construction grade aggregate rather than a depletion issue. Map 52 also reports that, *"In the next 50 years, California will need approximately*

13.5 billion tons of aggregate," Map 52 indicates that there exist around 74 billion tons of un-permitted aggregates within the state. California would only have to permit a fraction of the non-permitted aggregate resources throughout the state to meet its 50-year demand.

Considering the vast amount of resource availability within the San Bernardino P-C Region there would appear to be ample resources to permit and develop aggregate reserves within the San Bernardino P-C Region even if the 41 million tons of aggregate resources on the Project site were eliminated by the proposed Project, and therefore the impact of the Project on the availability of aggregate resources is considered less than significant.

Would the Project result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?

The Project area is located in an area identified as MRZ-2 under the State Mineral Resource Zone designation system. County Policy CO7.2 requires the County to establish a system that identifies mineral potential and economically viable resources consistent with the State designations. The City of Rialto's General Plan identifies a substantial portion of the project site located to the south of the I-15 Freeway (and excluding the Sycamore Flats and Sycamore Canyon areas) as "Sector B-5" in accordance with the classification system in SR 143, Part VII. There are no applicable specific plans or other land use plans affecting mineral resources. Neither the County General Plan nor the City's General Plan identify the Project area as a mineral resource recovery site. Moreover, for the reasons discussed below, the feasibility of the Project site being considered a mineral resource recovery site is remote. Therefore, although the Project will result in the loss of a MRZ-2 designated area, the Project site is not currently designated a mineral resource recovery site, and the feasibility of it being delineated as such in the future is remote, this report concludes that Project's impact is less than significant with respect to this particular threshold issue.

Mining in the area of the proposed Project represents significant constraints, which among other issues require extensive flood control engineering. Constraints that affect the estimates of total available construction aggregate resources include regulatory mine design restrictions such as slope angles, the maximum depth of extraction, mine setbacks, screening and landscaping, property buffer requirements, sensitive species and other environmental mitigation. The San Bernardino County Flood Control District has

imposed general mining restrictions to preserve and protect the flood control dynamics within the active Lytle Creek Wash. The implementations of large levees, grade control structures, depth limitations are all factors that will minimize aggregate extraction quantities and dramatically increases cost of aggregate mining.

Caltrans has imposed its jurisdiction on any mining activities occurring within 6000 feet of the I-15 freeway bridge. Most of the proposed Project occurs within this 6000 foot area of Caltrans jurisdiction. The Cal-Nevada pipeline transporting fuel via pipeline across the Lytle Creek flood channel downstream of the I-15 freeway bridge would cause additional issues relative to aggregate extraction, as would the San Gabriel Water District water conveyance lines that cross Lytle Creek further downstream. When SR 143 VII Report was created the Lytle Creek Wash was, for the most part, undeveloped. The I-15 freeway was not constructed and housing along Riverside Ave. did not exist. The future stability of the I-15 bridge structure would need to be considered should any significant mining were to occur either up stream or downstream of the bridge structure. The bridge has virtually eliminated mining in sector B-1 which lies upstream of the bridge structure. A 214 acre habitat species preserve exists within the Lytle Creek Wash and within the proposed Project area. The United States Department of Fish & Wildlife ("USFWS") has indicated that mining anywhere around the preserve would negatively impact the San Bernardino Kangaroo Rat. Further the USFWS has identified the existence of the federally endangered slender horned spine flower within the area.

Mining generates diesel-associated particulates typical to the industry as well as significant truck traffic. Housing developments that exist in the immediate area will be sensitive to the type of impact a mining operation will represent. CEMEX currently operates a large scale mining operation including the manufacture of Ready Mixed Concrete adjacent to the Project. Additionally, heavy truck traffic already exists along Riverside Avenue and other arterial roadways from the normal business conduct of the CEMEX facility. An additional mining facility in this area would cause even greater impacts to the existing housing developments within the general area of this project.

CEMEX and its predecessors in interest have operated its facility in the Lytle Creek Wash area for over 50 years. Surrounding urban land uses were not a concern when the operations began. Over time various developments started to encroach around the mining facilities. Due to the mining facilities vested status (permitted) CEMEX can operate throughout the life of its reserves, albeit the level of difficulty to attempt to permit the same site in today's regulatory climate would be problematic at best.

The County of San Bernardino General Plan and Development Code encourages the exploitation of aggregate resources and attempts to discourage land use conflicts. The County Code attempts to preclude conflicting land uses on or near MR Overlays to encourage mining in the areas classified by the State of California as aggregate resources exist where they naturally occur. However, as a result of the encroachment of housing

(primarily as a result of adjoining City's land use policies), road and freeway networks, and sensitive species preserves and the necessary flood control protective measures have caused serious land use conflicts that would discourage mining in the proposed Project area.

Summary and Conclusion

The Project will eliminate the potential to extract mineral resources from the San Bernardino P-C Region. However, as the resources discussed in this report are neither permitted nor currently available to mine and the feasibility of future mining is questionable, the Project will not eliminate resources identified from the Map 52 supply in order to meet the projected 50-year demand. The resources impacted by the Project are not permitted resources, and any application for permit to mine would require extensive processes with no guarantee of obtaining project approval. Available resources in the San Bernardino P-C Region more than meet the needed aggregate supply that the State of California has determined for its 50-year demand. This Project will impact the resource availability by only 0.4% as identified in the SR 143 VII Report. This resource elimination will impact the MRZ-2 classified resources by less than 1 percent. Even if the constraints of permitting (whether regulatory or otherwise) were ignored and the eliminated resources were increased 10 fold, this reduction in resources would only represent 4 percent of the P-C Regions State classified MRZ-2 resources. Therefore, the Project's impact on aggregate resources would be less than significant.

There are currently three major mining facilities located within close proximity to this proposed Project. All three of these existing facilities have the potential to permit significant additional aggregate reserves. It should be noted that these additional resources are not included in the permitted aggregate resource calculations within Map 52. However, they are considered within the MRZ-2 classified resources.

Ideally, it is beneficial to locally provide all aggregates from the area that generate the aggregate demand. This area is adequately served from a local level.

EXHIBIT 1

SECTORS B-1 & B-5 of MRZ-2 ZONE

IN THE SAN BERNARDINO

PRODUCTION-COMSUMPTON

REGION

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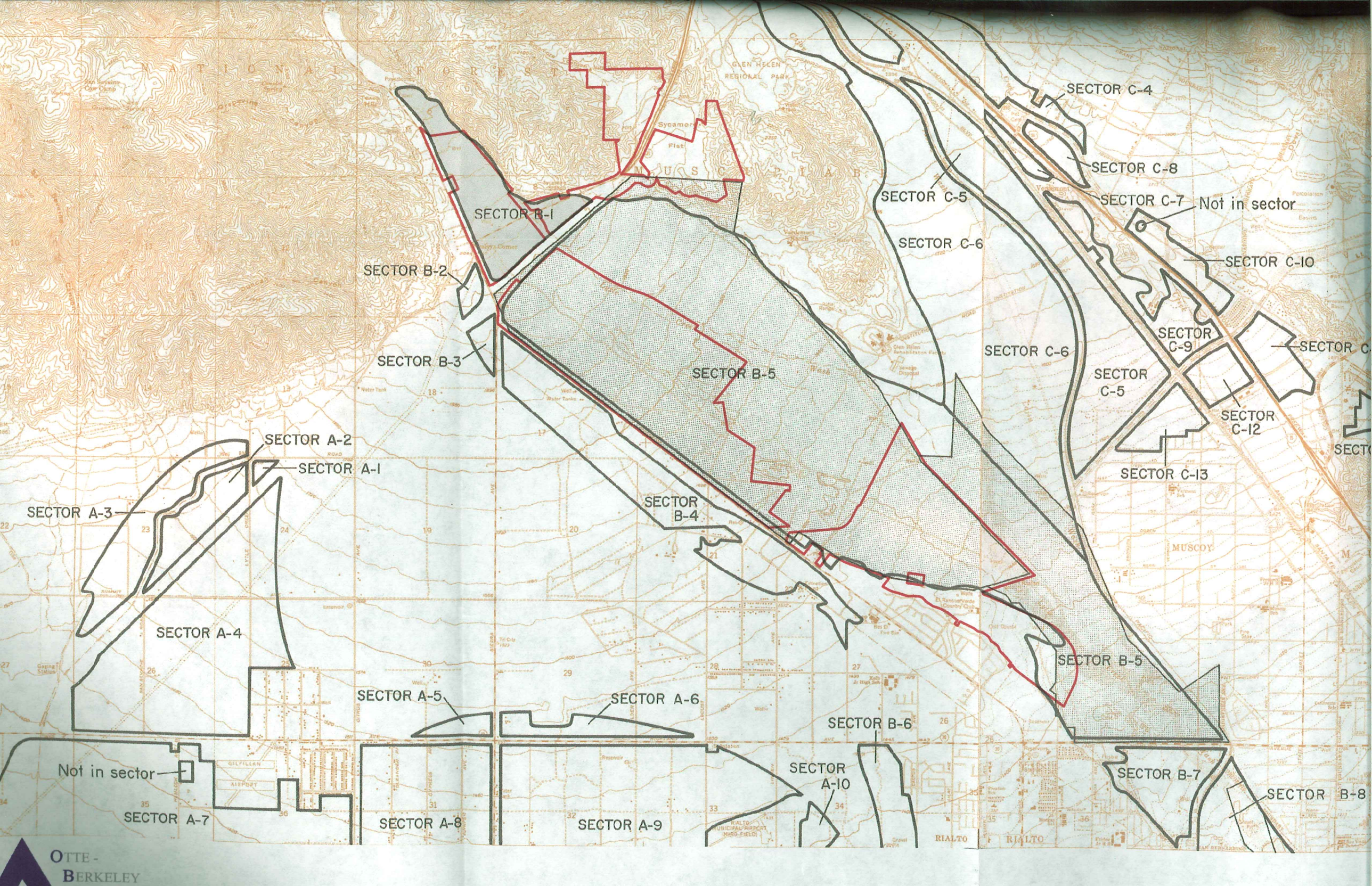

OTTE-
BERKELEY

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EXHIBIT 2

300 ACRE MINE PLAN

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E TO
NTIAL
G
1540
1530
1520
1510
1500
1490
1480
1470
1460
1450
2%
2%
100'
100'
WVWD
SYCAMORE

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EXHIBIT 3

240 ACRE MINE PLAN

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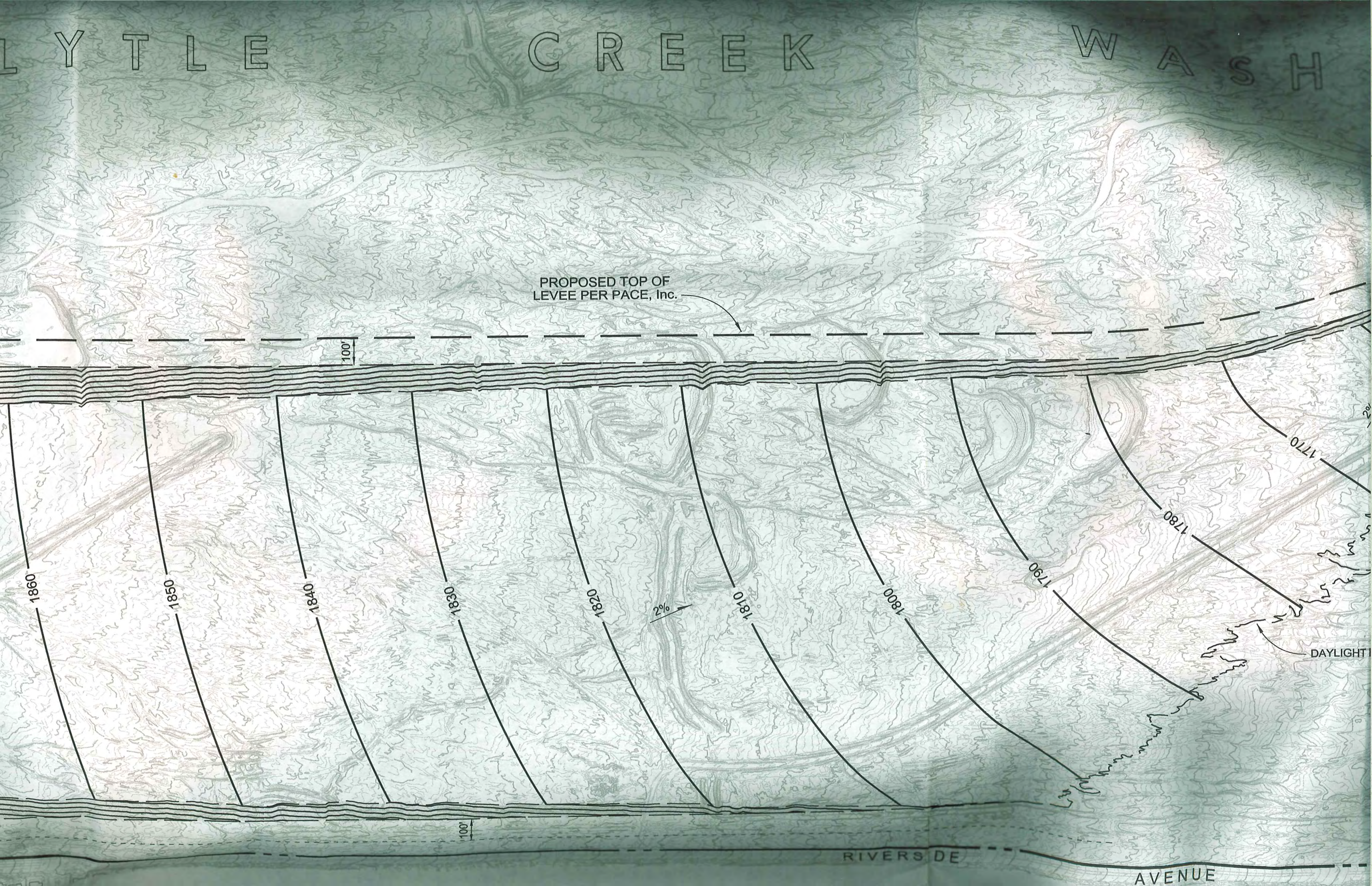
LYTLE CREEK WASH
PROPOSED TOP OF
LEVEE PER PACE, Inc.
100'
1860
1850
1840
1830
1820
1810
1800
1790
1780
1770
2%
DAYLIGHT
100'
RIVERSIDE AVENUE

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EXHIBIT 4

GENERALIZED MAP DEPICTING RESOURCE AREAS IN THE SAN BERNARDINO AND ADJACENT PRODUCTION-CONSUMPTION REGIONS

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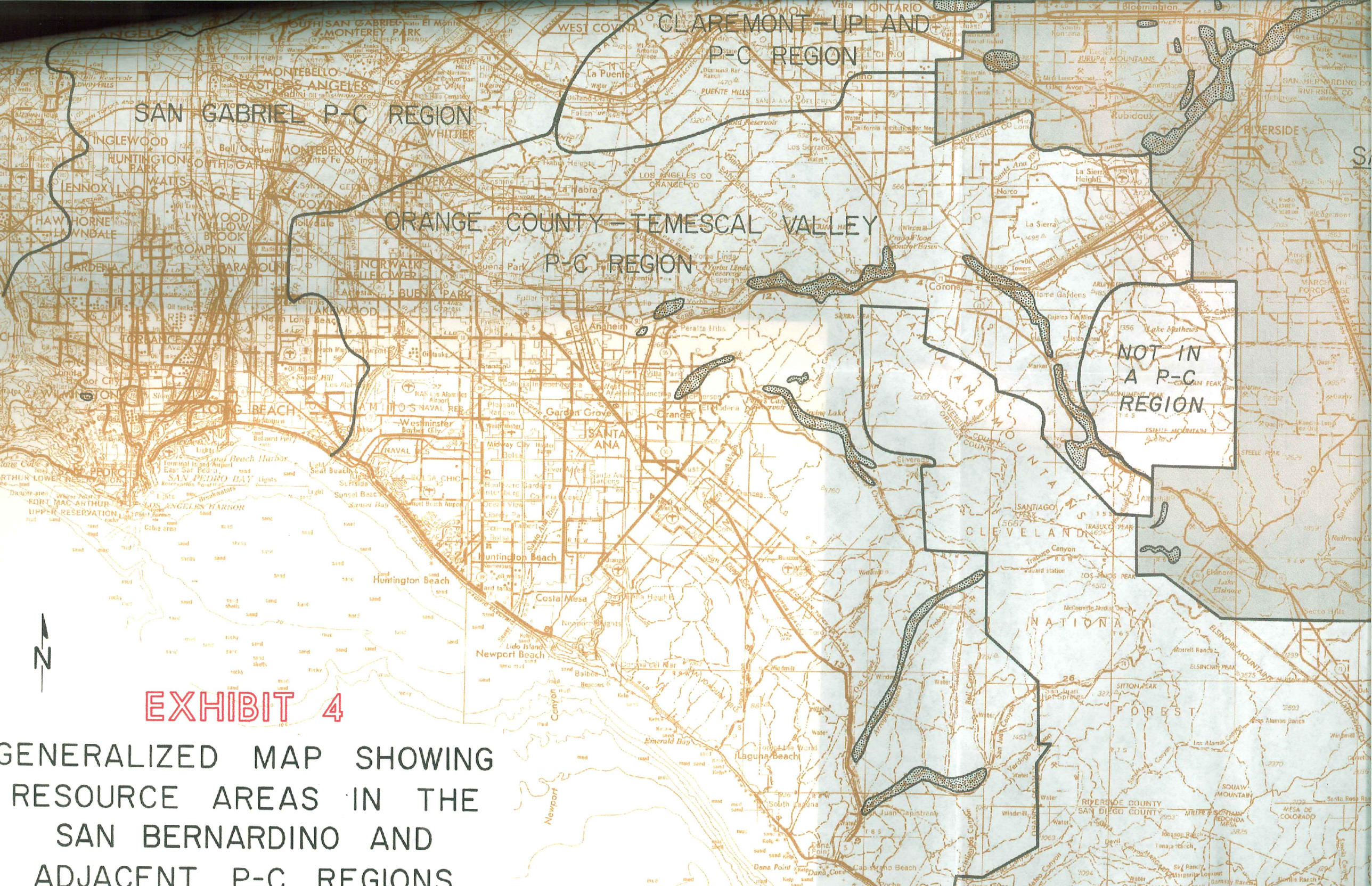

EXHIBIT 4

GENERALIZED MAP SHOWING RESOURCE AREAS IN THE SAN BERNARDINO AND ADJACENT P-C REGIONS

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EXHIBIT 5

MINING CONSTRAINTS

WITHIN THE MRZ-2 ZONE

IN THE SAN BERNARDINO

PRODUCTION-CONSUMPTION

REGION

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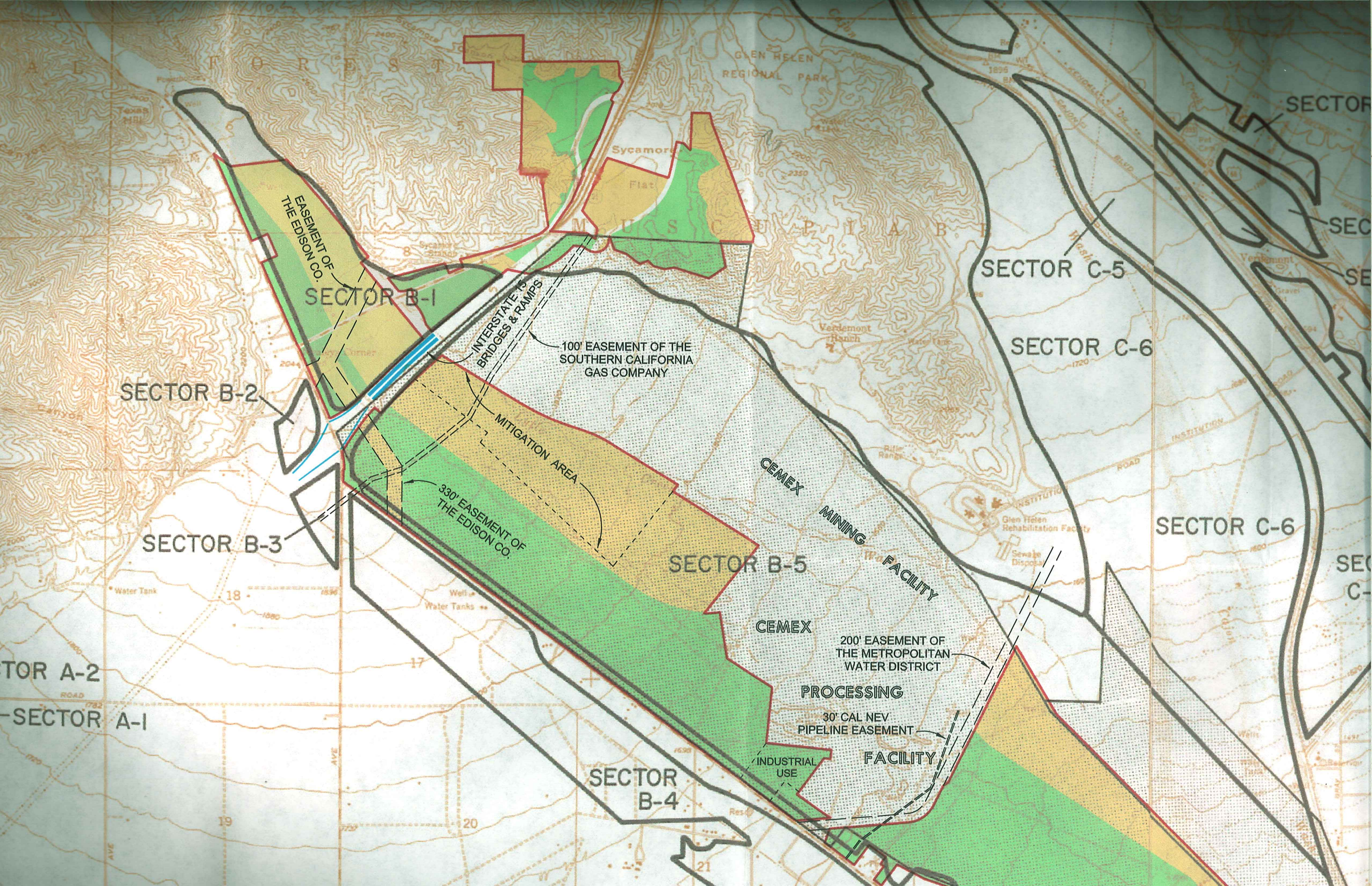
EASEMENT OF THE EDISON CO.
SECTOR B-1
INTERSTATE 15 BRIDGES & RAMPS
100' EASEMENT OF THE SOUTHERN CALIFORNIA GAS COMPANY
SECTOR B-2
MITIGATION AREA
330' EASEMENT OF THE EDISON CO.
SECTOR B-3
CEMEX
MINING
FACILITY
SECTOR B-5
CEMEX
200' EASEMENT OF THE METROPOLITAN WATER DISTRICT
PROCESSING
30' CAL NEV PIPELINE EASEMENT
FACILITY
INDUSTRIAL USE
SECTOR B-4
SECTOR C-5
SECTOR C-6
SECTOR C-6
SECTOR A-2
SECTOR A-1
GLEN HELEN REGIONAL PARK
Sycamore Flats
Verdemont Ranch
Glen Helen Rehabilitation Facility
Sewage Disposal
Water Tank
Well
Water Tanks

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APPENDIX

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Steve C. Cortner
Land Use Consulting
12890 Fremont Street
Yucaipa, CA 92399

BIOGRAPHY

STEVE C. CORTNER

Experience

Steve C. Cortner has over 35 years experience in the mining, asphalt and ready mix concrete industry. Proven ability to negotiate and develop Site Plan approvals and Reclamation Plans. Extensive skills in the regulatory environment dealing in land use issues, public affairs and environmental regulation. Mr. Cortner has extensive experience in California legislative procedures and is instrumental in political leadership planning and development. As the President of the California Mining Association ("CMA") from 2002-2006, he reviewed and addressed all California mining related regulatory and legislative issues, at the State Capitol level. The past 20 years Mr. Cortner has significant experience in CEQA litigation and product liability lawsuits. Additionally, Mr. Cortner has a strong background in planning, design, development, and construction oversight of aggregate, asphaltic concrete and ready mix production facilities.

Education

Associates of Arts Degree, San Bernardino Valley College 1974
Bachelors of Science Degree, California State College San Bernardino 1978

Licenses

California State General Engineering Contractor A License
Registered Environmental Assessor (REA)

Affiliations

President-California Mining Association (CMA), 2002-2006
Board of Directors-CMA, 2000-2006
Executive Committee-CMA, 2000-2006
Executive Committee-California Materials Association of California (CMAC) 2001-2005
Board of Directors-CMAC, 2001-2005
Board of Directors-City of Azusa Chamber of Commerce, 2000-2005
Board of Directors-Fund California Mining and Mineral Museum, 2004-2007
Board of Directors-Southern California Rock Products Association, 1993-1995
Executive Committee-Southern California Ready Mix Concrete Ass. 1993-1995

Steve C. Cortner
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Professional Experience

2006-	Steve Cortner Land Use Consulting, Principal
1999-2006	Vulcan Materials Company, Western Division, Vice President-Resource and Development
1996-1999	Calmat Co, District Manager, Los Angeles, San Bernardino, Riverside and Orange Counties
1995-1996	Oderbrecht of California, supervision and oversight of the construction of the rock processing facility for the supply of construction materials for the U.S.A.C.O.E., Seven Oaks Dam Project
1992-1995	CEMEX USA, Vice President, Property & Regulatory Affairs
1986-1992	C. L. Pharris Sand & Gravel, Inc., Vice President Property & Regulatory Affairs
1988-1992	Lytle Creek Land & Resources, Vice President Property
1972-1986	Livingston-Graham, Redlands CA, Plant Manager

REFERENCES

County of San Bernardino General Plan: Section V-Conservation Element, Number 6. Minerals, GOAL CO 7. through CO 7.6.

Larry Bush: California Department of Conservation, Division of Mines and Geology, Personal Conversations.

MAP SHEET 52 (Updated 2006): Aggregate Availability in California, Department of Conservation, California Geological Survey. Susan Kohler.

Russell V. Miller: California Department of Conservation, Division of Mines and Geology, Personal Conversations.

San Bernardino County Development Code: Mineral Resource Overlay, Sections 82.17.010 through 82.17.040.

SR 143 Part VII: Mineral Land Classification of the Greater Los Angeles Area: Classification of Sand and Gravel Resource Areas, San Bernardino Production Consumption Region. Miller, R.V., 1987.

Surface Mining and Reclamation Act 1975 as amended.

Susan Kohler: Department of Conservation, California Geological Survey, Personal Conversations.

GLOSSARY

Classification	Land classification within the San Bernardino P-C Region is organized by the use of Mineral Resource Zones on 26 U.S. Geological Survey topographic quadrangles that accompany this report (Plates 7.1-7.26). Mineral resource Zones were established on the basis of a sand, gravel, and stone resource appraisal which include: a study of pertinent geologic reports and maps, field investigations of outcrops and active and inactive pits, and an analysis of water-well logs and drill records. Nine major areas were determined to contain significant aggregate deposits and were classified MRZ-2.
Designation	The State Mining and Geology Board can designate areas classified as MRZ-2 as "regionally significant". This designation puts a higher value on these aggregates as important to the local region.
DMG	Department of Mines and Geology operating within the State of California, Department of Conservation.
MAP 52	Map Sheet 52 (Updated 2006) is issued by the Department of Conservation-California Geological Survey which a statewide map showing a compilation of data about aggregate availability and aggregate demand for the following 50 years.
MRZ-1	Mineral Resource Zone. Areas where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence.
MRZ-2	Mineral Resource Zone. Areas where adequate information indicates that significant mineral deposits are present, or where it is judged that a high likelihood for their presence exists.
MRZ-3	Mineral Resource Zone. Areas containing mineral deposits the significance of which cannot be evaluated from available data.
MRZ-4	Mineral Resource Zone. Areas where available information is inadequate for assignment to any other MRZ zone.
P-C Regions	Production Consumption Regions. The San Bernardino P-C Region outlines nine major MRZ-2 areas, with existing land uses that are compatible with mining which qualify as "sectors". Together they cover 64 square miles (7 percent of the total classified area) and contain a total of 10.5 billion tons of aggregate.

Reserves	Aggregate materials that a sand and gravel company owns or controls, and for which it has a valid mining permit.
Resources	The total amount of available aggregate in the area, including reserves.
Sectors	Resource sectors are defined areas that inform lead agencies and others of aggregate resources that could be made available for mining by virtue of the present, generally undeveloped status of the land. The sectorization of any specific area is not an advocacy of mining in that area.
SMARA	Surface Mining and Reclamation Act of 1975 enacted law in Chapter 9, Division 2 of the Public Resources Code, requiring the State Mining and Geology Board to adopt State mineral policy for the reclamation of mined lands and the conservation of mineral resources. This policy is for the guidance of local governments who are required by the Act to both, obtain reclamation plans for surface mining operations and to adopt mineral resource management policies in their general plans, which recognize and conserve resources. The policy includes the California Code of Regulations under Title 14 Natural Resources, Division 2 Department of Conservation, Chapter 8 Mining and Geology, Subchapter 1 State Mining and Geology Board.
SMGB	State Mining and Geology Board. It is the purpose of this Board to establish policy for the reclamation of mined lands and the conduct of surface mining operations in accordance with the general provisions set forth in Public Resources Code, Division 2, Chapter 9, Section 2710 et seq.
SR 143 VII	The principal objective of this report is to classify land in the greater Los Angeles area Mineral Resource Zones based on guidelines adopted by the California State Mining and Geology Board. This classification project will assist the Board in the event the Board contemplates designation of lands containing regionally significant aggregate resources pursuant to the Surface Mining and Reclamation Act of 1975. SR 143 VII focuses on the classification of sand and gravel resource areas in the San Bernardino P-C Region.

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U.S. GEOLGICAL SURVEY

TOPOGRAPHIC QUADRANGLES

PLATES 7.1 – 7.6

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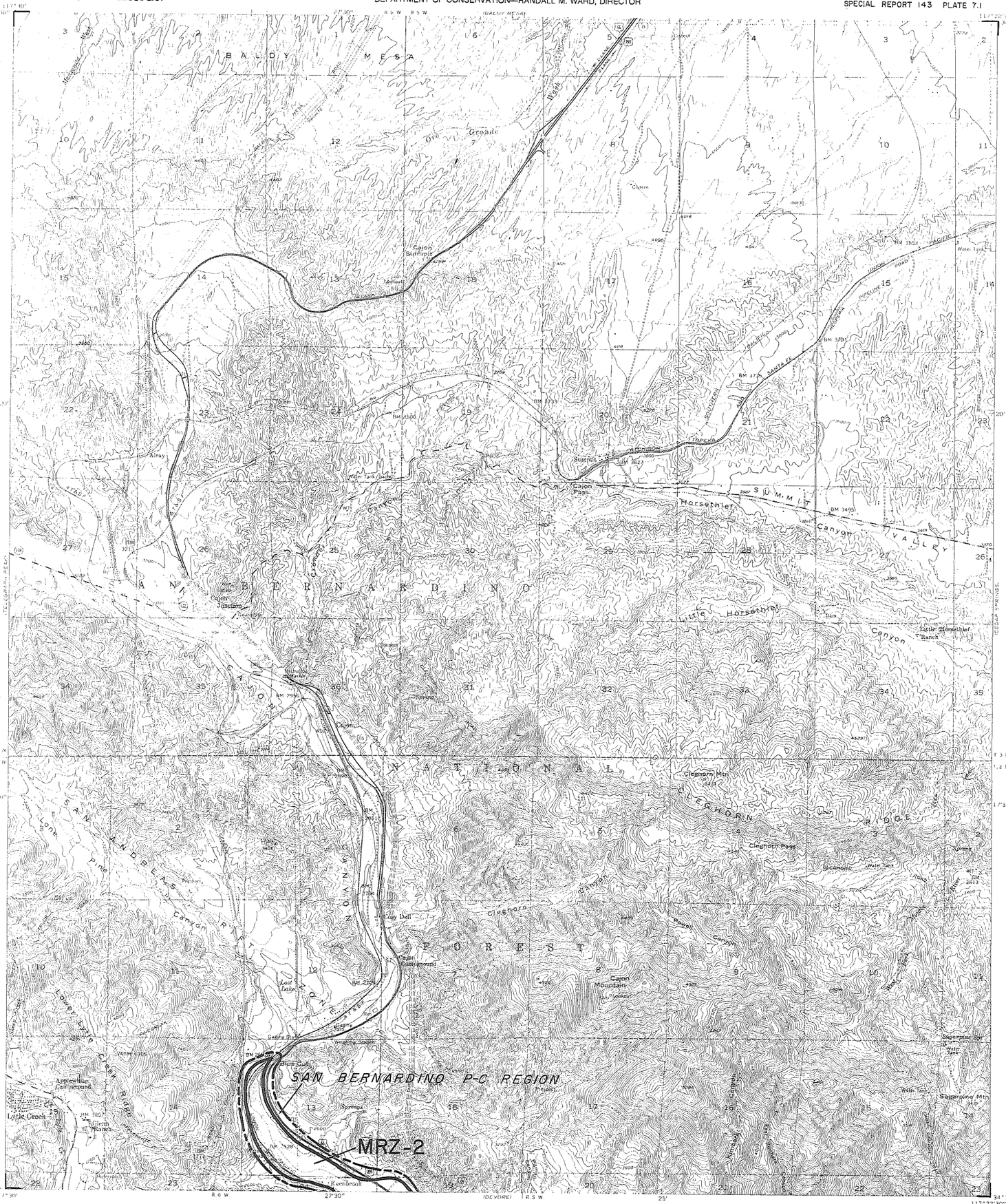
DIVISION OF MINES AND GEOLOGY
JAMES F. DAVIS, STATE GEOLOGIST

STATE OF CALIFORNIA—GEORGE DEUKMEJIAN, GOVERNOR
THE RESOURCES AGENCY—GORDON K. VAN VLECK, SECRETARY
DEPARTMENT OF CONSERVATION—RANDALL M. WARD, DIRECTOR

CAJON QUADRANGLE
SPECIAL REPORT 143 PLATE 7.1



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

Graphics by Chuck R. Owens and Dale M. Stickney

EXPLANATION

Drill hole

OUTER BOUNDARY OF AREAS SUBJECT TO URBANIZATION
Boundaries established from data supplied by the Office of Planning and Research with modifications developed from information supplied by local government and other sources. Hachures lie within area undergoing urbanization.

PRODUCTION-CONSUMPTION REGION BOUNDARY
(see text for discussion)

MINERAL RESOURCE ZONE BOUNDARIES

MRZ-2

- MRZ-1 Areas where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence.
- MRZ-2 Areas where adequate information indicates that significant mineral deposits are present, or where it is judged that a high likelihood for their presence exists.
- MRZ-3 Areas containing mineral deposits the significance of which cannot be evaluated from available data.
- MRZ-4 Areas where available information is inadequate for assignment to any other MRZ zone.

See text for additional explanation of MRZ Symbols.

By
Russell V. Miller

CAJON, CALIF.

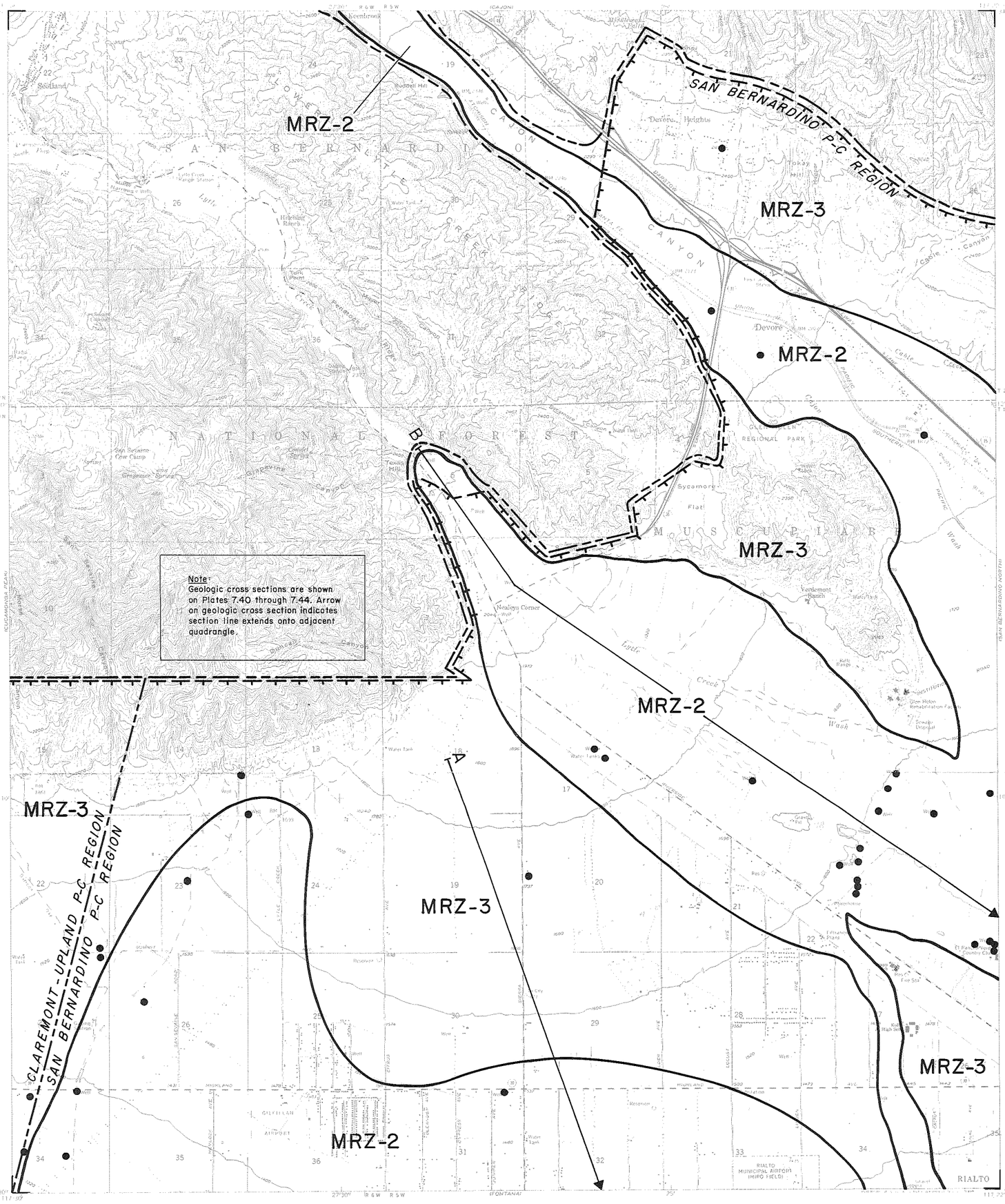
MINERAL LAND CLASSIFICATION MAP

AGGREGATE RESOURCES ONLY

San Bernardino P-C Region

PREPARED IN COMPLIANCE WITH THE SURFACE MINING AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

STATE GEOLOGIST



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

Graphics by Chuck R. Owens and Dale M. Stickney

EXPLANATION

Drill hole

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See text for additional explanation of MRZ Symbols.

By
Russell V. Miller

DEVORE, CALIF.

MINERAL LAND CLASSIFICATION MAP

AGGREGATE RESOURCES ONLY

San Bernardino P-C Region

PREPARED IN COMPLIANCE WITH THE SURFACE MINING AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

STATE GEOLOGIST

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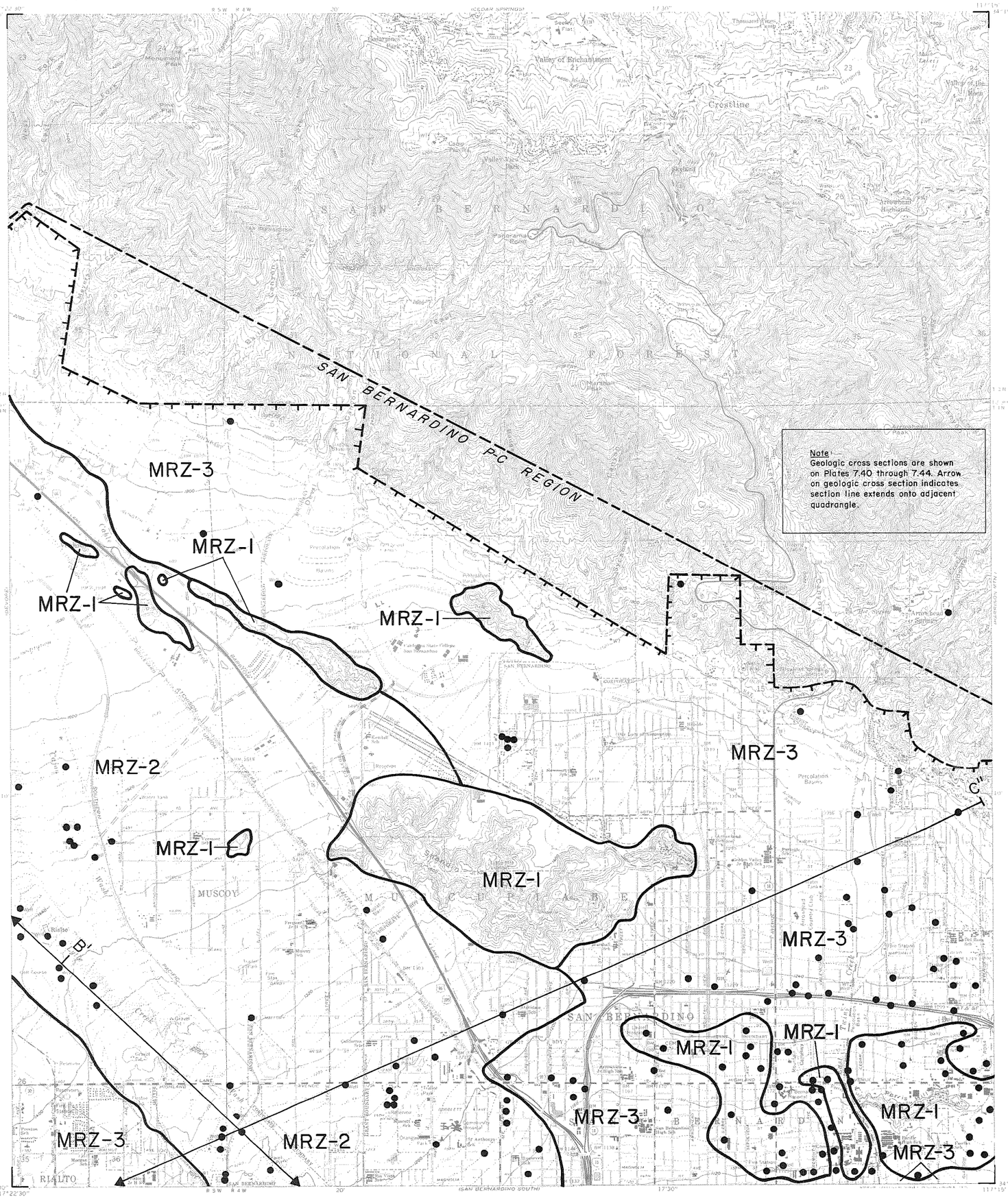
SAN BERNARDINO NORTH QUADRANGLE

SPECIAL REPORT 143 PLATE 7.3



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 10-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Graphics by Chuck R. Owens and Dale M. Stickney

SAN BERNARDINO NORTH, CALIF.

EXPLANATION

Drill hole

OUTER BOUNDARY OF AREAS SUBJECT TO URBANIZATION
Boundaries established from data supplied by the Office of Planning and Research with modifications developed from information supplied by local government and other sources. Hachures lie within area undergoing urbanization.

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(see text for discussion)

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See text for additional explanation of MRZ Symbols.

By
Russell V. Miller

MINERAL LAND CLASSIFICATION MAP

AGGREGATE RESOURCES ONLY

San Bernardino P-C Region

PREPARED IN COMPLIANCE WITH THE SURFACE MINING AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

James F. Davis
STATE GEOLOGIST

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STATE OF CALIFORNIA—GEORGE DEUKMEJIAN, GOVERNOR
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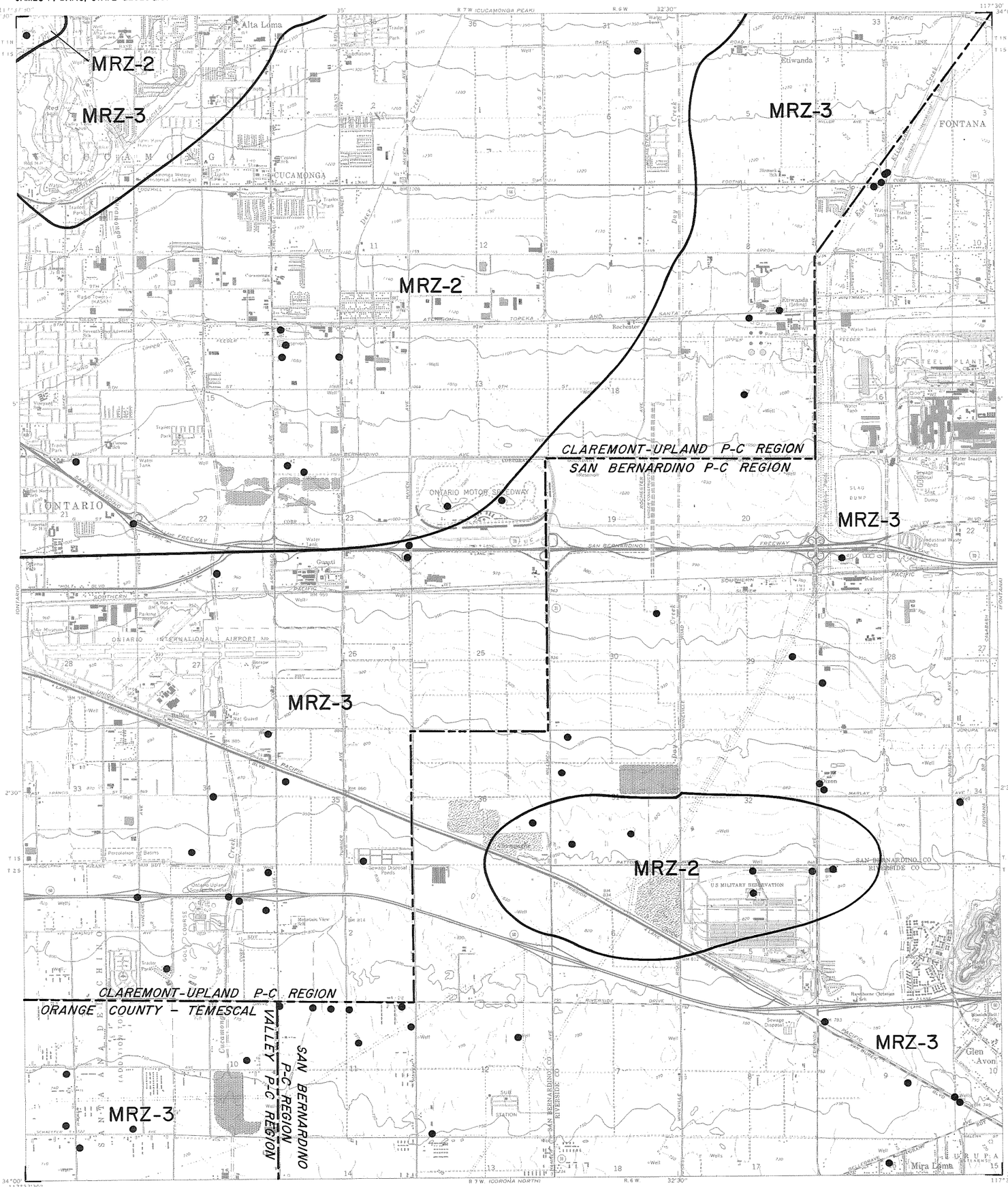
DEPARTMENT OF CONSERVATION—RANDALL M. WARD, DIRECTOR

GUASTI QUADRANGLE

SPECIAL REPORT 143 PLATE 7.5



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Graphics by Chuck R. Owens and Dale M. Stickney

GUASTI, CALIF.

EXPLANATION

● Drill hole

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MINERAL LAND CLASSIFICATION MAP

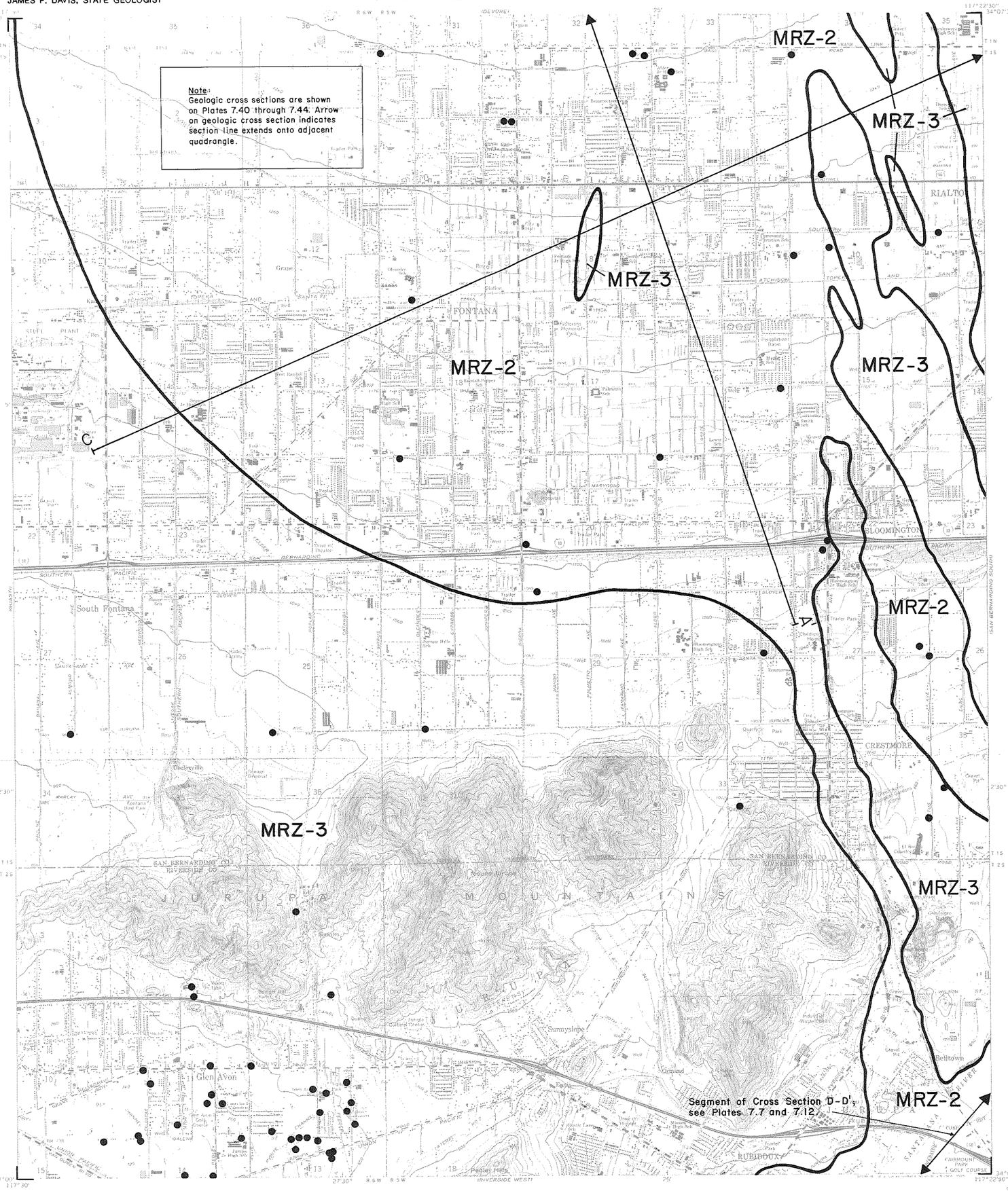
AGGREGATE RESOURCES ONLY

San Bernardino P-C Region

PREPARED IN COMPLIANCE WITH THE SURFACE MINING AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

By
Russell V. Miller

James F. Davis
STATE GEOLOGIST



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
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CONTOUR INTERVAL 20 FEET
DOTTED LINES REPRESENT 5-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Graphics by Chuck R. Owens and Dale M. Stickney

EXPLANATION

Drill hole

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See text for additional explanation of MRZ Symbols.

By
Russell V. Miller

FONTANA, CALIF.

MINERAL LAND CLASSIFICATION MAP

AGGREGATE RESOURCES ONLY

San Bernardino P-C Region

PREPARED IN COMPLIANCE WITH THE SURFACE MINING AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

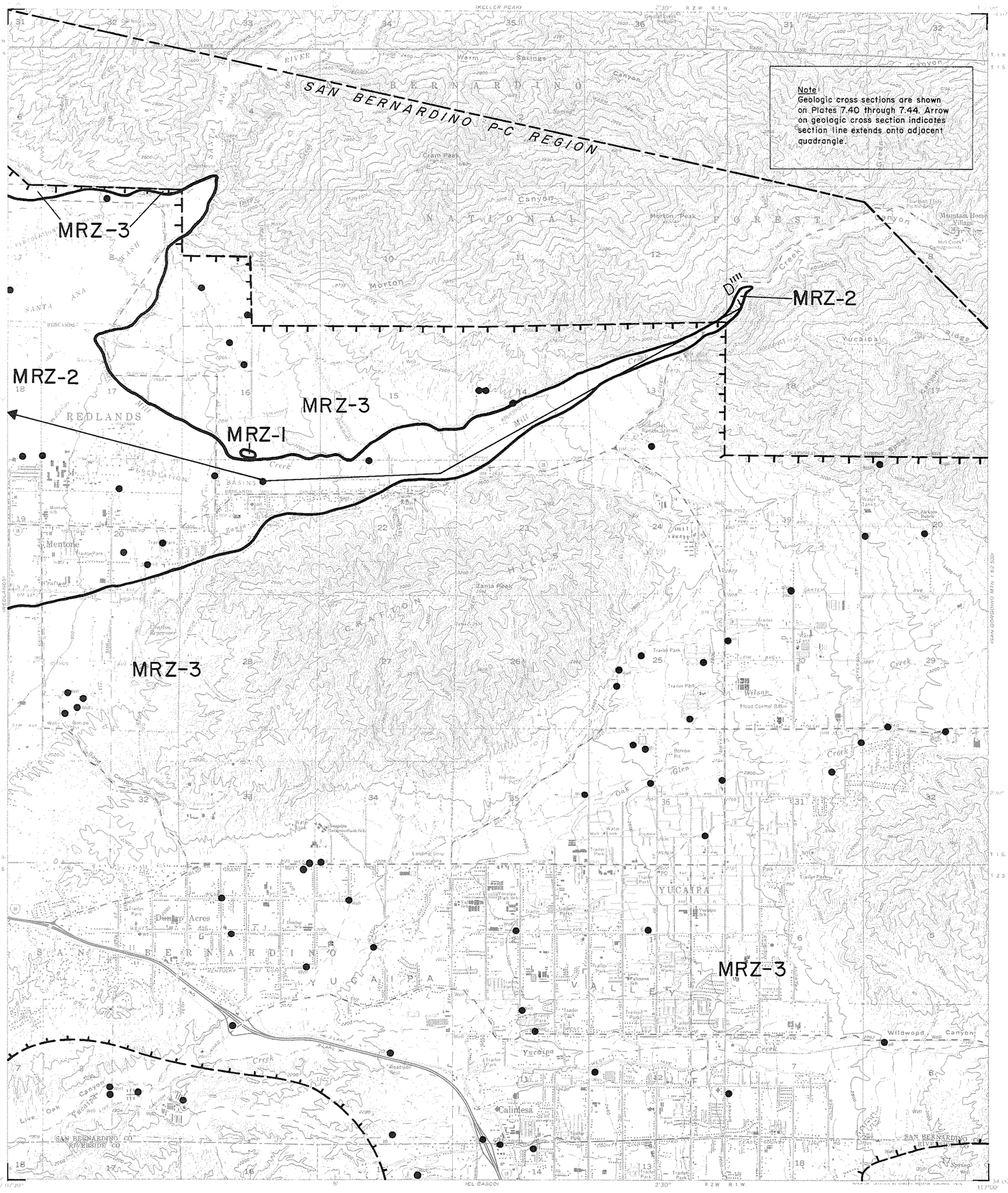
STATE GEOLOGIST

DIVISION OF MINES AND GEOLOGY
JAMES F. DAVIS, STATE GEOLOGIST

STATE OF CALIFORNIA—GEORGE DEUKMEJIAN, GOVERNOR
THE RESOURCES AGENCY—GORDON K. VAN VLECK, SECRETARY
DEPARTMENT OF CONSERVATION—RANDALL M. WARD, DIRECTOR

YUCAIPA QUADRANGLE

SPECIAL REPORT 143 PLATE 7.9



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Graphics by James D. Williams and Dale M. Stickney

EXPLANATION

Drill hole

OUTER BOUNDARY OF AREAS SUBJECT TO URBANIZATION
Boundaries established from data supplied by the Office of Planning and Research with modifications developed from information supplied by local government and other sources. Hachures lie within area undergoing urbanization.

PRODUCTION-CONSUMPTION REGION BOUNDARY
(see text for discussion)

MINERAL RESOURCE ZONE BOUNDARIES

MRZ-2

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See text for additional explanation of MRZ Symbols.

By
Russell V. Miller

YUCAIPA, CALIF.

MINERAL LAND CLASSIFICATION MAP

AGGREGATE RESOURCES ONLY

San Bernardino P-C Region

PREPARED IN COMPLIANCE WITH THE SURFACE MINING AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

STATE GEOLOGIST

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STATE OF CALIFORNIA—GEORGE DEUKMEJIAN, GOVERNOR
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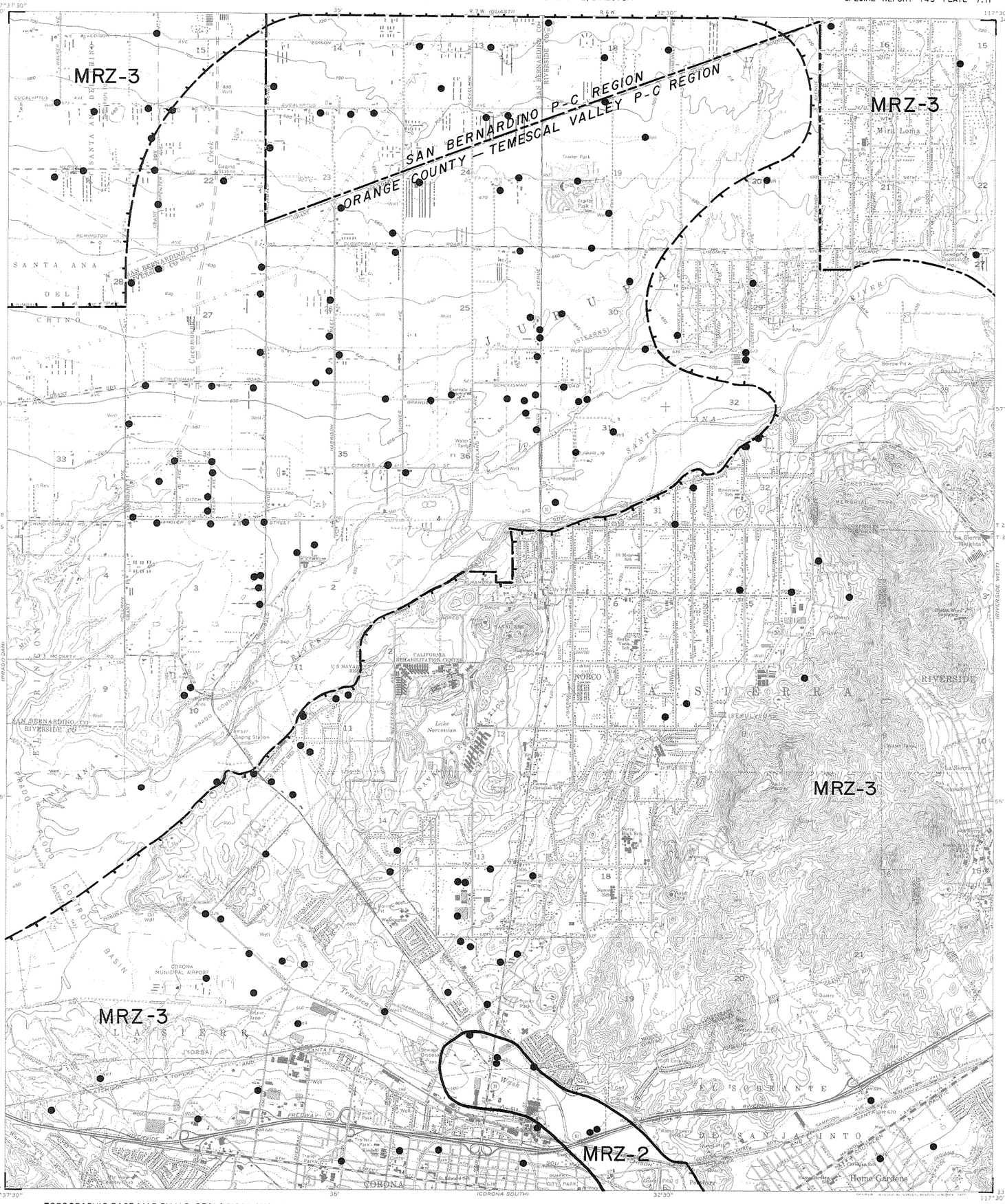
DEPARTMENT OF CONSERVATION—RANDALL M. WARD, DIRECTOR

CORONA NORTH QUADRANGLE

SPECIAL REPORT 143 PLATE 7.11



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

1 ½ 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 .5 0 1 KILOMETER

CONTOUR INTERVAL 20 FEET
DOTTED LINES REPRESENT 10-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Graphics by Chuck R. Owens and Dale M. Stickney

CORONA NORTH, CALIF.

EXPLANATION

● Drill hole

OUTER BOUNDARY OF AREAS SUBJECT TO URBANIZATION
Boundaries established from data supplied by the Office of Planning and Research with modifications developed from information supplied by local government and other sources. Hachures lie within area undergoing urbanization.

PRODUCTION-CONSUMPTION REGION BOUNDARY
(see text for discussion)

MINERAL RESOURCE ZONE BOUNDARIES

MRZ-2

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By
Russell V. Miller

MINERAL LAND CLASSIFICATION MAP

AGGREGATE RESOURCES ONLY

San Bernardino P-C Region

PREPARED IN COMPLIANCE WITH THE SURFACE MINING AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

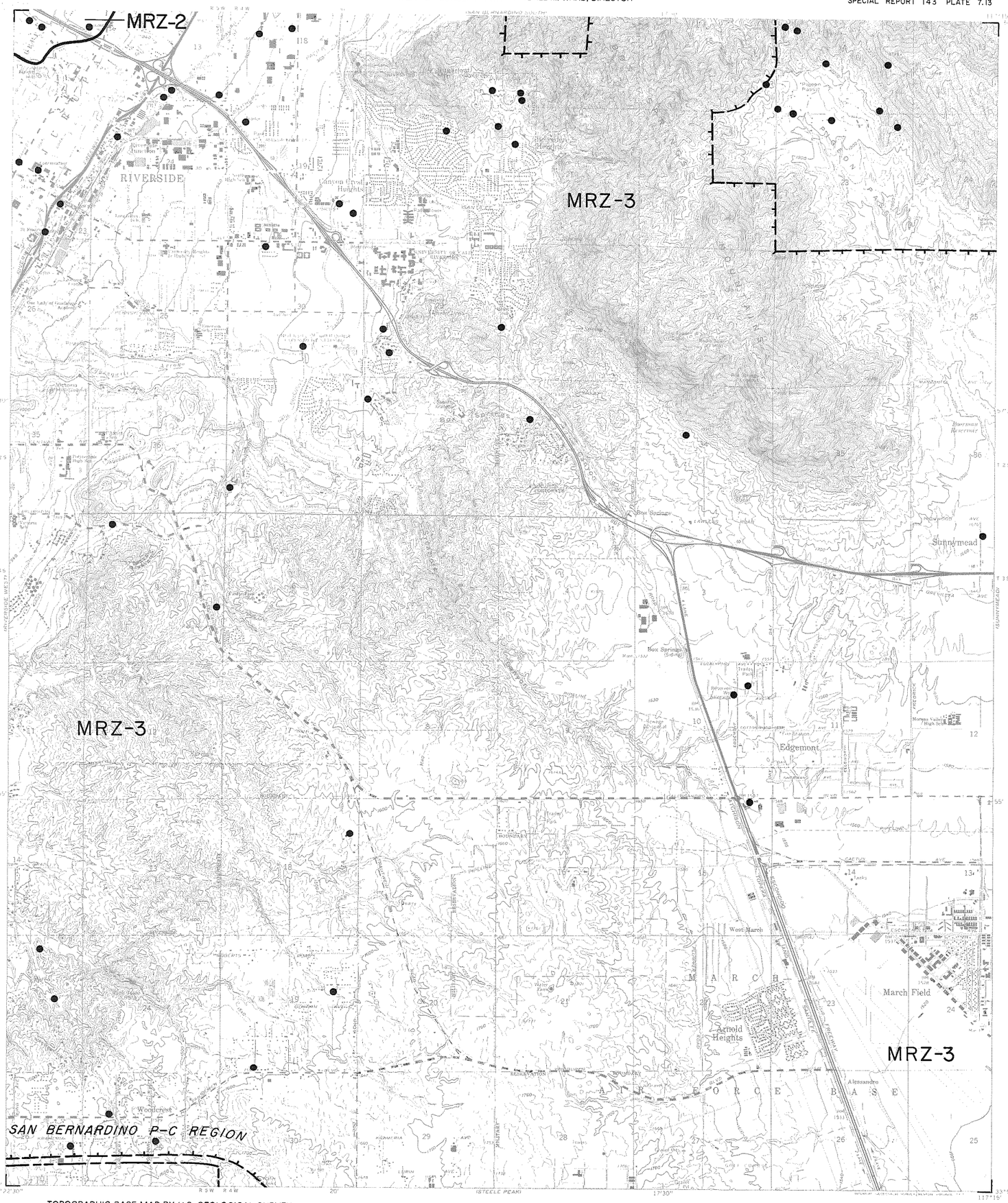
James F. Davis
STATE GEOLOGIST

DIVISION OF MINES AND GEOLOGY
JAMES F. DAVIS, STATE GEOLOGIST

STATE OF CALIFORNIA—GEORGE DEUKMEJIAN, GOVERNOR
THE RESOURCES AGENCY—GORDON K. VAN VLECK, SECRETARY
DEPARTMENT OF CONSERVATION—RANDALL M. WARD, DIRECTOR

RIVERSIDE EAST QUADRANGLE

SPECIAL REPORT 143 PLATE 7.13



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

CONTOUR INTERVAL 20 FEET
DOTTED LINES REPRESENT 10-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Graphics by Chuck R. Owens and Dale M. Stickney

EXPLANATION

Drill hole

OUTER BOUNDARY OF AREAS SUBJECT TO URBANIZATION
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PRODUCTION-CONSUMPTION REGION BOUNDARY
(see text for discussion)

MINERAL RESOURCE ZONE BOUNDARIES

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See text for additional explanation of MRZ Symbols.

By
Russell V. Miller

RIVERSIDE EAST, CALIF.

MINERAL LAND CLASSIFICATION MAP

AGGREGATE RESOURCES ONLY

San Bernardino P-C Region

PREPARED IN COMPLIANCE WITH THE SURFACE MINING AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

STATE GEOLOGIST

DIVISION OF MINES AND GEOLOGY
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STATE OF CALIFORNIA—GEORGE DEUKMEJIAN, GOVERNOR
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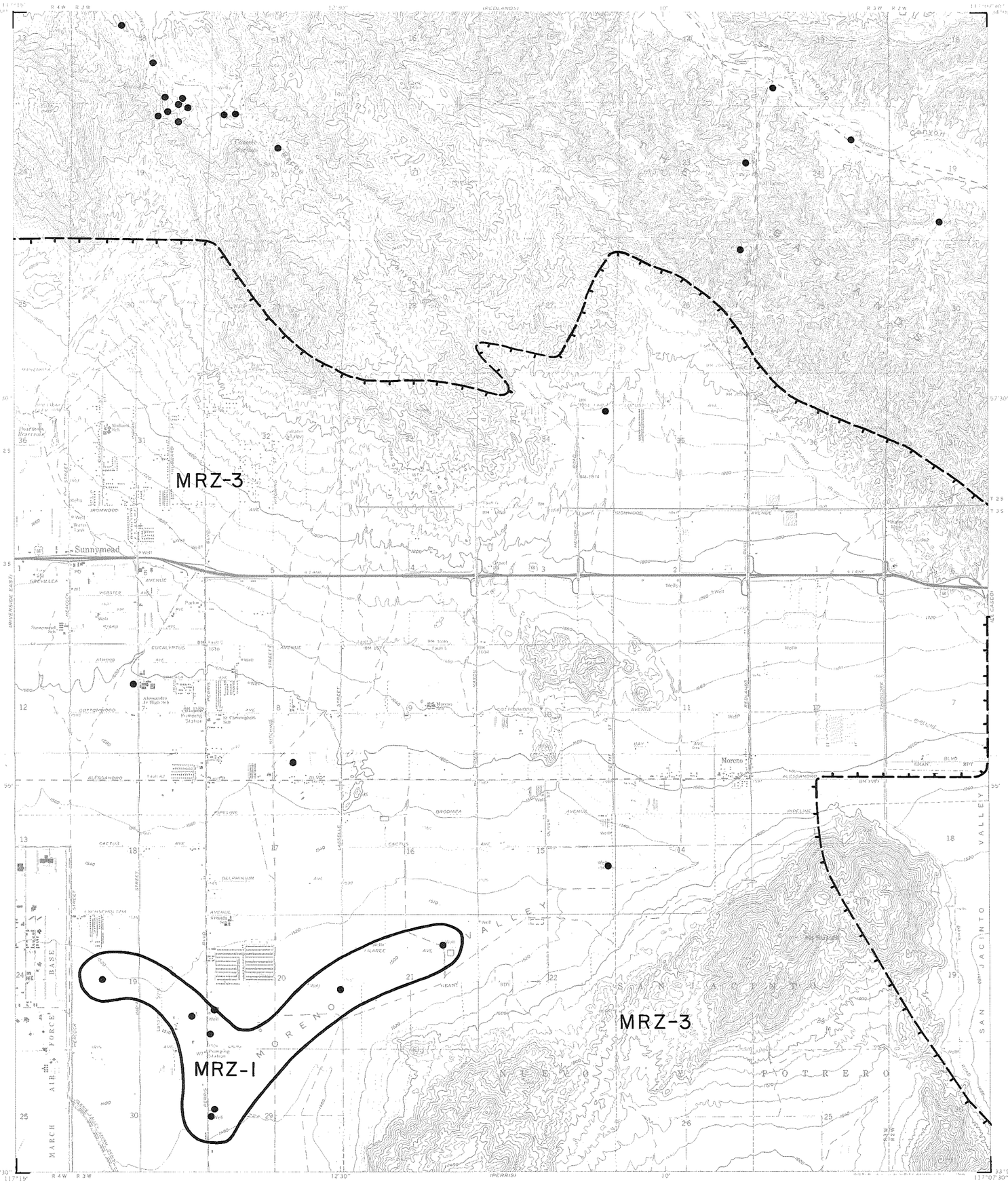
DEPARTMENT OF CONSERVATION—RANDALL M. WARD, DIRECTOR

SUNNYMEAD QUADRANGLE

SPECIAL REPORT 143 PLATE 7.14



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 10-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

Graphics by Chuck R. Owens and Dale M. Stickney

EXPLANATION

● Drill hole

OUTER BOUNDARY OF AREAS SUBJECT TO URBANIZATION
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PRODUCTION-CONSUMPTION REGION BOUNDARY
(see text for discussion)

MINERAL RESOURCE ZONE BOUNDARIES

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See text for additional explanation of MRZ Symbols.

By
Russell V. Miller

SUNNYMEAD, CALIF.

MINERAL LAND CLASSIFICATION MAP

AGGREGATE RESOURCES ONLY

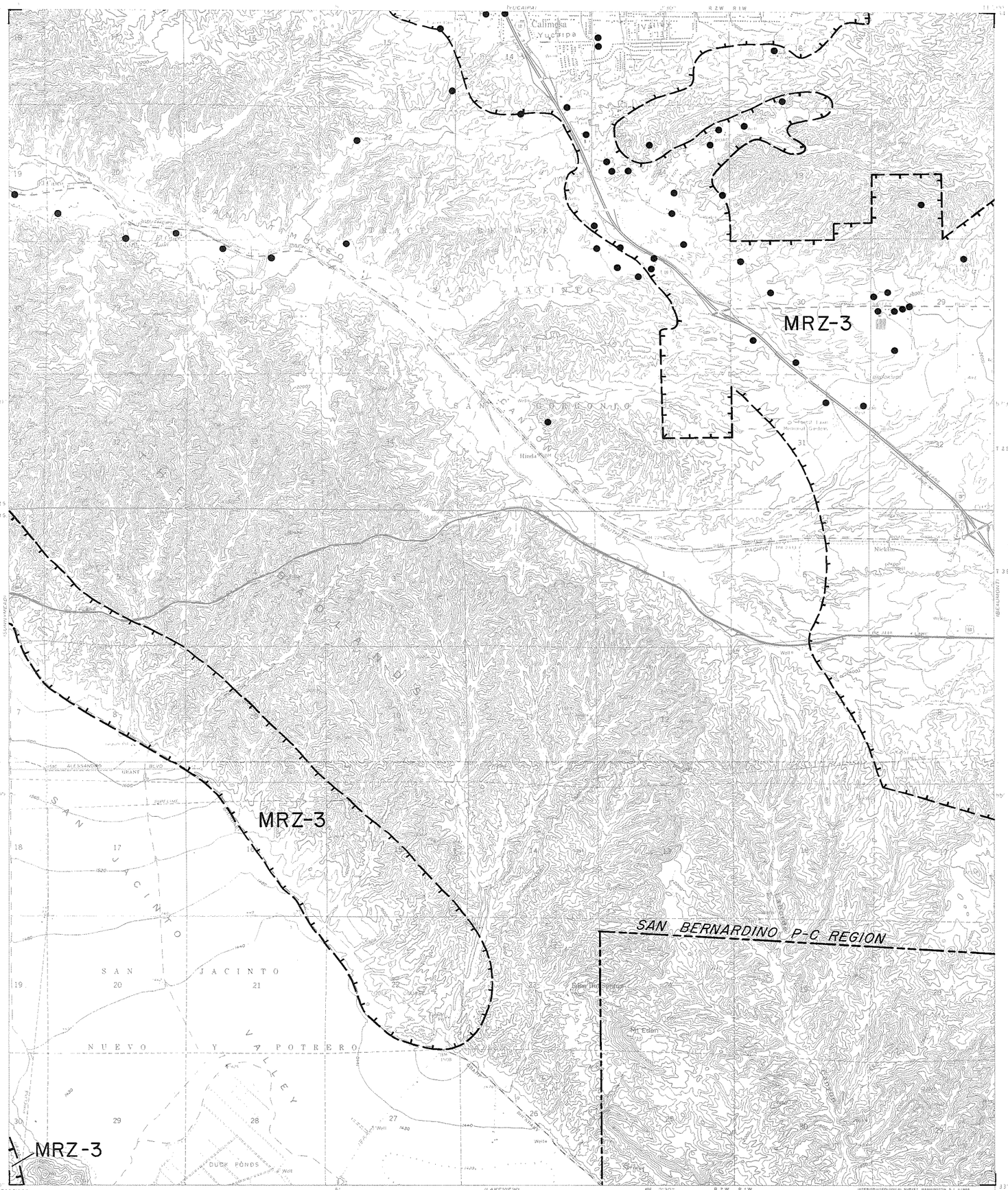
San Bernardino P-C Region

PREPARED IN COMPLIANCE WITH THE SURFACE MINING AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

STATE GEOLOGIST

DIVISION OF MINES AND GEOLOGY
JAMES F. DAVIS, STATE GEOLOGIST

STATE OF CALIFORNIA—GEORGE DEUKMEJIAN, GOVERNOR
THE RESOURCES AGENCY—GORDON K. VAN VLECK, SECRETARY
DEPARTMENT OF CONSERVATION—RANDALL M. WARD, DIRECTOR



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 10-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

Graphics by James D. Williams and Dale M. Stickney

EXPLANATION

Drill hole

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PRODUCTION-CONSUMPTION REGION BOUNDARY
(see text for discussion)

MINERAL RESOURCE ZONE BOUNDARIES

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MRZ-2

See text for additional explanation of MRZ Symbols.

By
Russell V. Miller

EL CASCO QUADRANGLE

MINERAL LAND CLASSIFICATION MAP

AGGREGATE RESOURCES ONLY

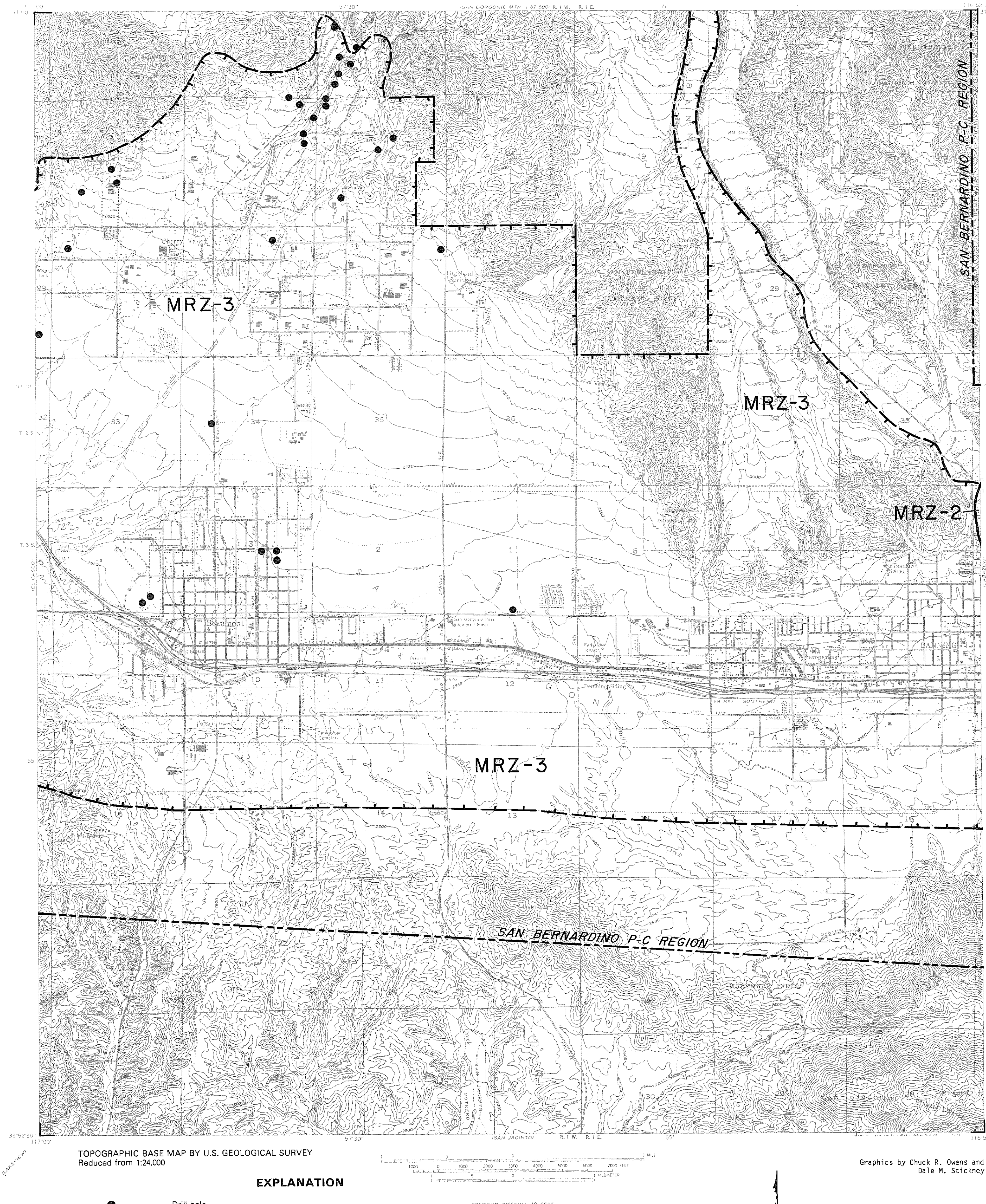
San Bernardino P-C Region

PREPARED IN COMPLIANCE WITH THE SURFACE MINING AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

STATE GEOLOGIST

DIVISION OF MINES AND GEOLOGY
JAMES F. DAVIS, STATE GEOLOGIST

STATE OF CALIFORNIA—GEORGE DEUKMEJIAN, GOVERNOR
THE RESOURCES AGENCY—GORDON K. VAN VLECK, SECRETARY
DEPARTMENT OF CONSERVATION—RANDALL M. WARD, DIRECTOR



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

CONTOUR INTERVAL 40 FEET
DASHED LINES REPRESENT HALF INTERVAL CONTOURS
DATUM IS MEAN SEA LEVEL

Graphics by Chuck R. Owens and Dale M. Stickney

BEAUMONT, CALIF.

EXPLANATION

● Drill hole

OUTER BOUNDARY OF AREAS SUBJECT TO URBANIZATION
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PRODUCTION-CONSUMPTION REGION BOUNDARY
(see text for discussion)

MINERAL RESOURCE ZONE BOUNDARIES

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See text for additional explanation of MRZ Symbols.

By
Russell V. Miller

MINERAL LAND CLASSIFICATION MAP

AGGREGATE RESOURCES ONLY

San Bernardino P-C Region

PREPARED IN COMPLIANCE WITH THE SURFACE MINING AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

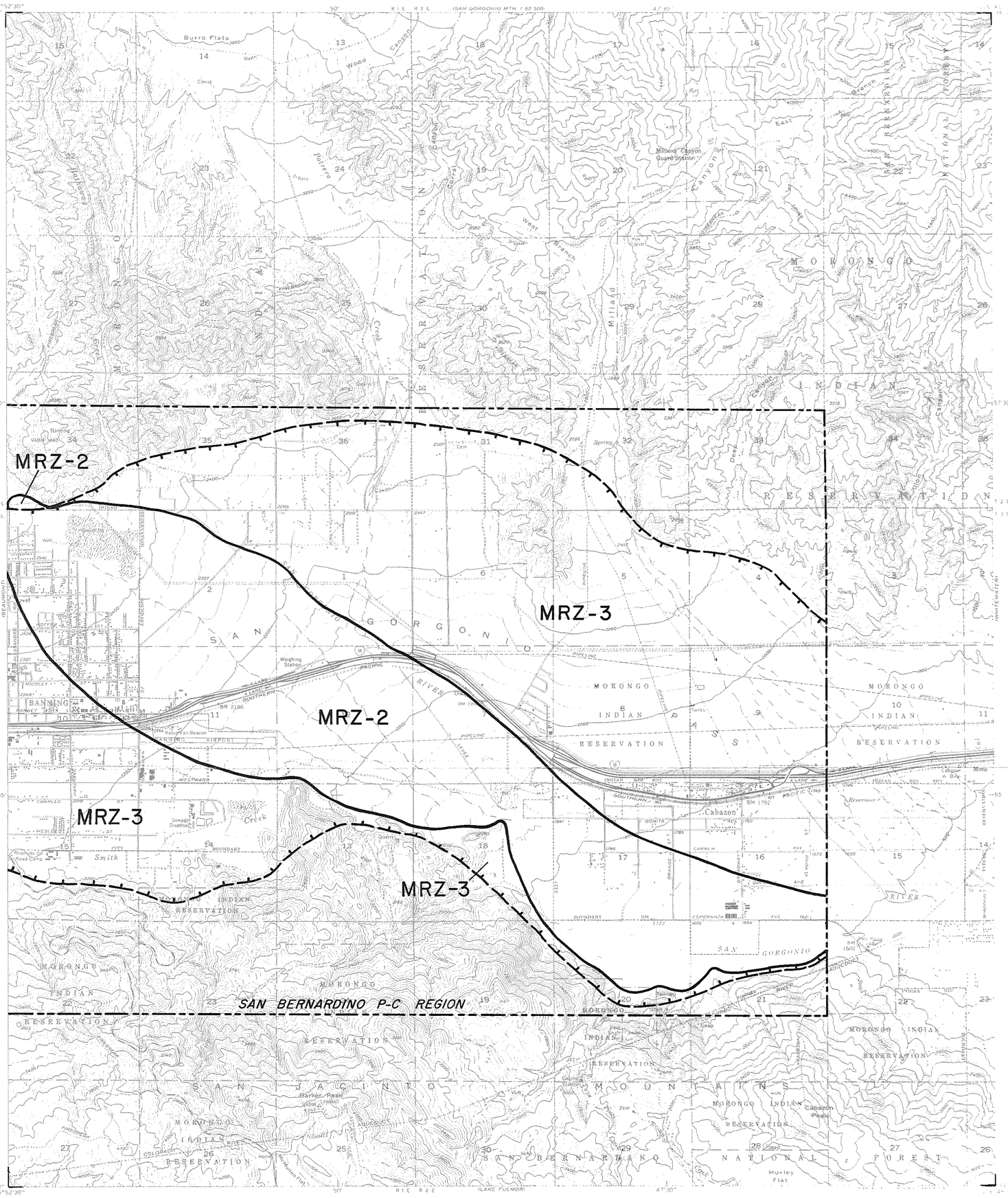
STATE GEOLOGIST

DIVISION OF MINES AND GEOLOGY
JAMES F. DAVIS, STATE GEOLOGIST

STATE OF CALIFORNIA—GEORGE DEUKMEJIAN, GOVERNOR
THE RESOURCES AGENCY—GORDON K. VAN VLECK, SECRETARY
DEPARTMENT OF CONSERVATION—RANDALL M. WARD, DIRECTOR

CABAZON QUADRANGLE

SPECIAL REPORT 143 PLATE 7.17



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

Graphics by Chuck R. Owens and Dale M. Stickney

CABAZON, CALIF.

EXPLANATION

Drill hole

OUTER BOUNDARY OF AREAS SUBJECT TO URBANIZATION
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PRODUCTION-CONSUMPTION REGION BOUNDARY
(see text for discussion)

MINERAL RESOURCE ZONE BOUNDARIES

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See text for additional explanation of MRZ Symbols.

By
Russell V. Miller

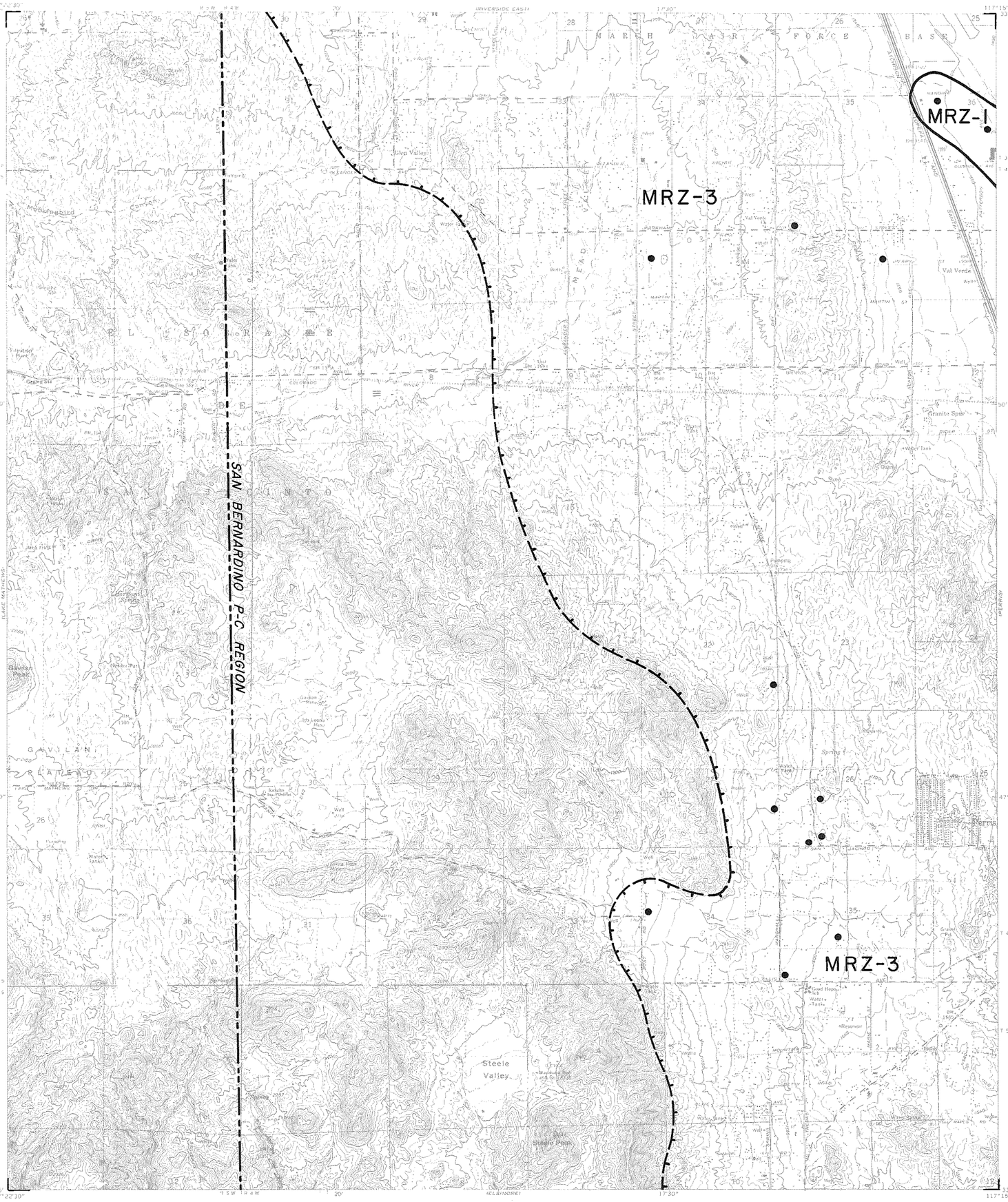
MINERAL LAND CLASSIFICATION MAP

AGGREGATE RESOURCES ONLY

San Bernardino P-C Region

PREPARED IN COMPLIANCE WITH THE SURFACE MINING AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

STATE GEOLOGIST



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER

CONTOUR INTERVAL 20 FEET
DOTTED LINES REPRESENT 10-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Graphics by Chuck R. Owens and Dale M. Stickney

EXPLANATION

● Drill hole

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PRODUCTION-CONSUMPTION REGION BOUNDARY
(see text for discussion)

MINERAL RESOURCE ZONE BOUNDARIES

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See text for additional explanation of MRZ Symbols

By
Russell V. Miller

STEELE PEAK, CALIF.

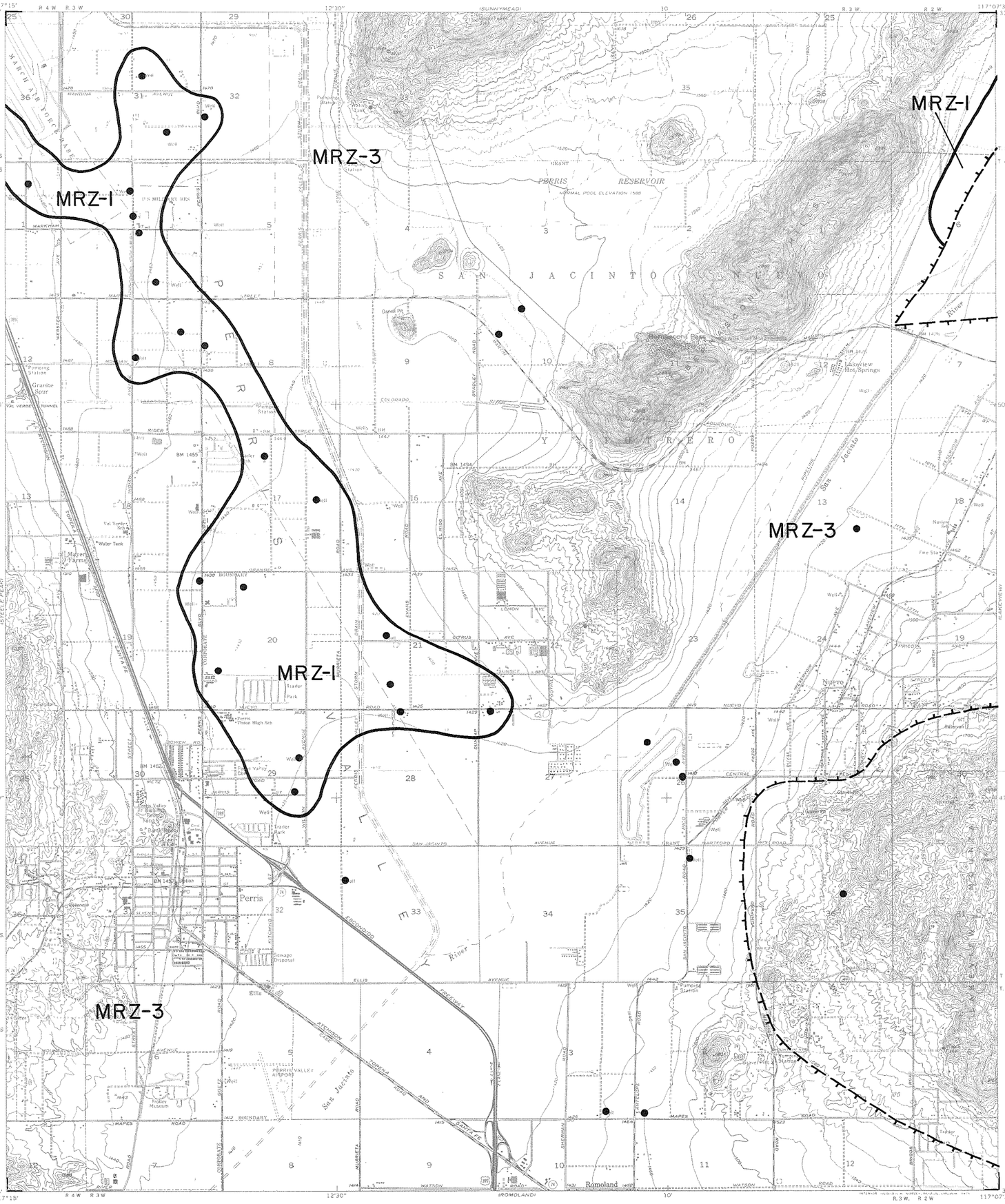
MINERAL LAND CLASSIFICATION MAP

AGGREGATE RESOURCES ONLY

San Bernardino P-C Region

PREPARED IN COMPLIANCE WITH THE SURFACE MINING AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

James F. Davis
STATE GEOLOGIST



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

CONTOUR INTERVAL 20 FEET
DOTTED LINES REPRESENT 10-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Graphics by James D. Williams and Dale M. Stickney

PERRIS, CALIF.

EXPLANATION

Drill hole

OUTER BOUNDARY OF AREAS SUBJECT TO URBANIZATION
Boundaries established from data supplied by the Office of Planning and Research with modifications developed from information supplied by local government and other sources. Hachures lie within area undergoing urbanization.

PRODUCTION-CONSUMPTION REGION BOUNDARY
(see text for discussion)

MINERAL RESOURCE ZONE BOUNDARIES

MRZ-2

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See text for additional explanation of MRZ Symbols.

By
Russell V. Miller

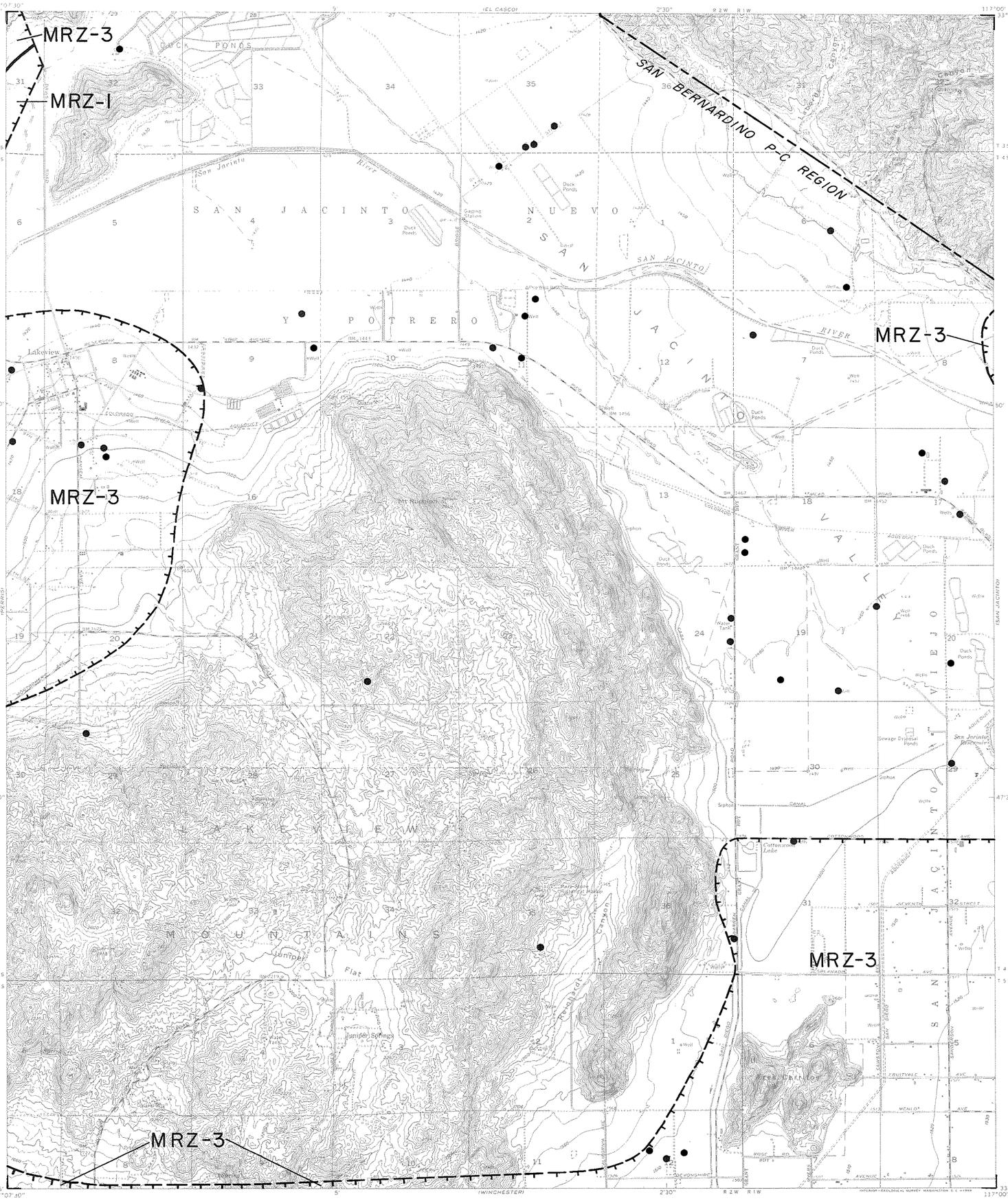
MINERAL LAND CLASSIFICATION MAP

AGGREGATE RESOURCES ONLY

San Bernardino P-C Region

PREPARED IN COMPLIANCE WITH THE SURFACE MINING AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

STATE GEOLOGIST



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER
1 0 1 2 3 4 5

CONTOUR INTERVAL 20 FEET
DOTTED LINES REPRESENT 10-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

Graphics by James D. Williams and Dale M. Stickney

EXPLANATION

Drill hole

OUTER BOUNDARY OF AREAS SUBJECT TO URBANIZATION
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PRODUCTION-CONSUMPTION REGION BOUNDARY
(see text for discussion)

MINERAL RESOURCE ZONE BOUNDARIES

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See text for additional explanation of MRZ Symbols.

By
Russell V. Miller

LAKEVIEW, CALIF.

MINERAL LAND CLASSIFICATION MAP

AGGREGATE RESOURCES ONLY

San Bernardino P-C Region

PREPARED IN COMPLIANCE WITH THE SURFACE MINING AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

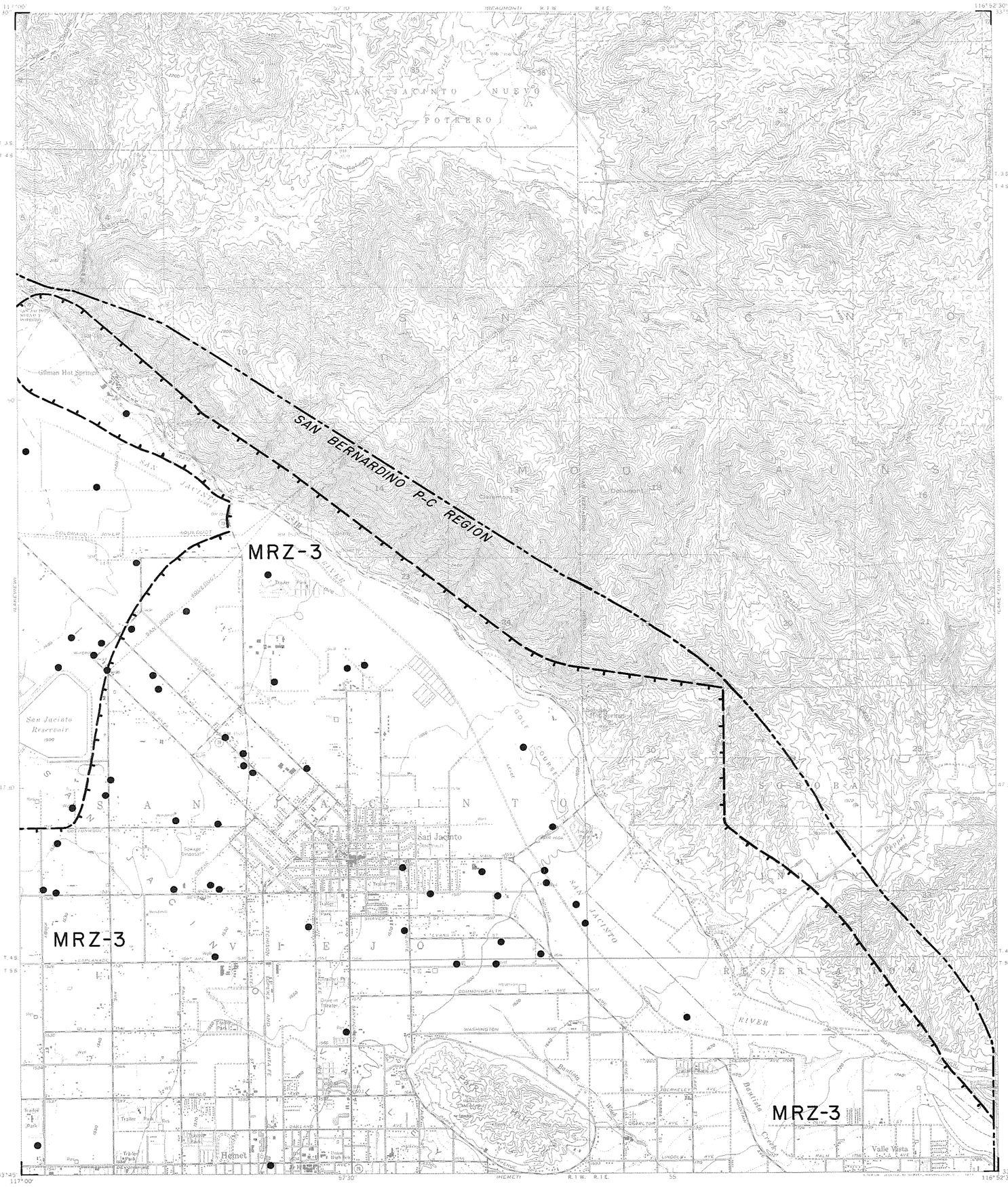
STATE GEOLOGIST

DIVISION OF MINES AND GEOLOGY
JAMES F. DAVIS, STATE GEOLOGIST

STATE OF CALIFORNIA—GEORGE DEUKMEJIAN, GOVERNOR
THE RESOURCES AGENCY—GORDON K. VAN VLECK, SECRETARY
DEPARTMENT OF CONSERVATION—RANDALL M. WARD, DIRECTOR

SAN JACINTO QUADRANGLE

SPECIAL REPORT 143 PLATE 7.21



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

Graphics by Chuck R. Owens and Dale M. Stickney

EXPLANATION

Drill hole

OUTER BOUNDARY OF AREAS SUBJECT TO URBANIZATION
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PRODUCTION-CONSUMPTION REGION BOUNDARY
(see text for discussion)

MINERAL RESOURCE ZONE BOUNDARIES

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MRZ-2

See text for additional explanation of MRZ Symbols.

CONTOUR INTERVAL 40 FEET
DASHED LINES REPRESENT 10 FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

SAN JACINTO, CALIF.

MINERAL LAND CLASSIFICATION MAP

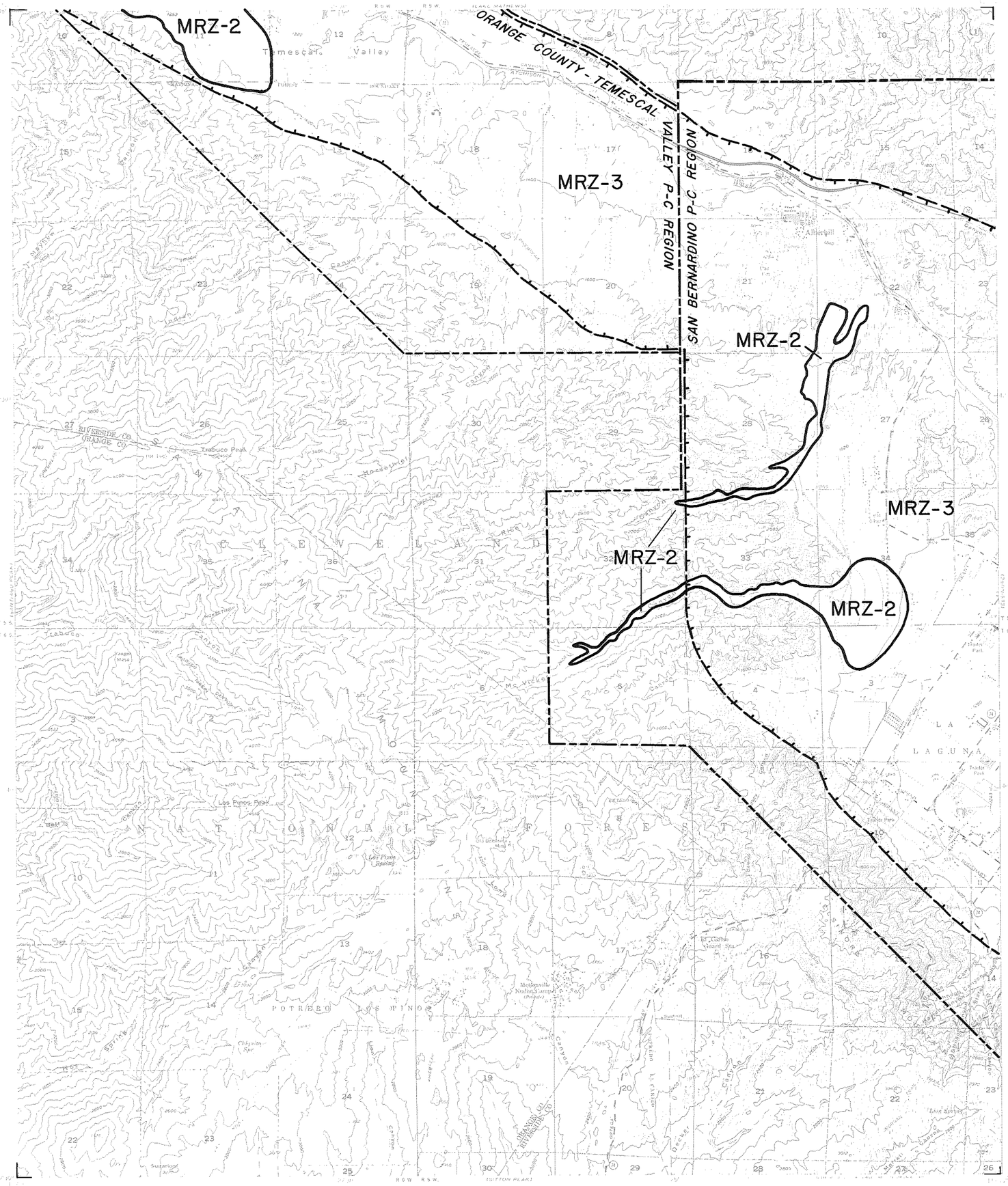
AGGREGATE RESOURCES ONLY

San Bernardino P-C Region

PREPARED IN COMPLIANCE WITH THE SURFACE MINING AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

By
Russell V. Miller

STATE GEOLOGIST



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

Graphics by Chuck R. Owens and Dale M. Stickney

EXPLANATION

Drill hole

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PRODUCTION-CONSUMPTION REGION BOUNDARY
(see text for discussion)

MINERAL RESOURCE ZONE BOUNDARIES

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See text for additional explanation of MRZ Symbols.

ALBERHILL, CALIF.

MINERAL LAND CLASSIFICATION MAP

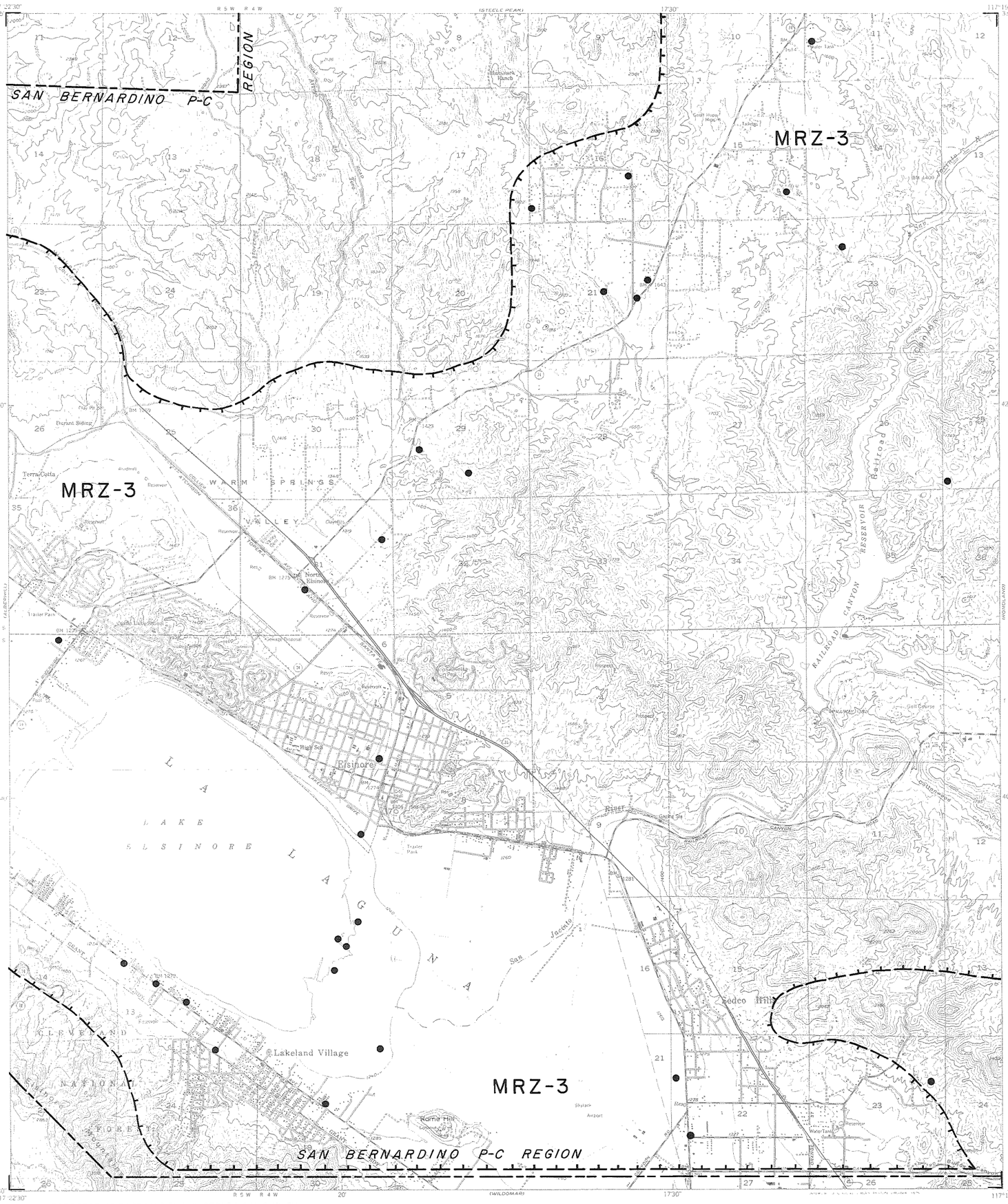
AGGREGATE RESOURCES ONLY

San Bernardino P-C Region

PREPARED IN COMPLIANCE WITH THE SURFACE MINING AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

By
Russell V. Miller

STATE GEOLOGIST



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

Graphics by James D. Williams and Dale M. Stickney

EXPLANATION

Drill hole

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PRODUCTION-CONSUMPTION REGION BOUNDARY
(see text for discussion)

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See text for additional explanation of MRZ Symbols.

CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT HALF-INTERVAL CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ELSINORE, CALIF.

MINERAL LAND CLASSIFICATION MAP

AGGREGATE RESOURCES ONLY

San Bernardino P-C Region

PREPARED IN COMPLIANCE WITH THE SURFACE MINING AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

By
Russell V. Miller

STATE GEOLOGIST

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PRODUCTION-CONSUMPTION REGION BOUNDARY
(see text for discussion)

MINERAL RESOURCE ZONE BOUNDARIES

MINERAL LAND CLASSIFICATION MAP

DIVISION OF MINES AND GEOLOGY
JAMES F. DAVIS, STATE GEOLOGIST

STATE OF CALIFORNIA—GEORGE DEUKMEJIAN, GOVERNOR
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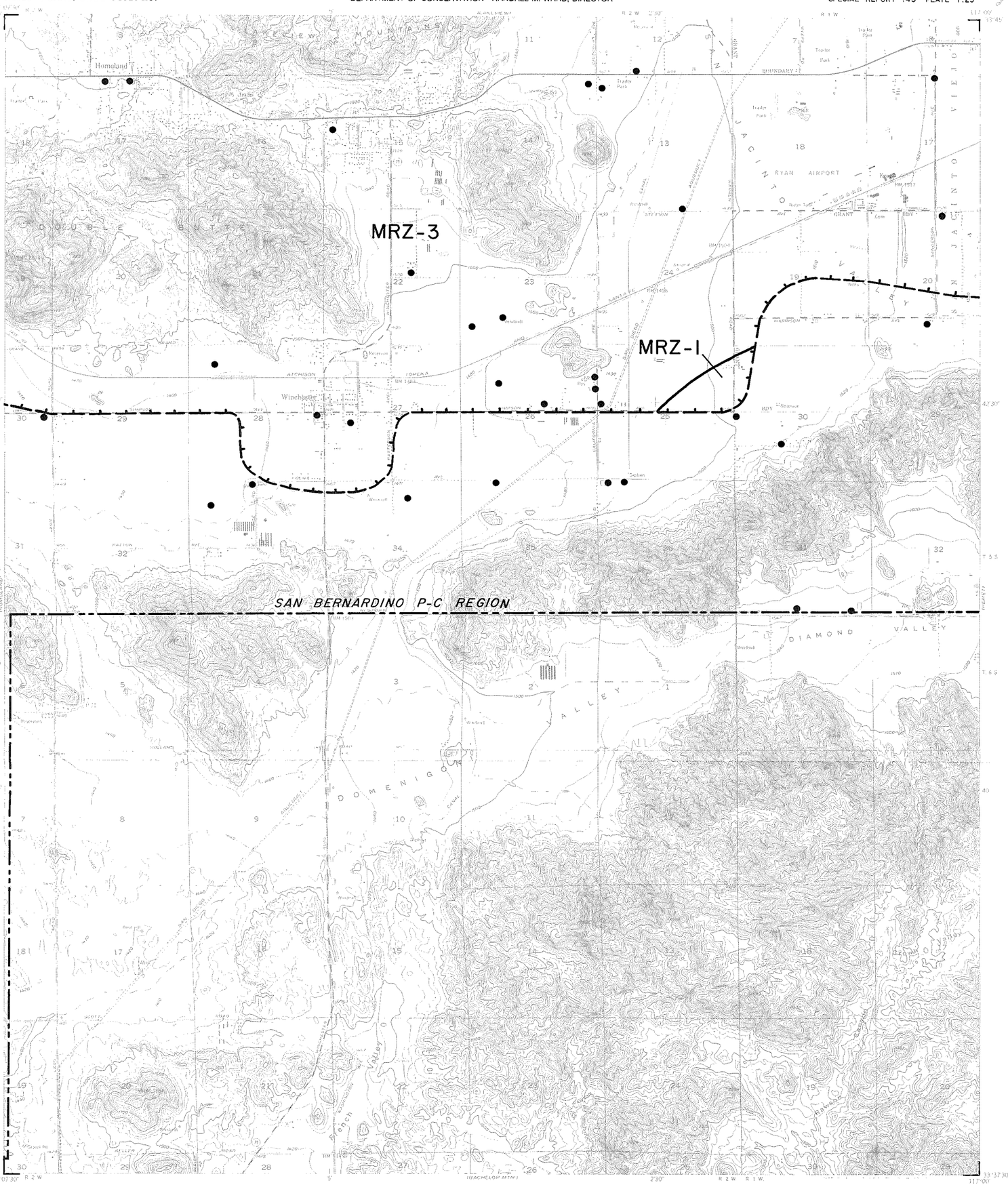
DEPARTMENT OF CONSERVATION—RANDALL M. WARD, DIRECTOR

WINCHESTER QUADRANGLE

SPECIAL REPORT 143 PLATE 7.25



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Graphics by Chuck R. Owens and Dale M. Stickney

WINCHESTER, CALIF.

EXPLANATION

Drill hole

OUTER BOUNDARY OF AREAS SUBJECT TO URBANIZATION
Boundaries established from data supplied by the Office of Planning and Research with modifications developed from information supplied by local government and other sources. Hachures lie within area undergoing urbanization.

PRODUCTION-CONSUMPTION REGION BOUNDARY
(see text for discussion)

MINERAL RESOURCE ZONE BOUNDARIES

MRZ-2

MRZ-1 Areas where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence.
MRZ-2 Areas where adequate information indicates that significant mineral deposits are present, or where it is judged that a high likelihood for their presence exists.
MRZ-3 Areas containing mineral deposits the significance of which cannot be evaluated from available data.
MRZ-4 Areas where available information is inadequate for assignment to any other MRZ zone.

See text for additional explanation of MRZ Symbols.

By
Russell V. Miller

MINERAL LAND CLASSIFICATION MAP

AGGREGATE RESOURCES ONLY

San Bernardino P-C Region

PREPARED IN COMPLIANCE WITH THE SURFACE MINING AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

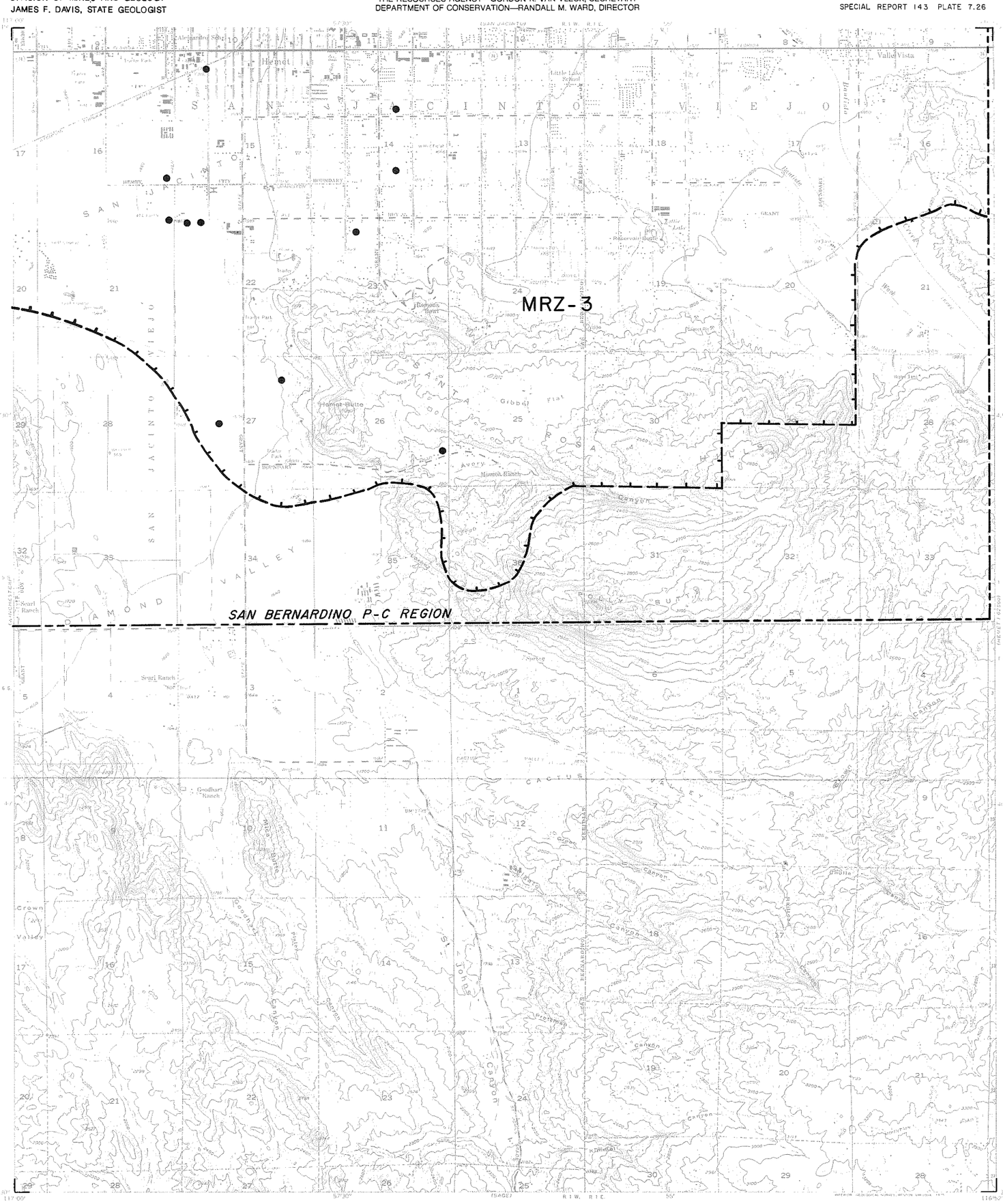
STATE GEOLOGIST

DIVISION OF MINES AND GEOLOGY
JAMES F. DAVIS, STATE GEOLOGIST

STATE OF CALIFORNIA—GEORGE DEUKMEJIAN, GOVERNOR
THE RESOURCES AGENCY—GORDON K. VAN VLECK, SECRETARY
DEPARTMENT OF CONSERVATION—RANDALL M. WARD, DIRECTOR

HEMET QUADRANGLE

SPECIAL REPORT 143 PLATE 7.26



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

CONTOUR INTERVAL 20 FEET
DASHED LINES REPRESENT HALF-INTERVAL CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Graphics by Chuck R. Owens and Dale M. Stickney

EXPLANATION

● Drill hole

OUTER BOUNDARY OF AREAS SUBJECT TO URBANIZATION
Boundaries established from data supplied by the Office of Planning and Research with modifications developed from information supplied by local government and other sources. Hachures lie within area undergoing urbanization.

PRODUCTION-CONSUMPTION REGION BOUNDARY
(see text for discussion)

MINERAL RESOURCE ZONE BOUNDARIES

MRZ-1 Areas where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence.

MRZ-2 Areas where adequate information indicates that significant mineral deposits are present, or where it is judged that a high likelihood for their presence exists.

MRZ-3 Areas containing mineral deposits the significance of which cannot be evaluated from available data.

MRZ-4 Areas where available information is inadequate for assignment to any other MRZ zone.

MRZ-2

See text for additional explanation of MRZ Symbols.

HEMET, CALIF.

MINERAL LAND CLASSIFICATION MAP

AGGREGATE RESOURCES ONLY

San Bernardino P-C Region

PREPARED IN COMPLIANCE WITH THE SURFACE MINING AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

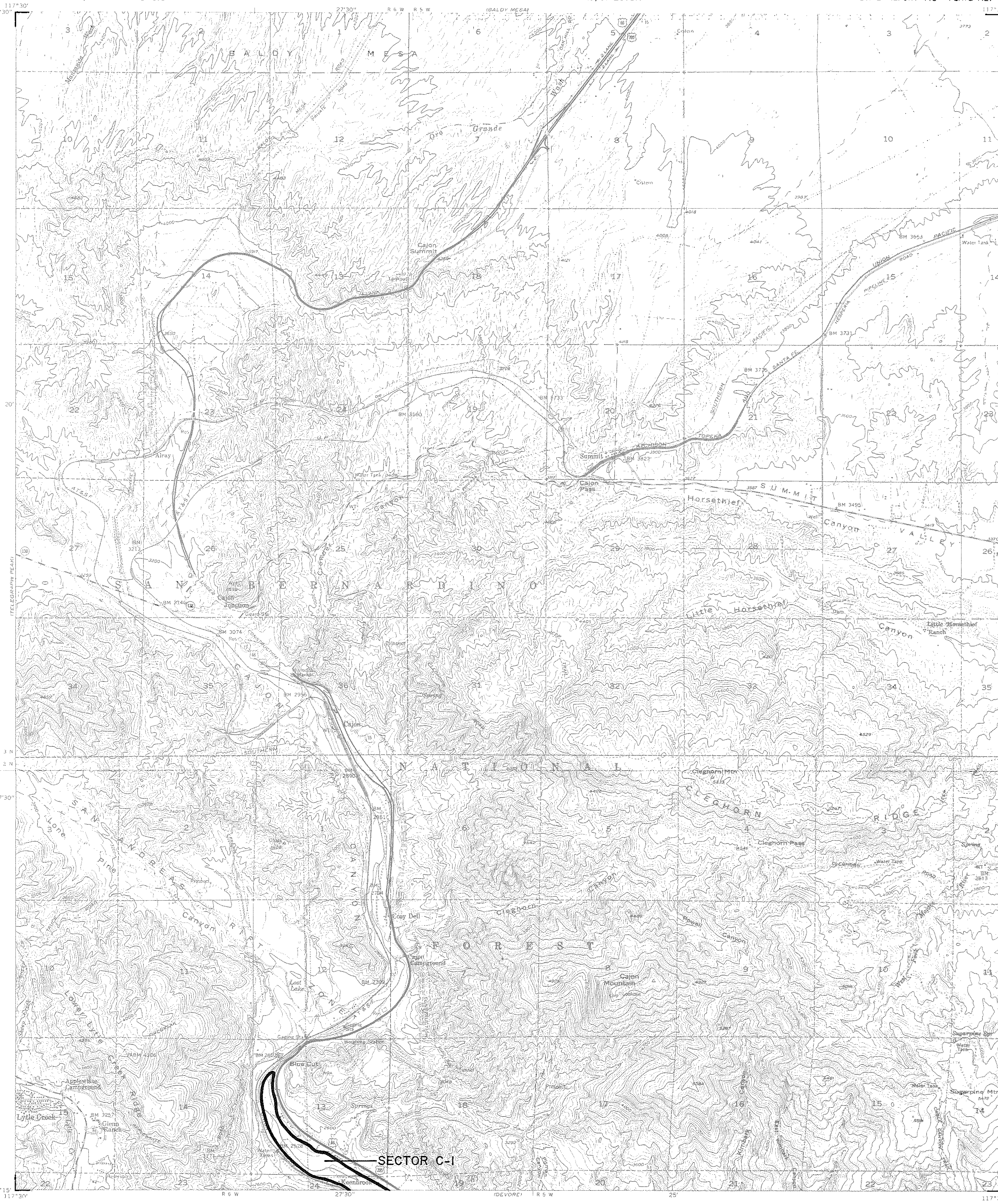
By
Russell V. Miller

STATE GEOLOGIST

DIVISION OF MINES AND GEOLOGY
JAMES F. DAVIS, STATE GEOLOGIST

STATE OF CALIFORNIA—GEORGE DEUKMEJIAN, GOVERNOR
THE RESOURCES AGENCY—GORDON K. VAN VLECK, SECRETARY
DEPARTMENT OF CONSERVATION—RANDALL M. WARD, DIRECTOR

CAJON QUADRANGLE
SPECIAL REPORT 143 PLATE 7.27



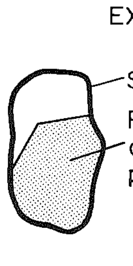
TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

Graphics by Chuck R. Owens and
Dale M. Stickney

CAJON, CALIF.

EXPLANATION



N

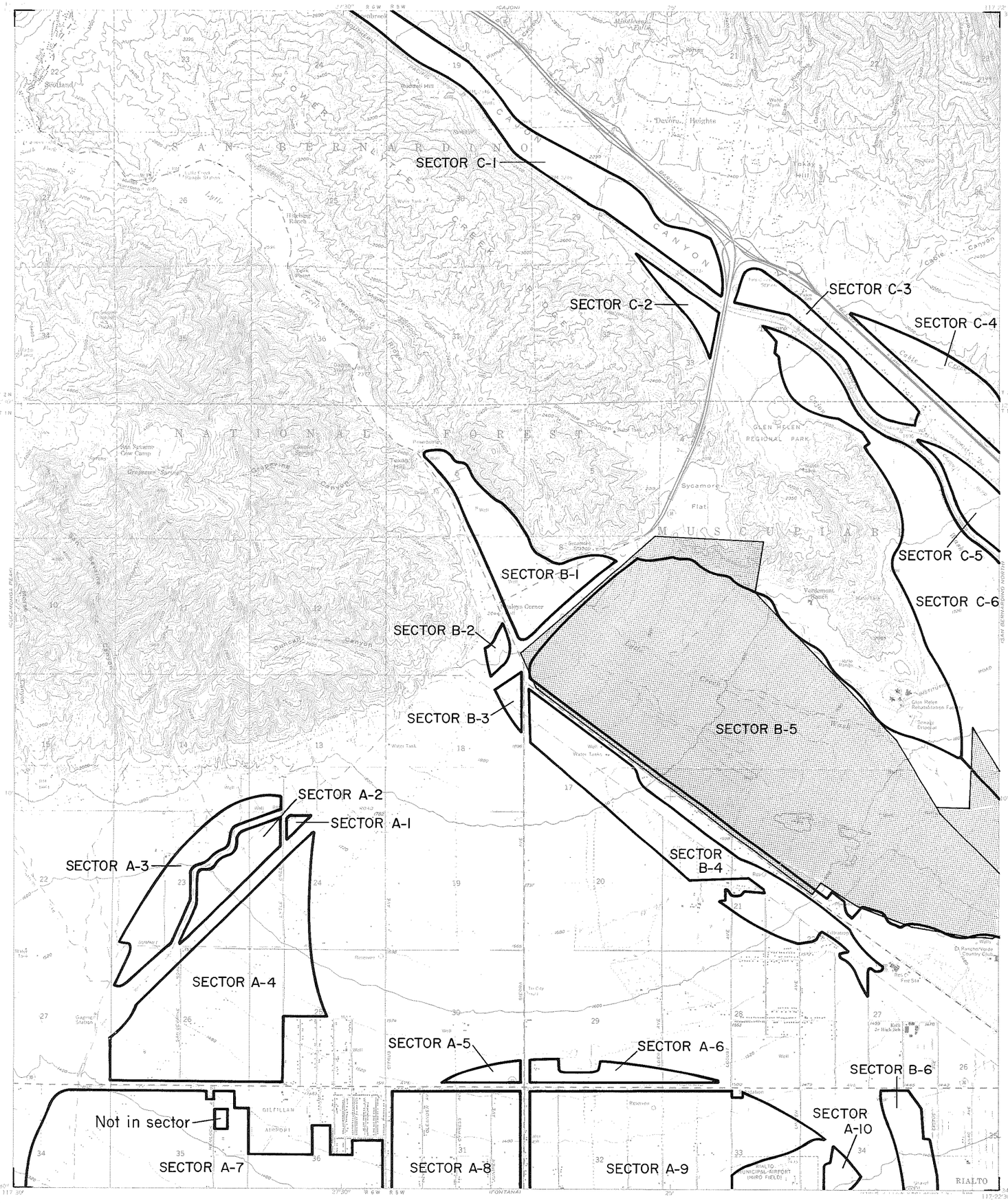
Aggregate Resource Sectors

San Bernardino P-C Region

By
Russell V. Miller
1983

PREPARED IN COMPLIANCE WITH THE SURFACE MINING
AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

STATE GEOLOGIST



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

Graphics by Chuck R. Owens and Dale M. Stickney

DEVORE, CALIF.

EXPLANATION

Sector boundary

Properties owned or controlled by aggregate producers

N

Aggregate Resource Sectors

San Bernardino P-C Region

By
Russell V. Miller
1983

PREPARED IN COMPLIANCE WITH THE SURFACE MINING AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

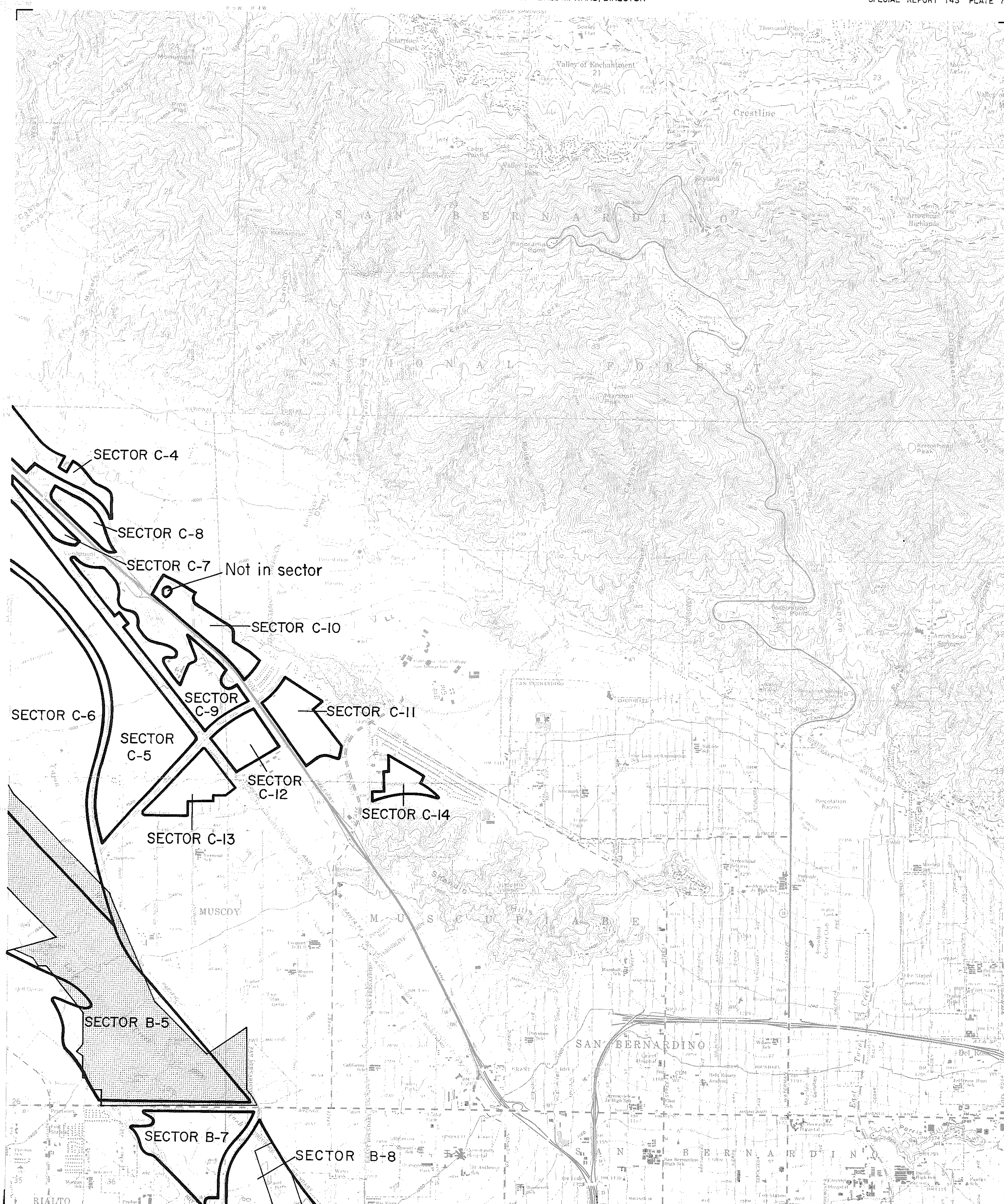
STATE GEOLOGIST

DIVISION OF MINES AND GEOLOGY
JAMES F. DAVIS, STATE GEOLOGIST

STATE OF CALIFORNIA—GEORGE DEUKMEJIAN, GOVERNOR
THE RESOURCES AGENCY—GORDON K. VAN VLECK, SECRETARY
DEPARTMENT OF CONSERVATION—RANDALL M. WARD, DIRECTOR

SAN BERNARDINO NORTH QUADRANGLE

SPECIAL REPORT 143 PLATE 7.29



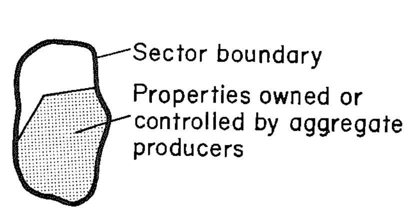
TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

CONTOUR INTERVAL 40 FEET
DOTTED LINES REPRESENT 20 FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Graphics by Chuck R. Owens and
Dale M. Stickney

SAN BERNARDINO NORTH, CALIF.

EXPLANATION



N

Aggregate Resource Sectors

San Bernardino P-C Region

By

Russell V. Miller

1983

PREPARED IN COMPLIANCE WITH THE SURFACE MINING
AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

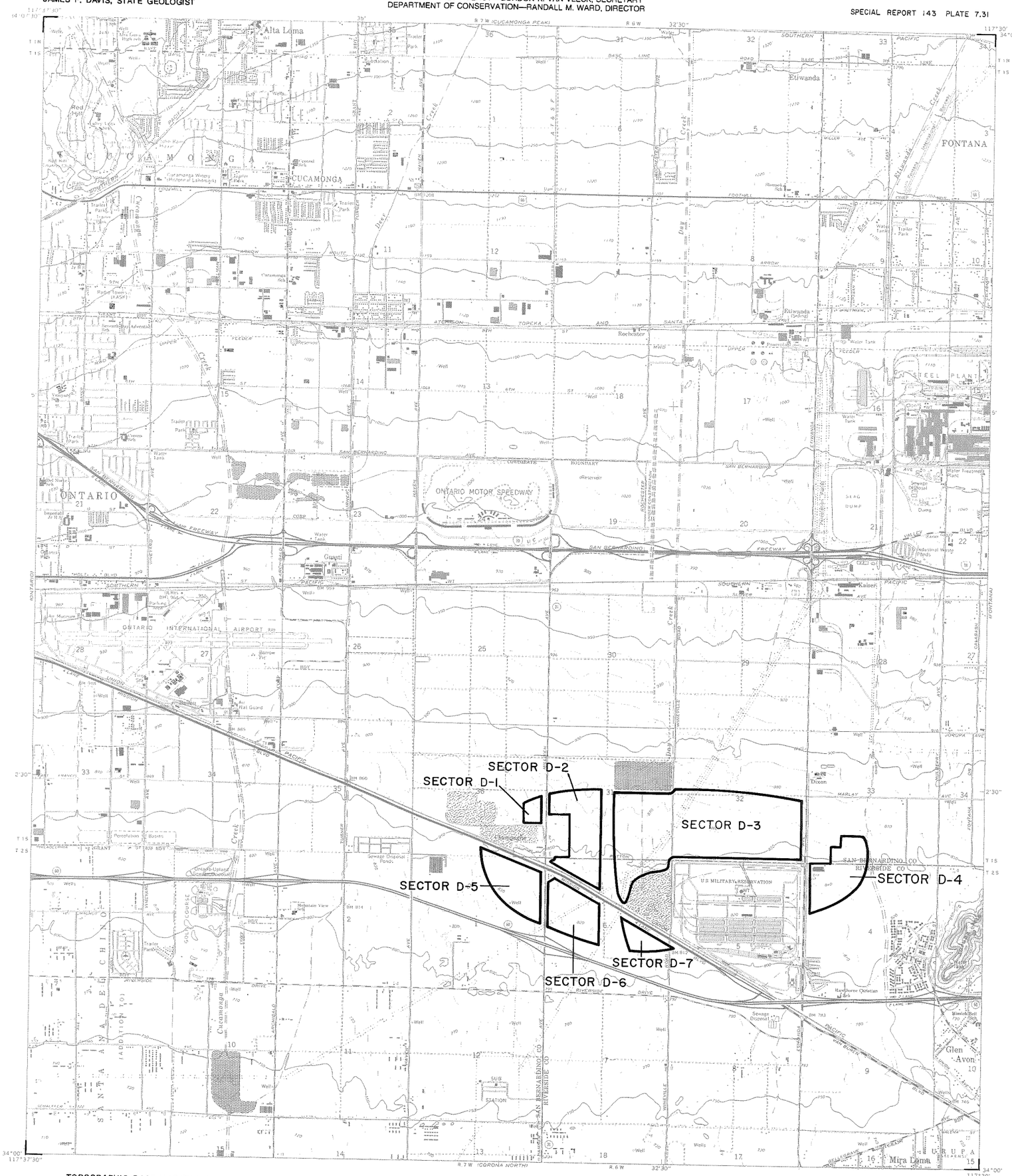
STATE GEOLOGIST

DIVISION OF MINES AND GEOLOGY
JAMES F. DAVIS, STATE GEOLOGIST

STATE OF CALIFORNIA—GEORGE DEUKMEJIAN, GOVERNOR
THE RESOURCES AGENCY—GORDON K. VAN VLECK, SECRETARY
DEPARTMENT OF CONSERVATION—RANDALL M. WARD, DIRECTOR

GUASTI QUADRANGLE

SPECIAL REPORT 143 PLATE 7.31



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Graphics by Chuck R. Owens and Dale M. Stickney

GUASTI, CALIF.

EXPLANATION

Sector boundary

Properties owned or controlled by aggregate producers

N

Aggregate Resource Sectors

San Bernardino P-C Region

By
Russell V. Miller
1983

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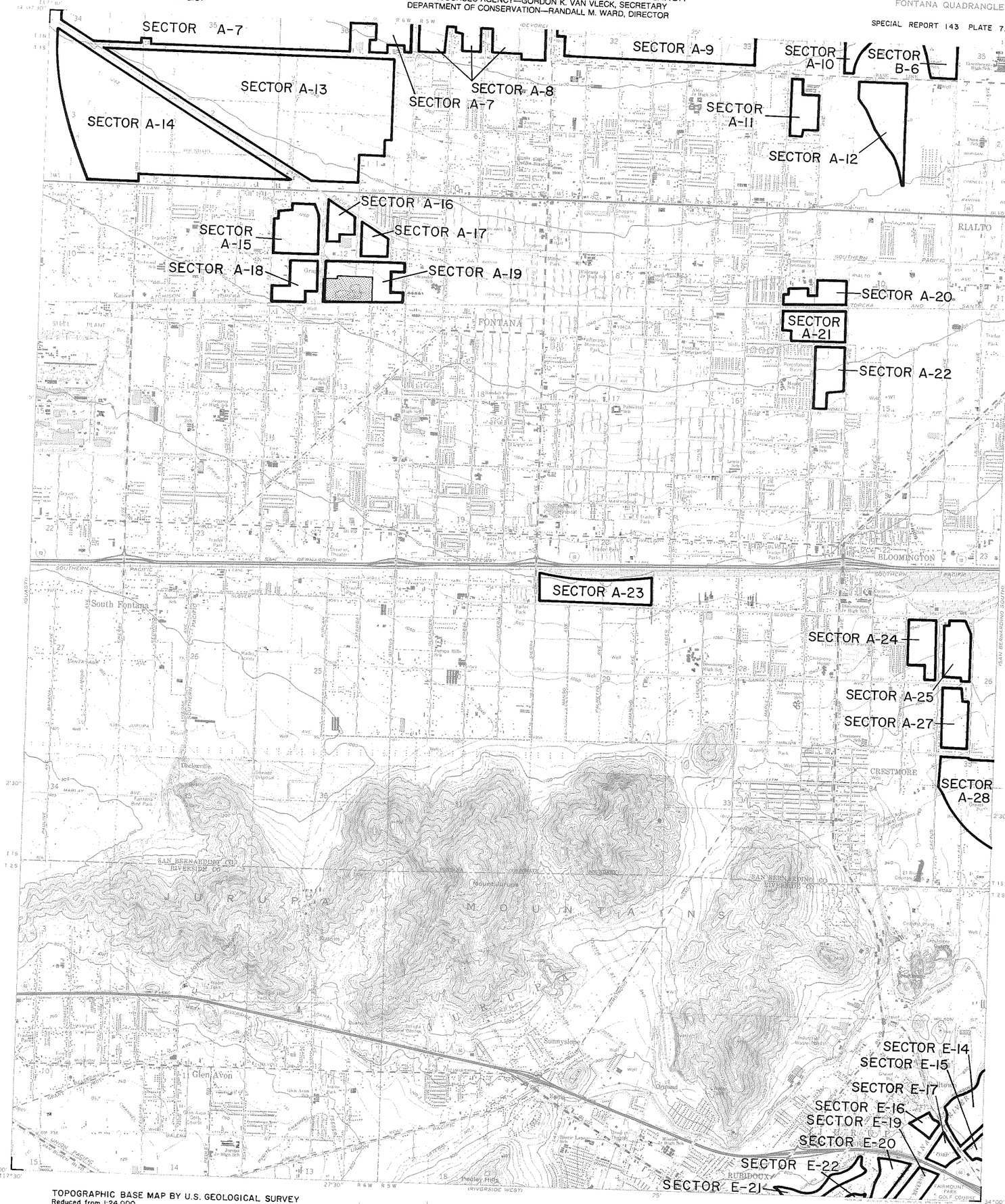
STATE GEOLOGIST

DIVISION OF MINES AND GEOLOGY
JAMES F. DAVIS, STATE GEOLOGIST

STATE OF CALIFORNIA—GEORGE DEUKMEJIAN, GOVERNOR
THE RESOURCES AGENCY—GORDON K. VAN VLECK, SECRETARY
DEPARTMENT OF CONSERVATION—RANDALL M. WARD, DIRECTOR

FONTANA QUADRANGLE

SPECIAL REPORT 143 PLATE 7.32



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

CONTOUR INTERVAL 20 FEET
DOTTED LINES REPRESENT 5-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Graphics by Chuck R. Owens and Dale M. Stickney

FONTANA, CALIF.

EXPLANATION

Sector boundary

Properties owned or controlled by aggregate producers

N

Aggregate Resource Sectors

San Bernardino P-C Region

By
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1983

PREPARED IN COMPLIANCE WITH THE SURFACE MINING AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

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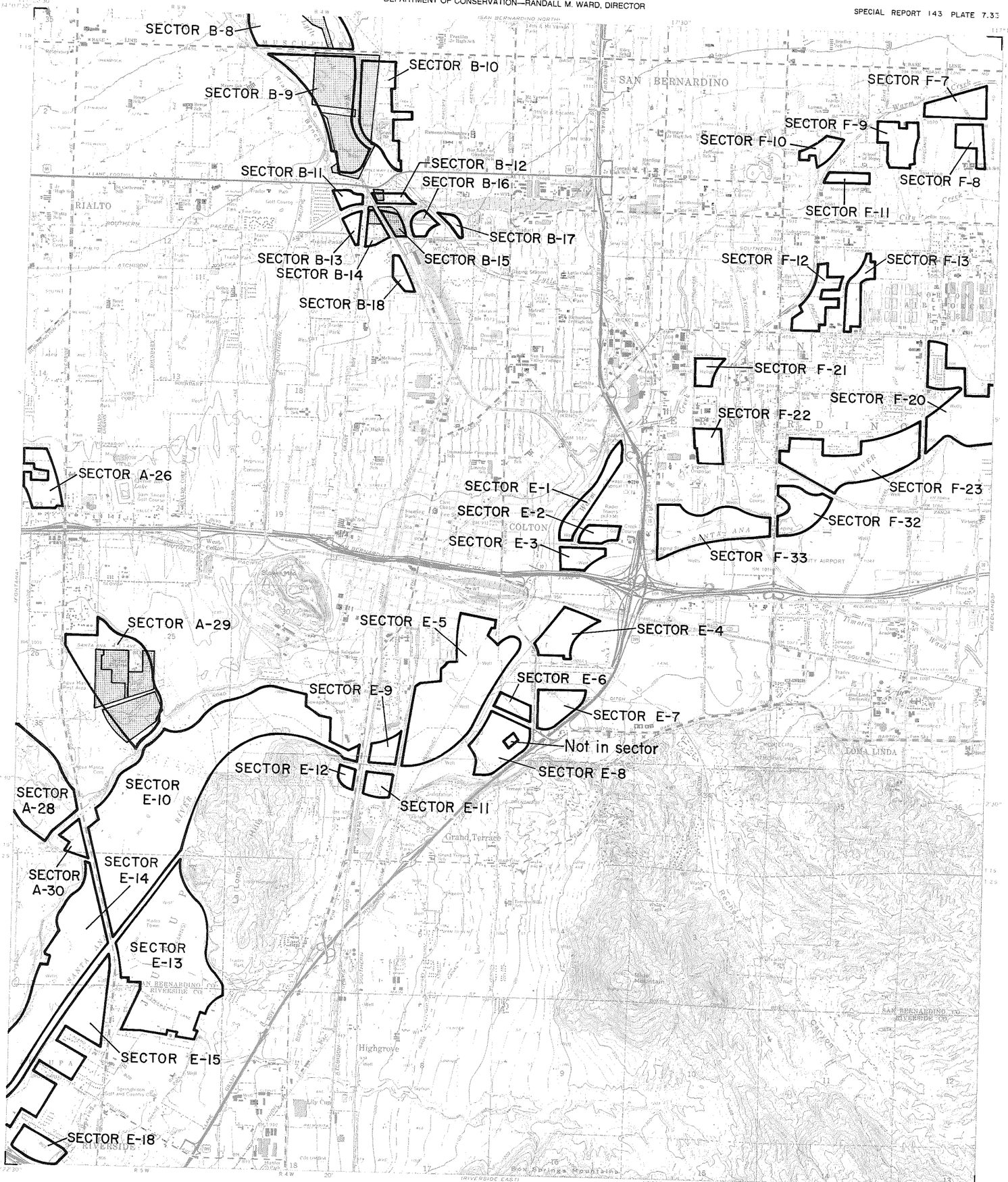
JAMES F. DAVIS, STATE GEOLOGIST

STATE OF CALIFORNIA—GEORGE DEUKMEJIAN, GOVERNOR
THE RESOURCES AGENCY—GORDON K. VAN VLECK, SECRETARY
DEPARTMENT OF CONSERVATION—RANDALL M. WARD, DIRECTOR

SAN BERNARDINO SOUTH QUADRANGLE

SPECIAL REPORT 143 PLATE 7.33



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

CONTOUR INTERVAL 20 FEET
DOTTED LINES REPRESENT 5-FOOT CONTOURS
DATUM IS MEAN SEA LEVEL

Graphics by Chuck R. Owens and Dale M. Stickney

SAN BERNARDINO SOUTH, CALIF.

EXPLANATION

Sector boundary

Properties owned or controlled by aggregate producers

N

Aggregate Resource Sectors

San Bernardino P-C Region

By
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1983

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STATE GEOLOGIST

STATE GEOLOGIST

DIVISION OF MINES AND GEOLOGY
JAMES F. DAVIS, STATE GEOLOGIST

STATE OF CALIFORNIA—GEORGE DEUKMEJIAN, GOVERNOR
THE RESOURCES AGENCY—GORDON K. VAN VLECK, SECRETARY
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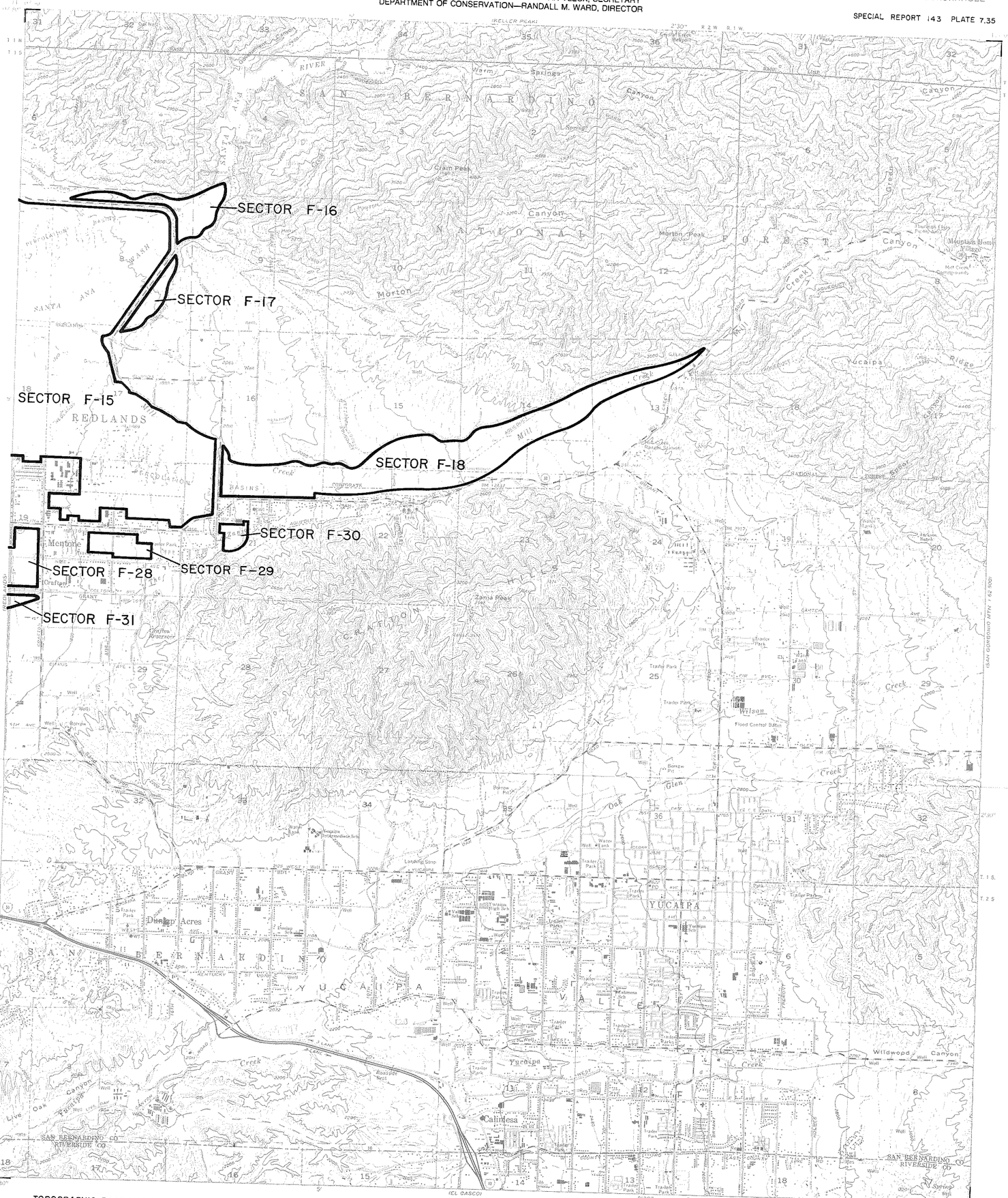
YUCAIPA QUADRANGLE

SPECIAL REPORT 143 PLATE 7.35



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Graphics by Chuck R. Owens and Dale M. Stickney

YUCAIPA, CALIF.

EXPLANATION

Sector boundary

Properties owned or controlled by aggregate producers

N

Aggregate Resource Sectors

San Bernardino P-C Region

By
Russell V. Miller
1983

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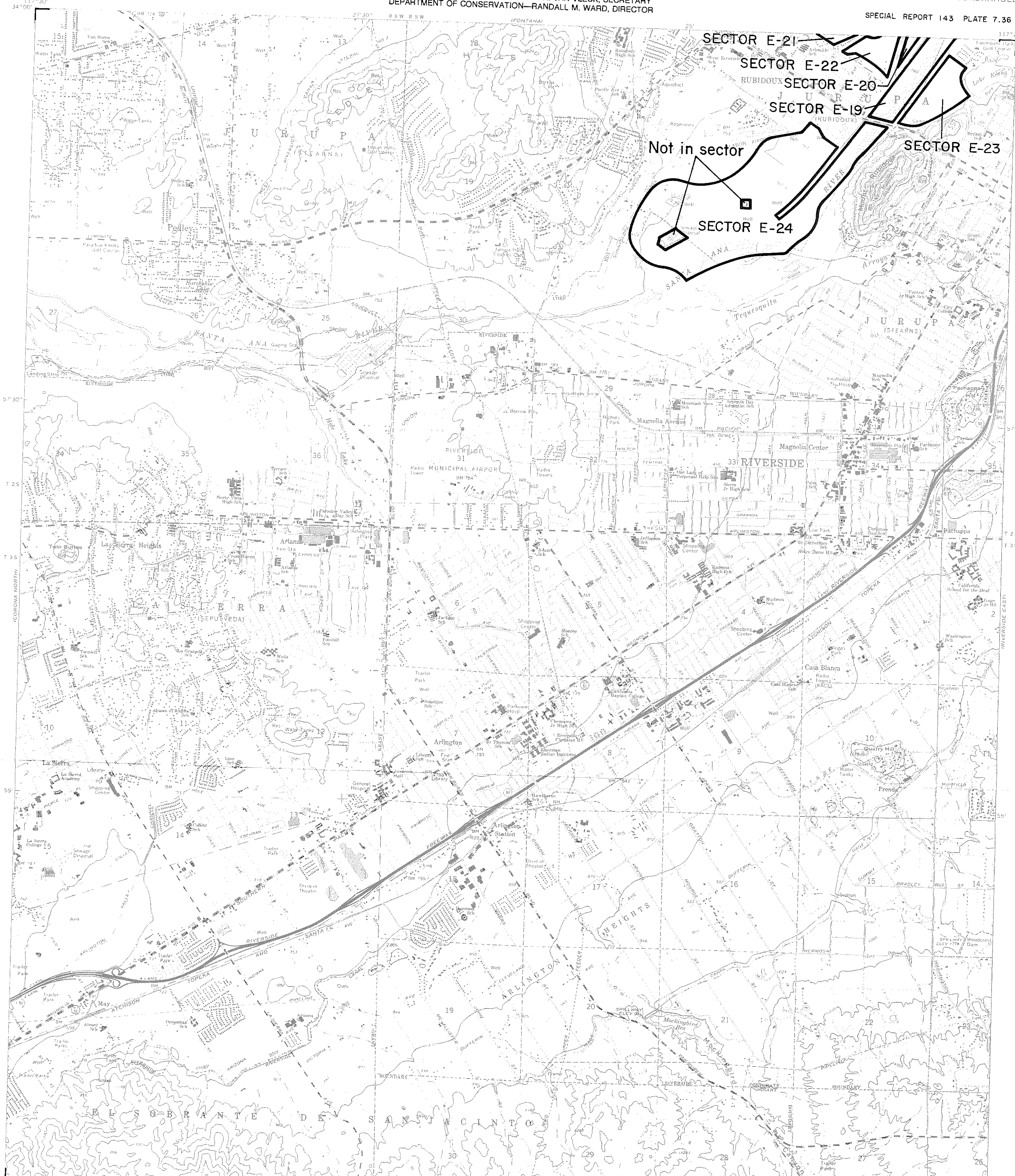
STATE GEOLOGIST

DIVISION OF MINES AND GEOLOGY
JAMES F. DAVIS, STATE GEOLOGIST

STATE OF CALIFORNIA—GEORGE DEUKMEJIAN, GOVERNOR
THE RESOURCES AGENCY—GORDON K. VAN VLECK, SECRETARY
DEPARTMENT OF CONSERVATION—RANDALL M. WARD, DIRECTOR

RIVERSIDE WEST QUADRANGLE

SPECIAL REPORT 143 PLATE 7.36



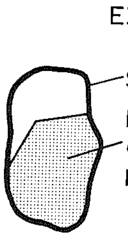
TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

CONTOUR INTERVAL 20 FEET
DOTTED LINES REPRESENT 10-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Graphics by Chuck R. Owens and
Dale M. Stickney

RIVERSIDE WEST, CALIF.

EXPLANATION



N

Aggregate Resource Sectors

San Bernardino P-C Region

By
Russell V. Miller
1983

PREPARED IN COMPLIANCE WITH THE SURFACE MINING AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

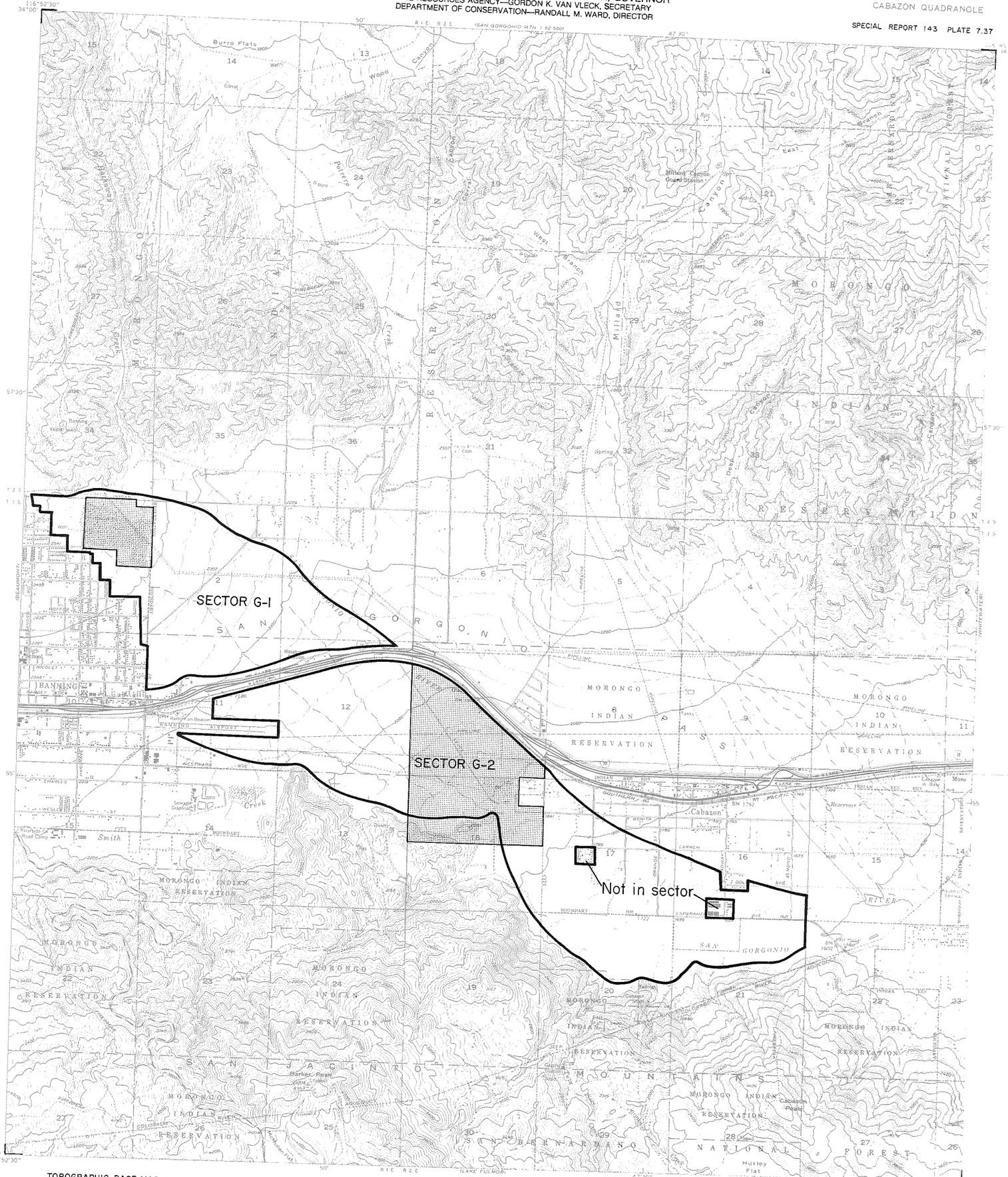
STATE GEOLOGIST

DIVISION OF MINES AND GEOLOGY
JAMES F. DAVIS, STATE GEOLOGIST

STATE OF CALIFORNIA—GEORGE DEUKMEJIAN, GOVERNOR
THE RESOURCES AGENCY—GORDON K. VAN VLECK, SECRETARY
DEPARTMENT OF CONSERVATION—RANDALL M. WARD, DIRECTOR

CABAZON QUADRANGLE

SPECIAL REPORT 143 PLATE 7.37



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

Graphics by Chuck R. Owens and Dale M. Stickney

CABAZON, CALIF.

EXPLANATION

Sector boundary

Properties owned or controlled by aggregate producers

N

Aggregate Resource Sectors

San Bernardino P-C Region

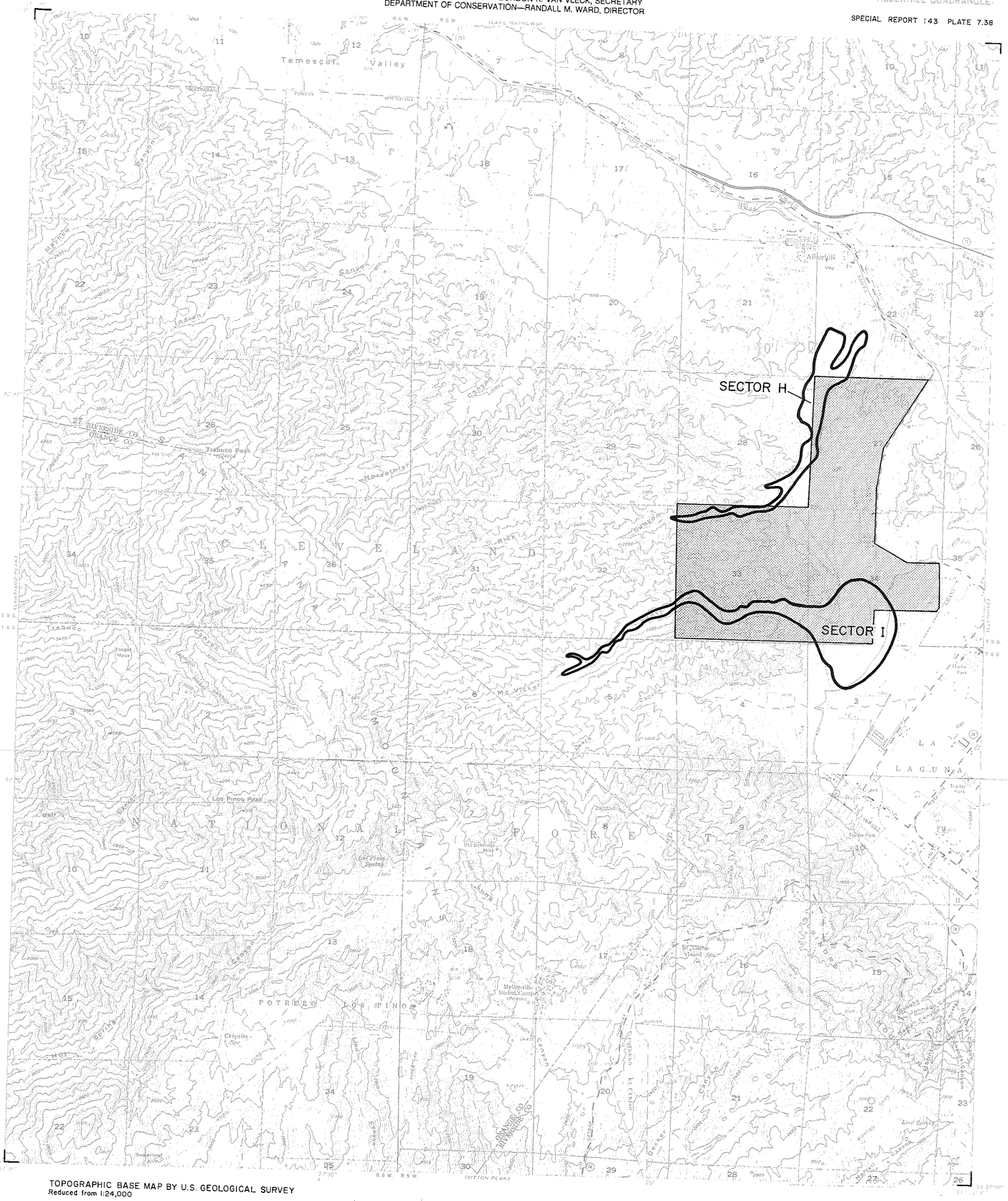
By
Russell V. Miller
1983

PREPARED IN COMPLIANCE WITH THE SURFACE MINING AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

STATE GEOLOGIST

DIVISION OF MINES AND GEOLOGY
JAMES F. DAVIS, STATE GEOLOGIST

STATE OF CALIFORNIA—GEORGE DEUKMEJIAN, GOVERNOR
THE RESOURCES AGENCY—GORDON K. VAN VLECK, SECRETARY
DEPARTMENT OF CONSERVATION—RANDALL M. WARD, DIRECTOR



TOPOGRAPHIC BASE MAP BY U.S. GEOLOGICAL SURVEY
Reduced from 1:24,000

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Graphics by Chuck R. Owens and Dale M. Stickney

ALBERHILL, CALIF.

EXPLANATION

Sector boundary

Properties owned or controlled by aggregate producers

N

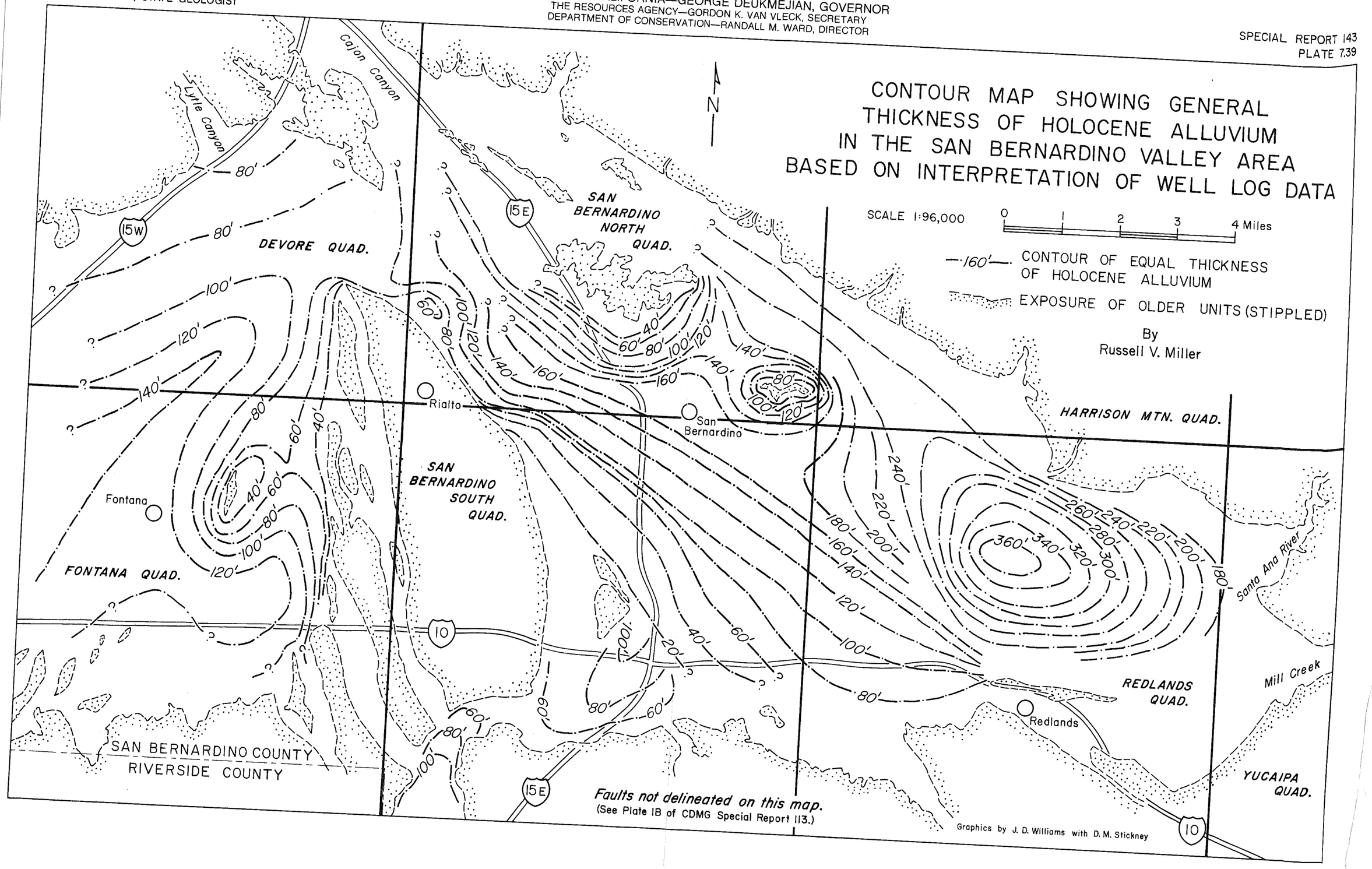
Aggregate Resource Sectors

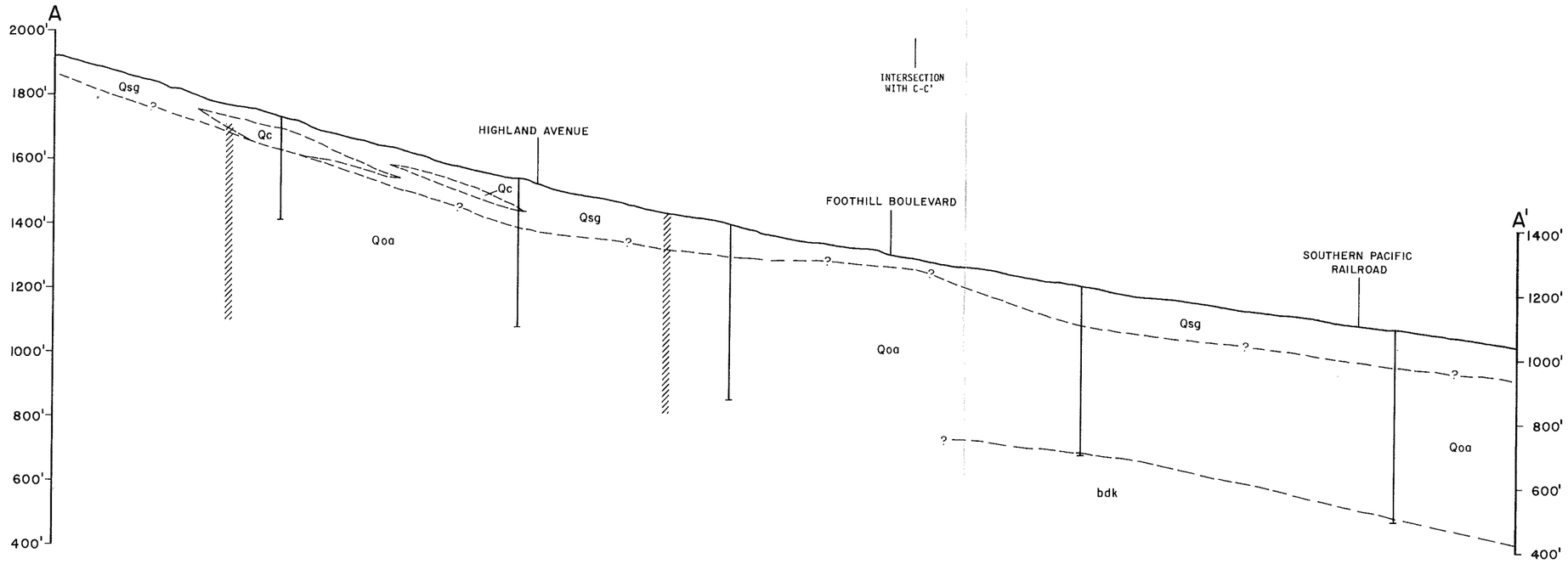
San Bernardino P-C Region

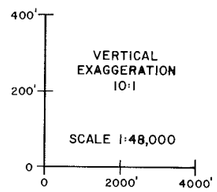
By
Russell V. Miller
1983

PREPARED IN COMPLIANCE WITH THE SURFACE MINING AND RECLAMATION ACT OF 1975, ARTICLE 4, SECTION 2761

James F. Davis
STATE GEOLOGIST


CONTOUR MAP SHOWING GENERAL THICKNESS OF HOLOCENE ALLUVIUM IN THE SAN BERNARDINO VALLEY AREA BASED ON INTERPRETATION OF WELL LOG DATA
SCALE 1:96,000
0 1 2 3 4 Miles
160' CONTOUR OF EQUAL THICKNESS OF HOLOCENE ALLUVIUM
EXPOSURE OF OLDER UNITS (STIPPLED)
By Russell V. Miller
N
DEVORE QUAD.
SAN BERNARDINO NORTH QUAD.
SAN BERNARDINO SOUTH QUAD.
HARRISON MTN. QUAD.
FONTANA QUAD.
REDLANDS QUAD.
YUCAIPA QUAD.
Lytle Canyon
Cajon Canyon
Rialto
San Bernardino
Fontana
Redlands
Santa Ana River
Mill Creek
15W
15E
10
SAN BERNARDINO COUNTY
RIVERSIDE COUNTY
Faults not delineated on this map.
(See Plate 1B of CDMG Special Report 113.)
Graphics by J. D. Williams with D. M. Stickney





MINERAL LAND CLASSIFICATION OF THE GREATER LOS ANGELES AREA
SAN BERNARDINO PRODUCTION-CONSUMPTION REGION

GENERALIZED GEOLOGIC CROSS SECTION A-A', LYTLE CREEK FAN

By R. V. Miller
1983

EXPLANATION

QUATERNARY
PLEISTOCENE – HOLOCENE

- Qsg — Sand and Gravel
- Qb — Boulders
- Qs — Sand
- Qc — Clay
- Qoa — Older Alluvium

PRE-QUATERNARY

- bdk — Bedrock

Heavy borders on boxes indicate units that appear on this plate.

SYMBOLS

- *Contact: dashed where inferred, queried where conjectural.
- Fault: solid where well known, dashed where inferred.
- *Drill hole
- *Ground-water barrier

*Symbol used on this plate.

NOTES:

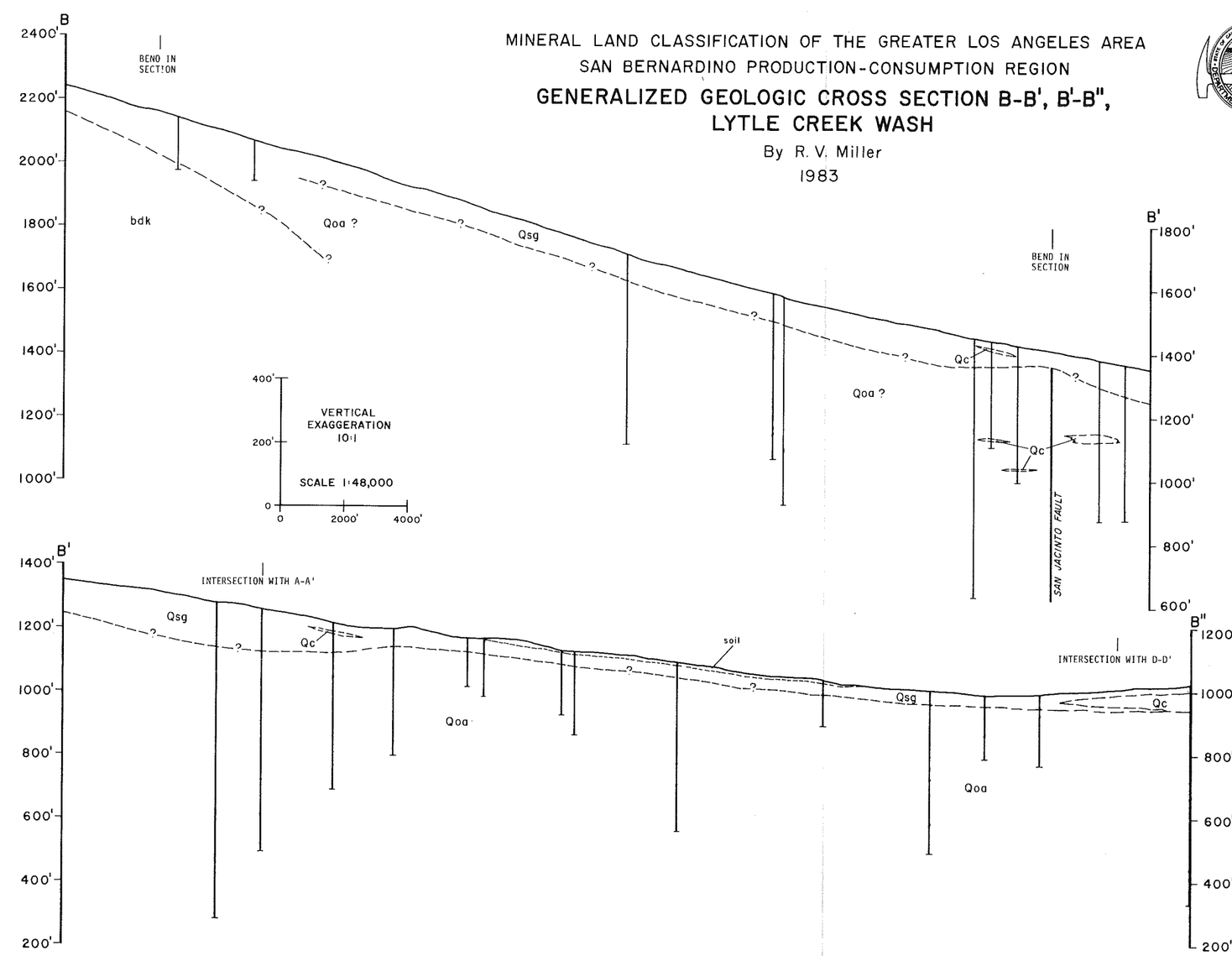
1) Geology taken from: Fife, D.L. and others, 1976, Geologic hazards in southwestern San Bernardino County, California: California Division of Mines and Geology, Special Report 113, Plate 1-B.
2) Refer to Plates 7.2 and 7.6 for location of section lines.

Graphics by C.R.Owens

MINERAL LAND CLASSIFICATION OF THE GREATER LOS ANGELES AREA
SAN BERNARDINO PRODUCTION-CONSUMPTION REGION

GENERALIZED GEOLOGIC CROSS SECTION B-B', B'-B'', LYTLE CREEK WASH

By R. V. Miller
1983



EXPLANATION

QUATERNARY — PLEISTOCENE – HOLOCENE

- Qsg — Sand and Gravel
- Qb — Boulders
- Qs — Sand
- Qc — Clay
- Qoa — Older Alluvium

PRE-QUATERNARY

- bdk — Bedrock

Heavy borders on boxes indicate units that appear on this plate.

SYMBOLS

- * Contact: dashed where inferred, queried where conjectural.
- * Fault: solid where well known, dashed where inferred.
- * Drill hole
- Ground-water barrier

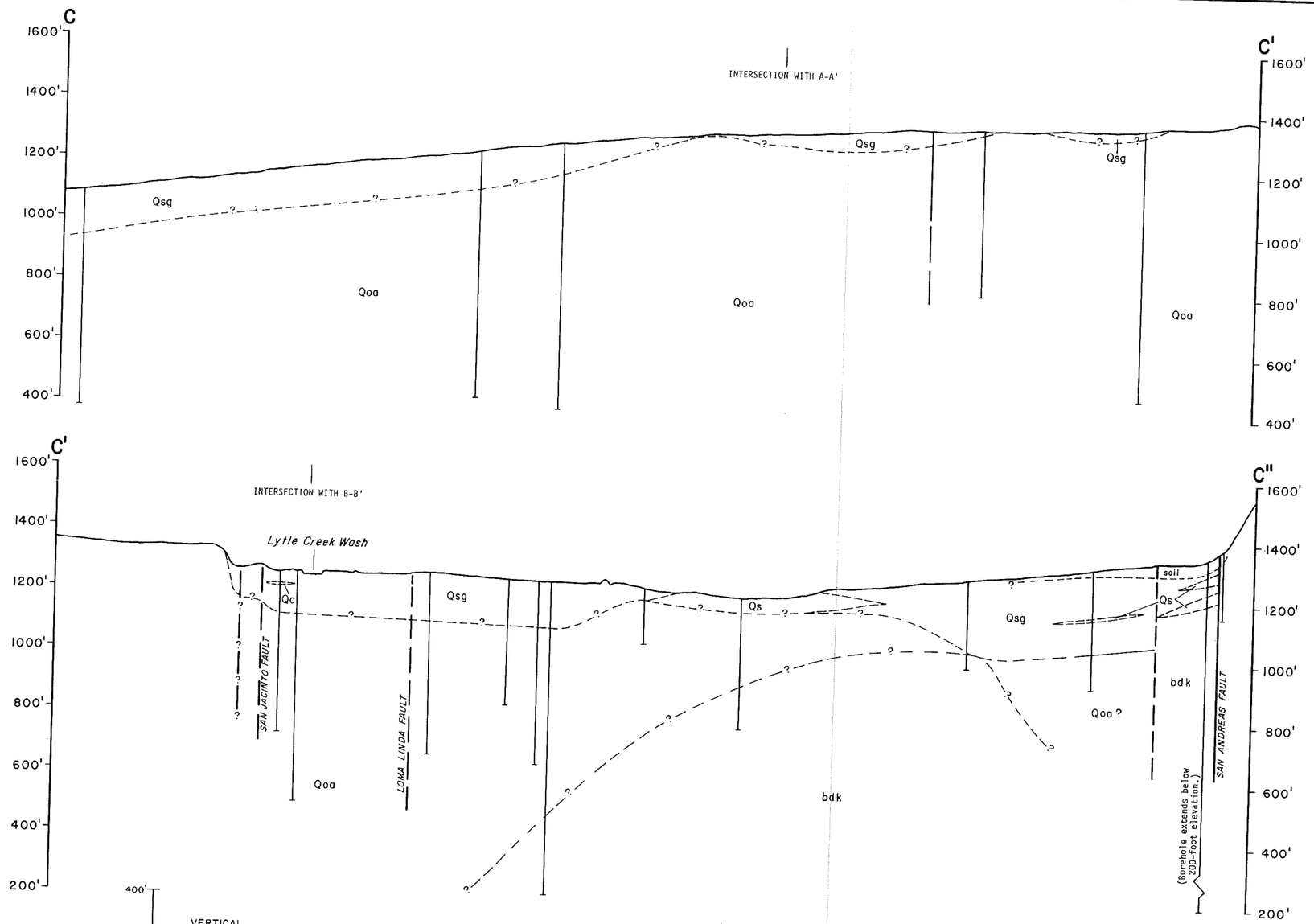
* Symbol used on this plate.

NOTES:

1) Geology taken from: Fife, D.L. and others, 1976, Geologic hazards in southwestern San Bernardino County, California: California Division of Mines and Geology, Special Report 113, Plate 1-B.

2) Refer to Plates 7.2, 7.3, and 7.7 for location of section lines.

Graphics by C.R.Owens



EXPLANATION

QUATERNARY
PLEISTOCENE – HOLOCENE

- Qsg — Sand and Gravel
- Qb — Boulders
- Qs — Sand
- Qc — Clay
- Qoa — Older Alluvium

PRE-QUATERNARY

- bdk — Bedrock

Heavy borders on boxes indicate units that appear on this plate.

SYMBOLS

- * Contact: dashed where inferred, queried where conjectural.
- * Fault: solid where well known, dashed where inferred.
- * Drill hole
- Ground-water barrier

* Symbol used on this plate.

NOTES:

1) Geology taken from: Fife, D.L. and others, 1976, Geologic hazards in southwestern San Bernardino County, California: California Division of Mines and Geology, Special Report 113, Plate 1-B.

2) Refer to Plates 7.3, 7.6, and 7.7 for location of section lines.

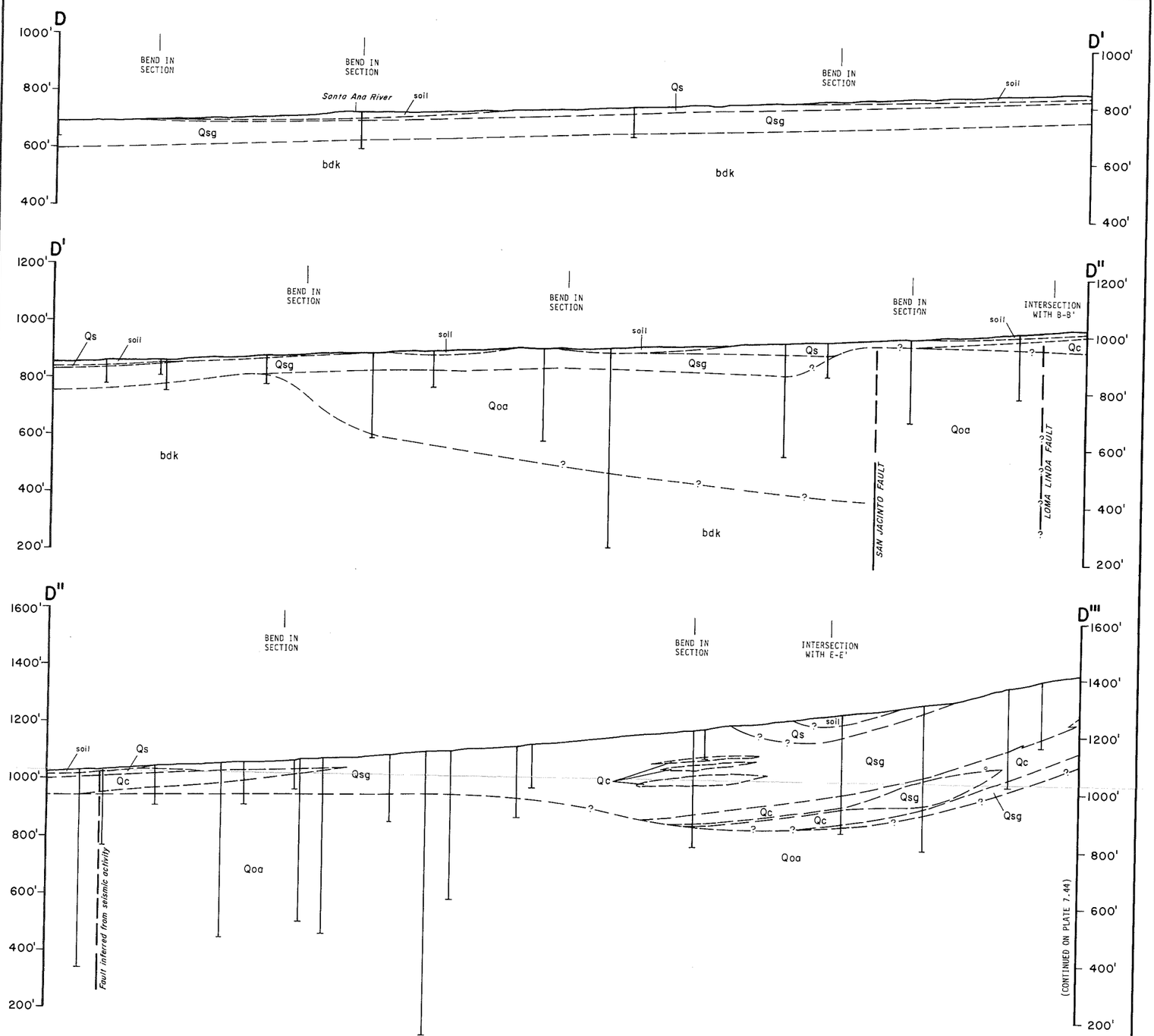
MINERAL LAND CLASSIFICATION OF THE GREATER LOS ANGELES AREA
SAN BERNARDINO PRODUCTION-CONSUMPTION REGION

GENERALIZED GEOLOGIC CROSS SECTION C-C', C'-C'', SAN BERNARDINO VALLEY

By R. V. Miller

1983

Graphics by C. R. Owens



EXPLANATION

QUATERNARY — PLEISTOCENE - HOLOCENE

- Qsg — Sand and Gravel
- Qb — Boulders
- Qs — Sand
- Qc — Clay
- Qoa — Older Alluvium

PRE-QUATERNARY

- bdk — Bedrock

Heavy borders on boxes indicate units that appear on this plate.

VERTICAL EXAGGERATION 10:1

SCALE 1:48,000

SYMBOLS

- * Contact: dashed where inferred, queried where conjectural.
- * Fault: solid where well known, dashed where inferred.
- * Drill hole
- Ground-water barrier

* Symbol used on this plate.

NOTES:
1) Geology taken from: Fife, D.L. and others, 1976, Geologic hazards in southwestern San Bernardino County, California: California Division of Mines and Geology, Special Report 113, Plate 1-B.
2) Refer to Plates 7.6, 7.7, 7.8, and 7.12 for location of section lines.

Graphics by C. R. Owens

MINERAL LAND CLASSIFICATION OF THE GREATER LOS ANGELES AREA
SAN BERNARDINO PRODUCTION-CONSUMPTION REGION

GENERALIZED GEOLOGIC CROSS SECTION D-D', D'-D'', D''-D''', SANTA ANA RIVER AND SANTA ANA WASH

By R. V. Miller

1983

MINERAL LAND CLASSIFICATION OF THE GREATER LOS ANGELES AREA
SAN BERNARDINO PRODUCTION-CONSUMPTION REGION

GENERALIZED GEOLOGIC CROSS SECTIONS D'''-D'''' AND E-E', SANTA ANA WASH

By R. V. Miller
1983

EXPLANATION

QUATERNARY — PLEISTOCENE - HOLOCENE

- Qsg — Sand and Gravel
- Qb — Boulders
- Qs — Sand
- Qc — Clay
- Qoa — Older Alluvium

PRE-QUATERNARY

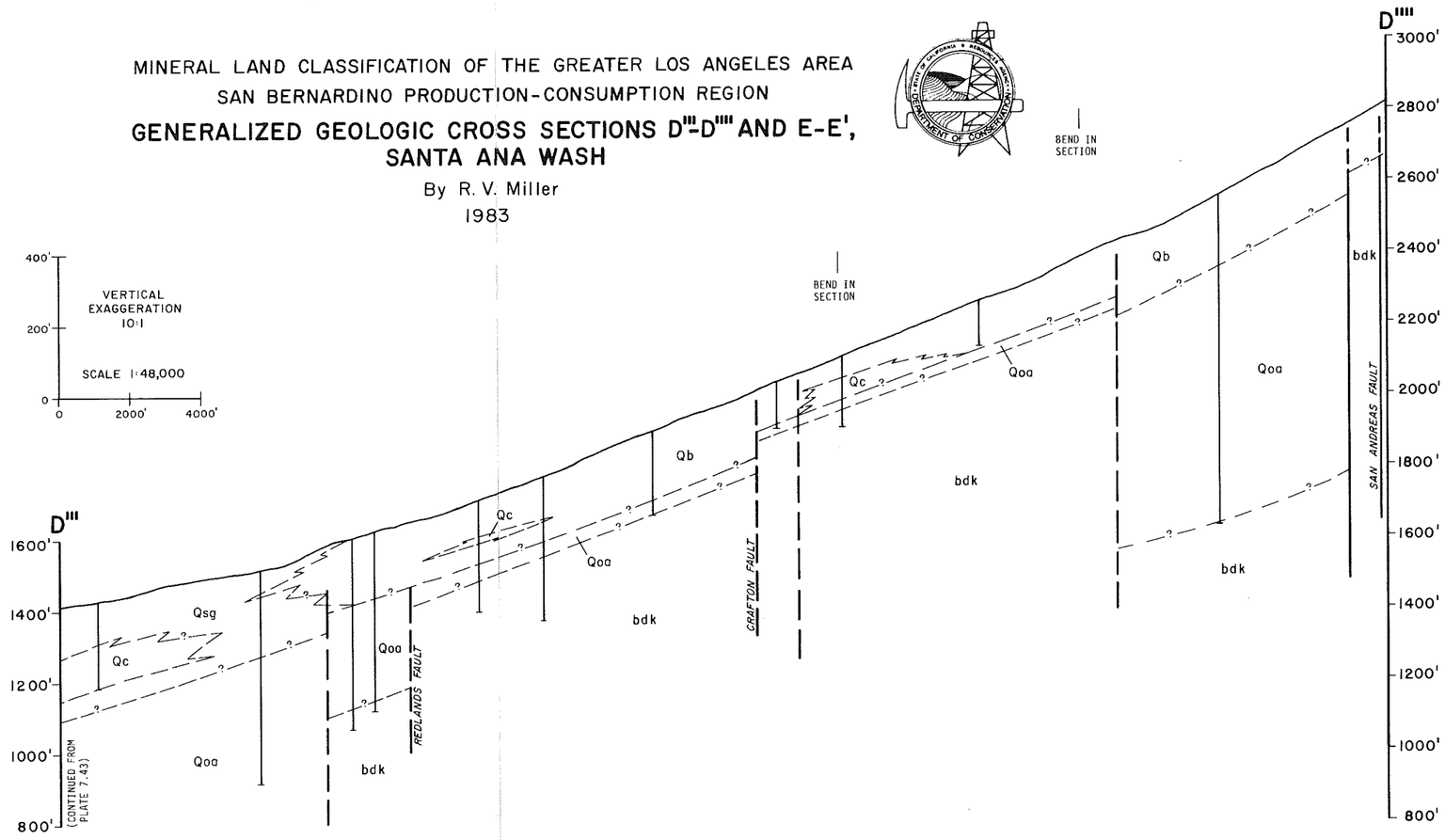
- bdk — Bedrock

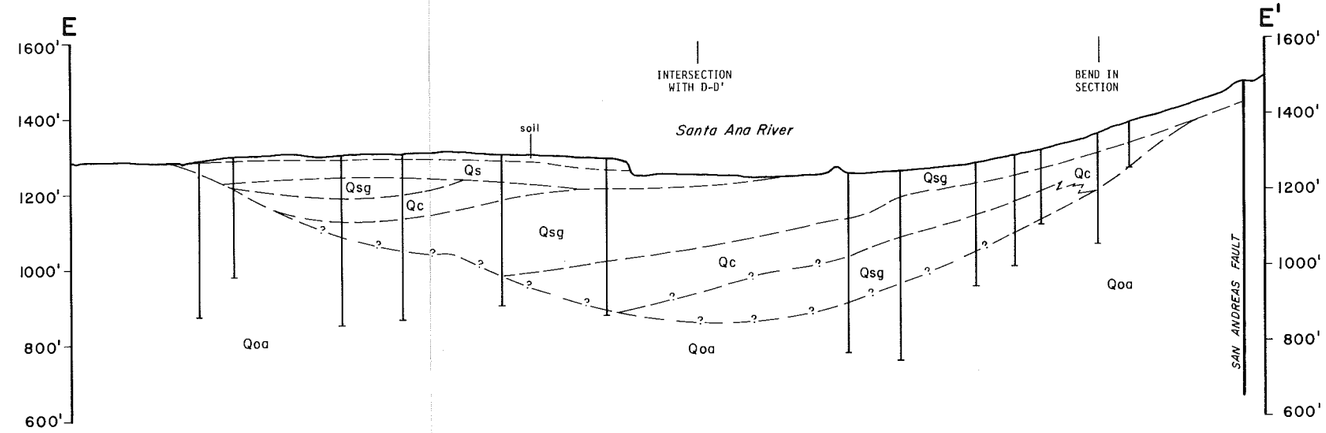
Heavy borders on boxes indicate units that appear on this plate.

SYMBOLS

- * Contact: dashed where inferred, queried where conjectural.
- * Fault: solid where well known, dashed where inferred.
- * Drill hole
- Ground-water barrier

* Symbol used on this plate.





NOTES:

1) Geology taken from: Fife, D.L. and others, 1976, Geologic hazards in southwestern San Bernardino County, California: California Division of Mines and Geology, Special Report 113, Plate 1-B.

2) Refer to Plates 7.4, 7.8, and 7.9 for location of section lines.

Graphics by C.R.Owens

Appendix III-C

HYDROLOGY AND WATER QUALITY ANALYSIS

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Appendix III-C-A

PACE Advanced Water Engineering Technical Memorandum: Lytle West DEIR Comments Regarding Watershed Drainage Boundaries September 21, 2009

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Technical Memorandum

Date: **September 21, 2009**

To: **Kevin Lynch, Lytle Development**

From: **Jonis C. Smith, PE**.

Re: **Lytle West DEIR Comments Regarding Watershed Drainage Boundaries** **8425E**

The table below provides the revised accounting of watershed area attributed to each development Neighborhood in the proposed Lytle West project. The information referenced in the DEIR is outdated. The attached exhibits show the differences between the existing and proposed condition watershed boundaries. You will notice that the differences are mostly due to the construction of the proposed bank improvements along Neighborhoods 2 and 3 (N2 and N3). In the existing condition there is land area that is within the creek that is part of the N2 and N3 watershed. The proposed bank improvements will provide a barrier to prevent runoff in the creek from encroaching into the N2 and N3 communities. The result is that part of the land area that is tributary in the existing condition is no long tributary in the proposed condition. Runoff from that portion of land will remain in the creek.

The Hansen quarry is tributary to N2 in the existing condition but, the conceptual grading prepared by KTGY shows a proposed fill slope that will be constructed between the quarry and N2. This slope will prevent runoff from the quarry area from flowing into N2 as it does currently. We assumed that the runoff from the quarry area would be directed northerly to the creek. The result is a reduction in watershed area in the proposed condition. There is a small parcel of land in the Caltrans Right-of-Way which is currently tributary to the N3 watershed. It was assumed that when the site is developed runoff from Caltrans r/w would be captured and conveyed directly to the creek. This also results in a reduced watershed area for N3 in the proposed condition.

The attached exhibits indicate that there are no differences between the existing and proposed watershed boundaries for N1 and N4 as is reflected in the table shown below.

Watershed Condition	Watershed Area (ac)			
	N1	N2	N3	N4
Existing Condition	1423.93	1024.8	658.87	1197.41
Proposed Condition	1423.93	616.07	559.43	1197.31
Difference	0	408.73	99.44	0.1

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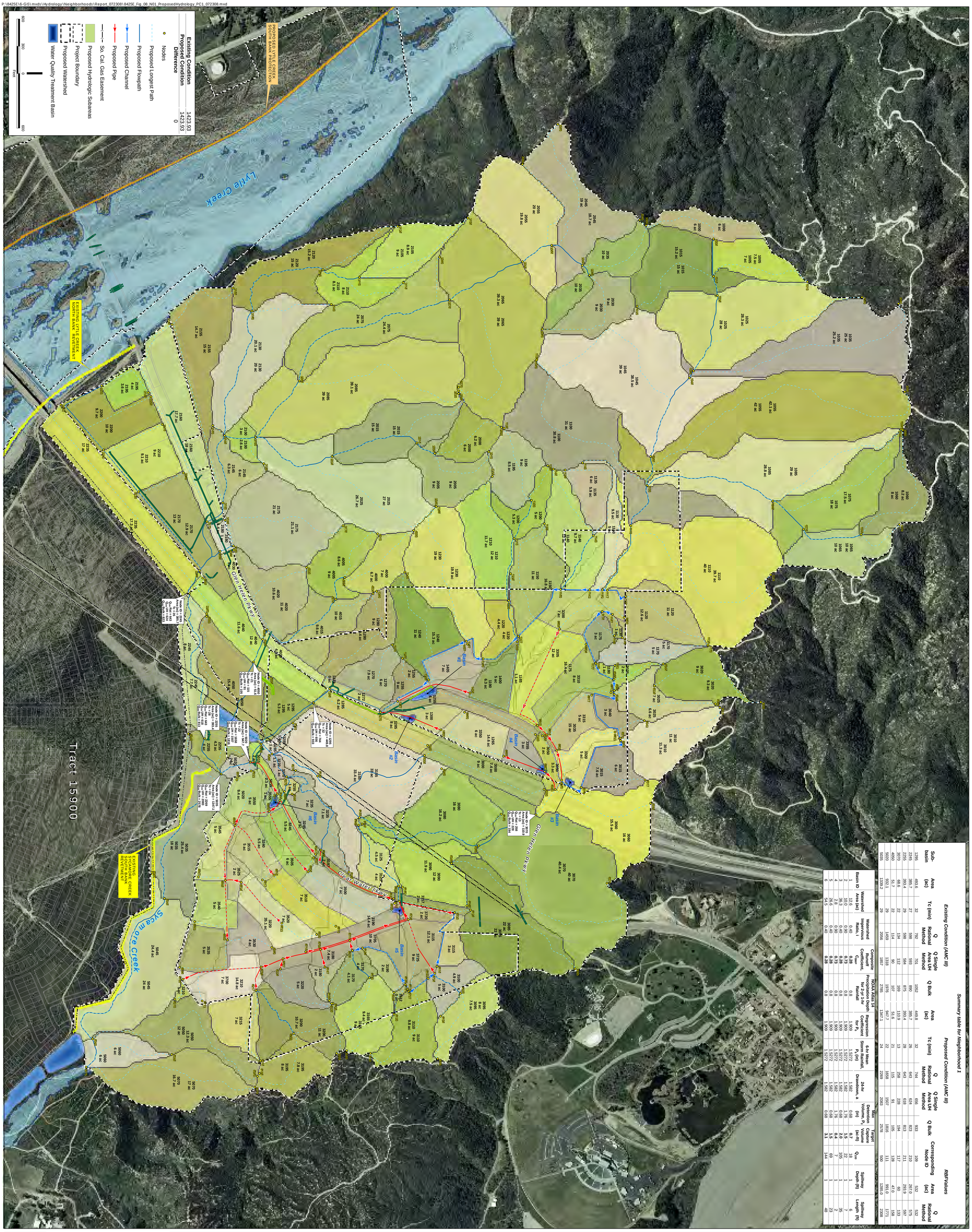


Existing Condition (AMC III)

Sub-basin	Area (ac)	Tc (min)	Q Rational Method	Q Simple Area UH Method	Q Bulk	Area (ac)	Tc (min)	Q Rational Method	Q Simple Area UH Method	Q Bulk	Corresponding Node ID	Area (ac)	Q Rational Method
1295	459.6	32	792	701	1052	449.8	32	744	656	933	109	532	532
2245	385.7	27	598	593	890	385.7	26	643	634	923	210	267.0	575
2255	393.4	29	598	584	875	393.4	28	643	618	813	211	269.9	597
2050	61.6	22	134	92	140	61.6	21	158	98	149	117	43.0	133
5020	51.1	22	134	92	140	51.1	21	158	98	149	130	35.7	133
5025	932.1	29	1459	1318	1976	947.7	22	1658	1507	1816	111	991.0	1771
1330.2	29	2056	1857	2785	1347.1	24	2269	2083	2578	500	1285.0	2208

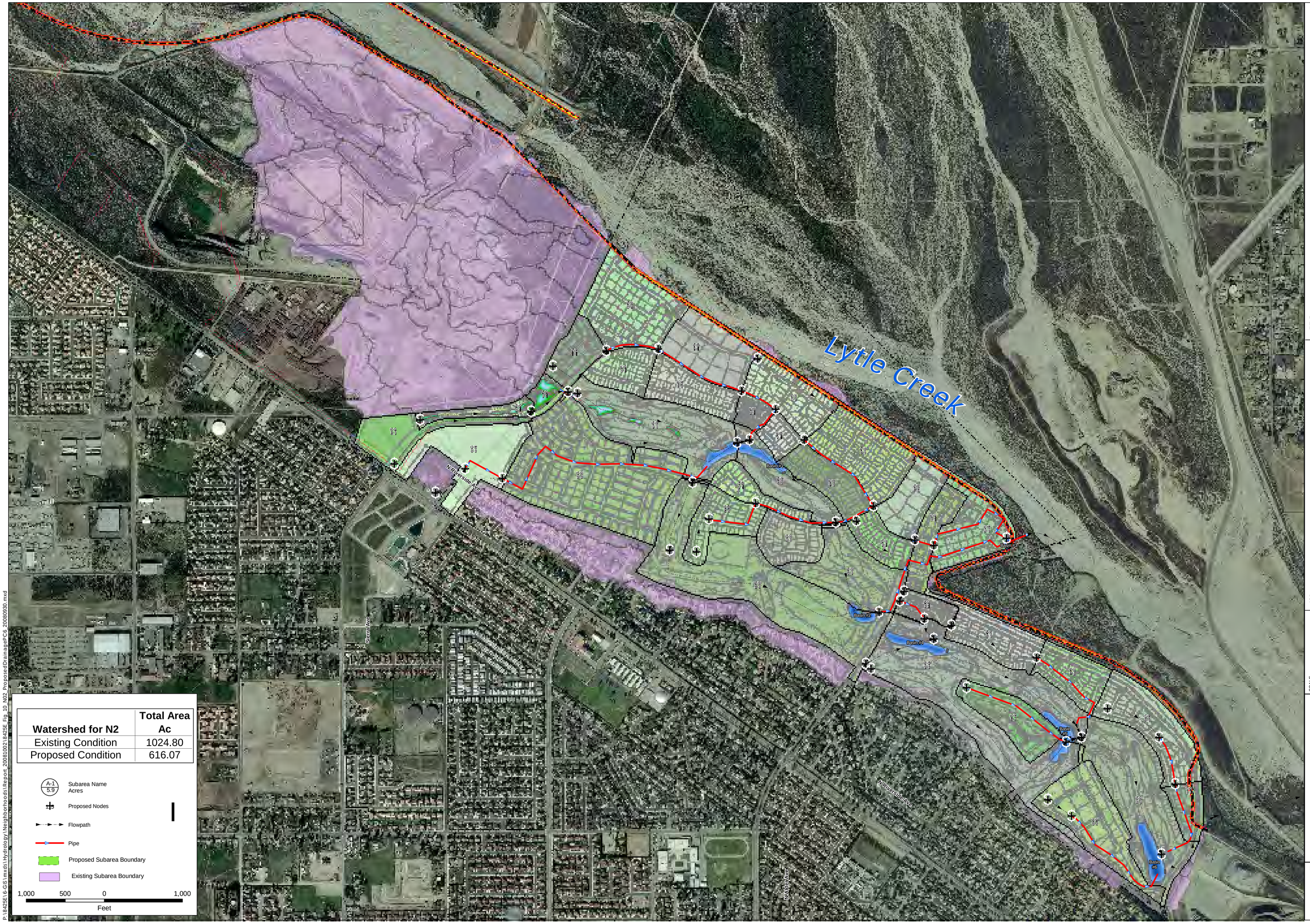
Summary table for Neighborhood 1

Proposed Condition (AMC III)

RBFValues

Basin ID	Watershed Area (ac)	Watershed Impervious Ratio	Composite Runoff Coefficient, C	NOAA Atlas 14 Precipitation Depth for 1yr 1 hr Rainfall	Regression Coefficient	6-hr Mean Storm Rainfall,	24-hr Duration,	Max Detention Volume, P_v	Target Capture Volume (ac-ft)	Q_{bw}	Spillway Depth (ft)	Spillway Length (ft)	Q Rational Method
1	12.6	0.40	0.28	0.8	1.909	1.5272	1.562	0.68	0.7	18	1	7	48
2	10.0	0.90	0.73	0.8	1.909	1.5272	1.562	1.76	1.5	22	1	7	
3	36.3	0.40	0.28	0.8	1.909	1.5272	1.562	1.68	2.0	105	1	35	
4	26.0	0.40	0.28	0.8	1.909	1.5272	1.562	0.68	1.5	69	1	23	
5	54.5	0.40	0.28	0.8	1.909	1.5272	1.562	0.68	3.1	144	1	48	
6													

FIGURE	PACE Advanced Water Engineering	SCALE 1" = 300'	DESIGNED PC	DRAWING PC	CHECKED SP	DATE 07/24/08	JOB NO. 8425-E	JOB Lytle Creek Ranch RIALTO CA	TITLE Proposed Hydrology Neighborhood 1
8									



Watershed for N2	Total Area Ac
Existing Condition	1024.80
Proposed Condition	616.07

A-1 5.9 Subarea Name Acres

Proposed Nodes

Flowpath

Pipe

Proposed Subarea Boundary

Existing Subarea Boundary

1,000 500 0 1,000

Feet

TITLE

Master Drainage Plan

Neighborhood 2

JOB

Lytle Creek Ranch

RIALTO CA

SCALE	1"= 500'
DESIGNED	RL
DRAWING	PC
CHECKED	SP
DATE	09/30/08
JOB NO.	8425-E

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FOUNTAIN VALLEY, CA 92708
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FIGURE

10

P:\8425E\6-GIS\mxds\Hydrology\Neighborhoods\Report 20081002\8425E_Fig_10_N02_ProposedDrainagePC6_20080930.mxd

Hydrologic Subarea
Acres

Flow Connection Point

Channel

Flowpath

Pipe

Water Quality Treatment Basin

Proposed Subarea Boundary

Existing Subarea Boundary

1,000 500 0 1,000
Feet

	Area
Existing Condition	658.87
Proposed Condition	559.43
Difference	99.44

Tract 15900

High Pressure Gas line

Lytle Creek

N Riverside Ave

Sierra Ave

N Alder Ave

N Locust Ave

Casa Grande Dr

WQ Basin 1

WQ Basin 2

WQ Basin 3

WQ Basin 4

WQ Basin 5

WQ Basin 6

WQ Bain 8

WQ Basin 7

WQ Basin 9

WQ Basin 10

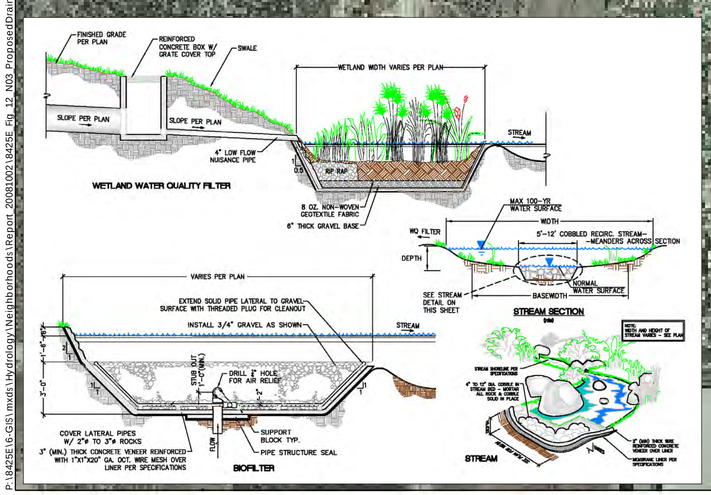
WQ Basin 11

WQ Basin 12

WQ Basin 13

WQ Basin 14

WQ Basin 15



Master Drainage Plan
Neighborhood 3

TITLE

Lytle Creek Ranch

JOB

RIALTO

CA

SCALE	1"= 500'
DESIGNED	CD
DRAWING	PC
CHECKED	SP
DATE	09/29/08
JOB NO.	8425-E

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FOUNTAIN VALLEY, CA 92708
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FIGURE

12

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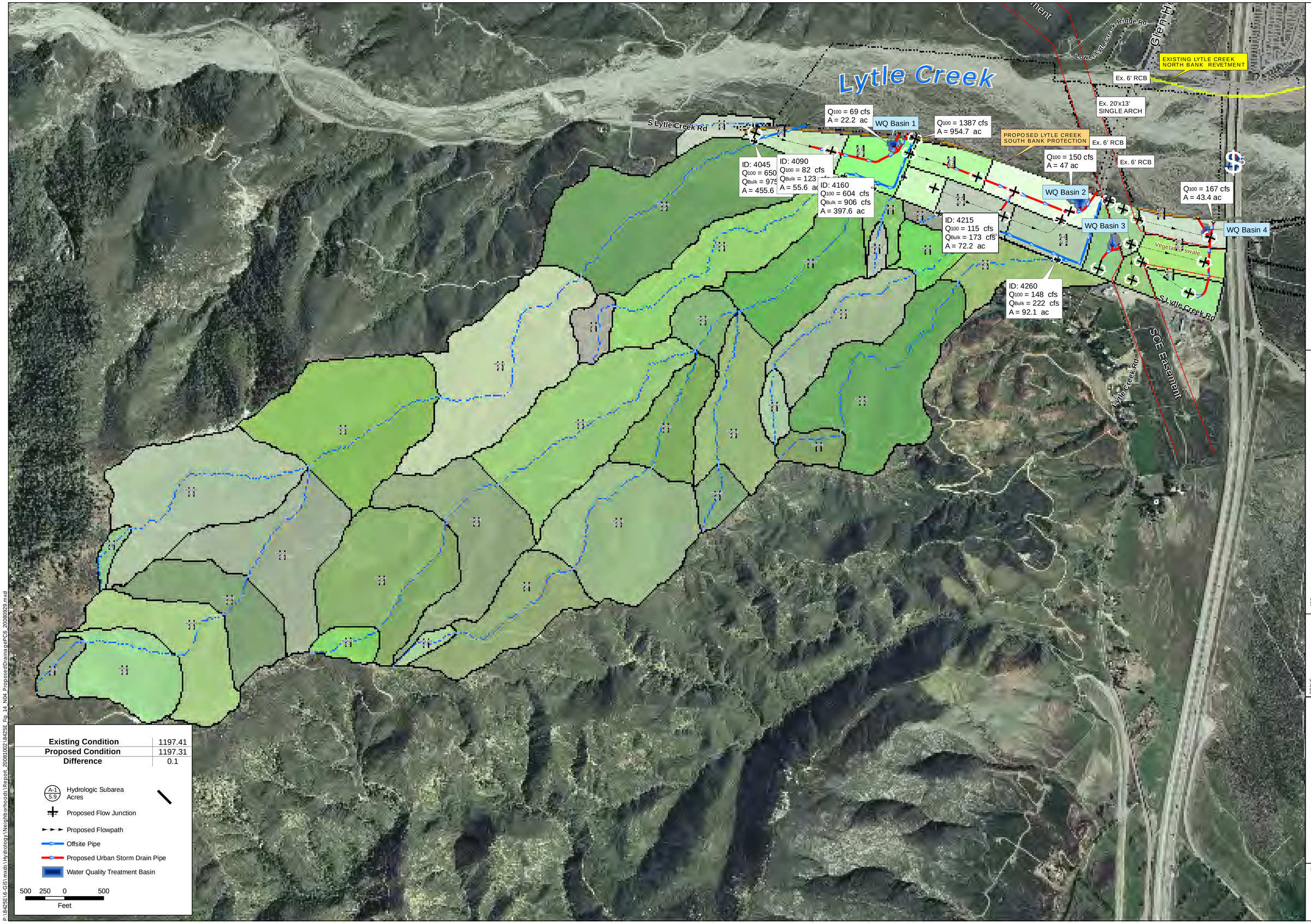

TITLE

Master Drainage Plan
Neighborhood 4

JOB

Lytle Creek Ranch

RIALTO CA

SCALE	1"=250'
DESIGNED	CD
DRAWING	PC
CHECKED	SP
DATE	09/29/08
JOB NO.	8425-E

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FIGURE

14

P:\8425E\6-GIS\mxds\Hydrology\Neighborhoods\Report 20081002\8425E Fig 14 N04 ProposedDrainagePC6 20080929.mxd

Appendix III-C-B

Geoscience Support Services Evaluation of Ground Water Impacts from the Proposed Lytle Creek Ranch Development

September 30, 2008

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EVALUATION OF GROUND WATER IMPACTS FROM THE PROPOSED LYTLE CREEK RANCH DEVELOPMENT

Prepared for: Lytle Development Company

September 30, 2008

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EVALUATION OF GROUND WATER IMPACTS FROM THE PROPOSED LYTLE CREEK RANCH DEVELOPMENT

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3	Ground Water Elevations and Hydrographs
4	Current Ambient TDS and Nitrate Concentrations
5	Well Locations in the Vicinity of the Lytle Creek Ranch Development
6	Historical and Proposed Spreading Locations
7	Lytle Creek Recharge Offset Amounts vs. TDS of Recharge Water, Lytle Creek North Wastewater Recycling Plant – Effluent Discharge Rate = 1,953 acre-ft/yr and TDS = 470 mg/L

APPENDIX

Ltr.	Description
A	Curve Number Values used for Existing and Proposed Project Conditions

EVALUATION OF GROUND WATER IMPACTS FROM THE PROPOSED LYTLE CREEK RANCH DEVELOPMENT

1.0 INTRODUCTION

Pacific Advanced Civil Engineering (PACE) was contracted in early 2008 by Lytle Development Company to prepare a Water Quality Management Plan (WQMP) in compliance with Santa Ana Regional Water Quality Control Board Order Number R8-2002-0012 (NPDES Permit No. CAS618036) for the Lytle Creek Ranch Development designated as Neighborhoods 1-4 (see Figure 1). The WQMP was finalized, after receiving comments, in June 2008.

This report has been prepared to address potential impacts from the project on ground water resources. The report also relied on the proposed drainage and stormwater management analysis provided in the WQMP.

1.1 Project Description

Lytle Development Company's proposed Lytle Creek Ranch development is located in an unincorporated part of San Bernardino County south of Devore, north of the Cities of Fontana and Rialto, and adjacent to Lytle Creek at the Interstate 15 (I-15) crossing over Lytle Creek (see Figure 1). The development comprises four neighborhoods:

Neighborhood 1	417.2 acres either side of I-15 at Glen Helen Parkway.
Neighborhood 2	801.8 acres east of the I-15 at Sierra Avenue and bounded by El Rancho Verde golf course to the southeast.
Neighborhood 3	968.8 acres east of I-15 at Sierra Avenue.
Neighborhood 4	259.5 acres west of I-15 at Sierra Avenue.

A summary of landuse for each of the planned neighborhoods is provided in the following table.

Summary of Landuse – Lytle Creek Ranch Development

Neighborhood	Landuse	Area [Acres]	Number of Dwellings
1	Open Space	176.0	0
	OS/Recreation	11.0	0
	Residential	172.0	942
	Mixed Use	12.0	336
	Roadways	46.2	0
2	Open Space	176.0	0
	OS/Recreation	226.0	0
	Residential	334.0	2567
	Mixed Use	24.2	364
	Roadways	41.6	0
3	Open Space	396.0	0
	OS/Recreation	70.8	0
	OS/Park/School	17.0	0
	Residential	334.0	2704
	Mixed Use	87.8	625
	Roadways	39.2	0
	School	24.0	0
4	Open Space	160.0	0
	OS/Recreation	21.0	0
	Residential	54.0	869
	Mixed Use	17.0	0
	Roadways	7.5	0
	Total	***2447.3***	***8407***

Source of Data: PACE (2008a)

Summary of Percent Landuse Type Throughout Entire Development

Landuse	Area [Acres]	Total Landuse [Percent]
Open Space	908.0	37%
OS/Recreation	328.8	13%
OS/Park/School	17.0	1%
Residential	894.0	37%
Mixed Use	141.0	6%
Roadways	134.5	5%
School	24.0	1%
Total	***2447.3***	***100%***

The proposed development is expected to be fully operational by 2030, while some individual phases would become operational prior to that date.

1.2 Project Setting

The proposed development is located within the Lytle Creek Subbasin of the Santa Ana River Watershed (see Figure 1). Ground water in the subbasin meets State drinking water quality requirements and has been used for public water supply by local water agencies for nearly 100 years, with no need for formal water treatment. The Lytle Creek Wash consists of highly permeable materials, with percolation rates on the order of 3 ft/day (GEOSCIENCE, 2007). The ground water basin underlying the development is the Lytle Basin which has a storage volume of 324,000 acre-ft (GEOSCIENCE, 2004).

1.2.1 Geology

The Lytle Basin is located within the Upper Santa Ana River Valley, north of the San Jacinto Fault Zone and south of the San Gabriel and San Bernardino Mountains (see Figure 1). The basin is composed of alluvial fan and river channel deposits consisting of younger and older alluvium. The four project neighborhoods overlie a number of unconsolidated sedimentary deposits, with Neighborhood 1 also overlying some hard rock formations. The underlying geology for each neighborhood is listed below and shown in Figure 2a:

Neighborhood 1 very young wash deposits, very young alluvial fan deposits, young alluvial fan deposits, very old alluvial deposits, grandiosity of Telegraph Peak, mylonitized leucogranite, leucocratic muscovite monzogranite, pelona schist, and metasedimentary schist and gneiss.

Neighborhood 2 very young wash deposits, very young alluvial fan deposits, young alluvial fan deposits, and young alluvial valley deposits.

Neighborhood 3 very young wash deposits, very young alluvial fan deposits, young alluvial fan deposits, and young alluvial valley deposits.

Neighborhood 4 very young wash deposits, very young alluvial fan deposits, young alluvial fan deposits, young alluvial valley deposits, and old alluvial fan deposits.

1.2.2 Hydrology

Precipitation in the area averages approximately 16 inches per year. The distribution of historical precipitation can be seen in the cumulative departure from the mean annual precipitation chart shown on Figure 1. Most rainfall occurs between October and April each year.

Lytle Creek is the main surface water feature crossing the project area. Lytle Creek is a "flashy" stream with an average base flow of 30 acre-ft per day. The distribution of stream flow in Lytle Creek is shown on the insets of Figure 1 (note the smaller inset chart on Figure 1 is a zoomed in version of the main streamflow chart).

1.2.3 Topography

Surface elevations in the Lytle Basin range from 2,400 ft in the northwestern-most alluvial fans flanking the San Gabriel Mountains, to 1,200 ft above mean sea level (amsl) at the basin's southeastern boundary. This boundary is delineated by a concealed fault labeled Barrier G (see Figure 2a; Dutcher and Garret, 1963).

Summary of Surface Elevations
For Lytle Creek Ranch Neighborhoods 1 – 4

Neighborhood	Elevation, ft above mean sea level			
	Minimum	Maximum	Range	Average
1	1,906	2,336	430	2,045
2	1,352	1,614	262	1,495
3	1,614	2,001	387	1,836
4	2,008	2,195	187	2,085

1.2.4 Ground Water Recharge and Discharge

Lytle Creek originates in the San Gabriel Mountains and is the major tributary to Lytle Basin. Minor ground water recharge to Lytle Basin is also supplied by infiltration in the Cajon Creek stream channel and underflow across the Loma Linda Fault (Dutcher and Garrett, 1963). Ground water flow generally follows the slope of the land – from the northwest to the southeast (see Figure 3). Numerous faults transect the area, which tend to compartmentalize ground water flow.

Other sources of recharge in Lytle Basin include underflow from saturated alluvium and fractures within the surrounding bedrock hills, artificial recharge of native waters at spreading grounds along Lytle Creek, intermittent flow from Bunker Hill-A Basin across the Loma Linda Fault, and deep percolation of precipitation.

Artificial recharge of native waters at spreading grounds along Lytle Creek has historically been practiced by forming low level earth berms to retain diverted flows during the wet winter period (see Figure 4). A 1995 study by GEOSCIENCE found that during the years 1980 to 1992, when there were approximately 43 acres of active recharge ponds in Lytle Basin, the average annual recharge to ground water was approximately 13,000 acre-ft/yr, and the maximum daily percolation rate in the system of basins and interconnecting channels was 1,380 acre-ft/day. This report also estimated that if water were available, the maximum daily percolation rate in the main

channel of Lytle Creek was approximately 980 acre-ft/day. Since the temporary berm structures were destroyed by high flow storm events over the past 20 years, there is currently no active engineered artificial recharge basins within the Lytle Basin.

1.2.5 Ground Water Basin Compartments and Flow Barriers

The southwestern and northeastern boundaries of Lytle Basin are delineated by faults which are for the most part leaky barriers to ground water flow. These barriers have been identified based on ground water level differences on opposite sides of the faults (Dutcher and Garrett, 1963)[1]. To the southwest, the Lytle Basin is separated from the Rialto Basin by the San Jacinto Fault and its northwestern extension, Barrier E (see Figure 2a). To the northeast and east, the Loma Linda Fault and Barrier G act as barriers to ground water flow and separate the Lytle and Bunker Hill-A Basins (Dutcher and Garrett, 1963). On the northwest, the Lytle Basin is bounded by the San Gabriel Mountains.

Lytle Basin also contains interior barriers which separate the Basin into six compartments (Dutcher and Garrett, 1963). The proposed development overlies a number of ground water compartments (see Figure 2a). Neighborhood 1 and 4 are upgradient of Barrier J, while Neighborhood 3 is bisected by Barrier J, and Neighborhood 2 is downgradient of Barrier J. Neighborhoods 2, 3 and 4 are all west of Barrier A, with Neighborhood 1 bisected by Barrier A.

The faults and barriers displayed on Figure 2a were those delineated by Wildermuth (2000) for use in defining management zone boundaries. Sources of data used to derive these faults and barriers were: Eckis, 1934; Gleason, 1947; Burnham and Dutcher, 1960; Dutcher and Garrett, 1963; Dutcher and Fenzel, 1972; Izbicki et al., 1998. Note that this report on ground water

[1] The barrier effect of the faults is believed to be due to the presence of highly cemented zones and clayey fault gouge and/or offset of strata as the result of faulting. The barriers serve to impede ground water flow in varying degrees with effects being most pronounced in the older alluvium which underlies unconsolidated younger alluvium in the study area. It is believed that the ability of the faults to act as ground water barriers diminishes considerably in the younger alluvium. However, during periods of heavy pumping, ground water levels decline well below the younger alluvium and the barriers become quite effective in governing ground water movement (GEOSCIENCE, 1990).

impacts does not include analysis of the activity of the faults, but rather focuses on their influence on ground water movement. Reports on the age of last fault movement, seismic activity, and required setbacks for the neighborhoods have been prepared by GeoSoils, Inc. (1994, 2006, 2007, and 2008).

1.2.6 Ambient Ground Water Quality

Wildermuth (2000) calculated current ambient concentrations of total dissolved solids (TDS) and nitrate for each ground water basin (also referred to as ground water management zones) within the Santa Ana River Watershed. These basin-wide ambient concentrations are reported in the proposed Basin Plan amendment (RWQCB, 2004). In the Lytle Basin, the current average ambient concentration of TDS is 240 mg/L, and nitrate (as Nitrogen) is 2.8 mg/L. Figure 4 shows the water quality contours of TDS and nitrate used to estimate basin-wide ambient water quality concentrations.

2.0 DRAINAGE AND STORMWATER MANAGEMENT

2.1 Existing Conditions

Presently, the land where the proposed development is to be constructed is undeveloped alluvial floodplain or undeveloped foothills (PACE, 2008a). Where vegetation occurs, it is usually moderate dense native scrub-type vegetation. Granite outcrops are common with soils comprising pervious coarse to very coarse graded sand.

The WQMP prepared by PACE (2008a) states that the pollutants of concern for the proposed development in its existing condition are pathogens.

2.2 Proposed Project Conditions

In general, the stormwater management system improvements for all four neighborhoods comprises a closed conduit storm drain system capable of conveying debris from the offsite watershed, and an onsite closed conduit storm drain and/or open channel conveyance systems. A water quality management system will also be used to treat non-storm and small-storm runoff before being discharged to the Sycamore and/or Lytle Creeks (Sycamore Creek is a tributary of Lytle Creek).

Runoff from residential lots will be directed into onsite landscaped areas and vegetated swales, with flows directed over sidewalks and into the parkway areas, which will be planted with street trees and turf. Flows in the parkway areas will be directed into the street gutter for conveyance to downstream catch basin interception, eventually leading to the various BMP swales or BMP basins designed within the project. Extended dry detention basins (or catch basins), wet ponds, vegetated swales, biofilters and water quality filters will be provided throughout the project to capture nuisance flow, runoff from a 2-year storm or less, and the first flush stormwater runoff from storms larger than the 2-year storm event. The table below summarizes existing and developed project drainage.

Drainage and Stormwater Control – Existing and Developed Conditions

Neighborhood	Planning Area	Existing Condition	Stormwater Control after Development
1	1 to 5	Onsite and offsite runoff intercepted in natural channels	Open channels discharge to existing freeway culverts that discharge to undeveloped open space adjacent to I-15
	8	East to west drainage to open space enclosed by I-15 on west, Glen Helen Parkway on the north and Clearwater Parkway on east	Dual storm drain and channel conveyance system to capture and convey runoff to the open space described under existing conditions. Onsite non-storm and storm runoff storm drainage system will discharge to dry extended detention basins for treatment and pollutant removal. Once treated it will be conveyed to open space described under existing conditions
	13 and 15	Both onsite and offsite flow is intercepted and conveyed west of Glen Helen Parkway via existing channels and culverts, discharging storm runoff into existing dry extended detention basin open space area east of I-15.	Same as existing condition. Onsite flow will be routed through a dry extended detention basin and then to open space after treatment
2	All	Storm runoff occurs as sheet flow, with some minor natural ditches and swales. Flow is tributary to Lytle Creek.	Storm water conveyance consists of underground storm drains, golf course channels, and detention/conveyance ponds. One dry extended detention BMP basin for onsite storm and nuisance runoff Southeasterly portion of Neighborhood 3 will be connected to Neighborhood 2. The storm drain from Neighborhood 3 will pass through Neighborhood 2 and discharge into Lytle Creek
3	All	Storm runoff occurs as sheet flow, with some minor natural ditches and swales. Flow is tributary to Lytle Creek.	A plastic-lined drainage corridor/channel will convey non-storm, nuisance and storm runoff from west to east. The corridor will feature a number of small interconnected ponds that include a recirculating stream that will allow for treatment of nuisance flows and small storms. Each pond will have wetland filters and/or biofilters to treat water. Most runoff generated will discharge to Lytle Creek via the drainage corridor. The southeastern portion will pass through Neighborhood 3 as discussed above.

Neighborhood	Planning Area	Existing Condition	Stormwater Control after Development
4	All	A large 1,103 acre, generally undeveloped catchment south of the neighborhood which discharges through the development and into Lytle Creek, mainly as sheet flow. Due to the steepness and undeveloped nature of the offsite catchment, considerable debris is expected.	Runoff from the offsite catchment will be intercepted south of Lytle Creek Road and conveyed via a closed conduit storm drain discharging into Lytle Creek. Non-storm and storm related onsite runoff will be conveyed to onsite storm drain system, which will discharge to dry extended detention basins for treatment, and ultimately into Lytle Creek.

Note: if more detail on the proposed stormwater systems is required, the reader is referred to the Water Quality Management Plan prepared by PACE (2008a)

Because of the dry extended detention basins, only large storms would discharge directly into Sycamore or Lytle Creek. Water retained in dry extended detention basins has an opportunity to infiltrate and recharge the ground water basin. (WQMP states maintenance of the detention basins will occur when they take longer than 72 hours to drain)

3.0 POTENTIAL PROJECT IMPACTS TO GROUND WATER LEVELS AND STORAGE

The change in land cover due to the development affects the amount of areal recharge and runoff infiltrating below the ground surface. Given the stormwater controls proposed for the project, the following sections discuss potential impacts to ground water storage as a result of the proposed development.

3.1 Existing Conditions vs. Proposed Project Conditions

The change in potential infiltration within the footprint of each neighborhood was estimated by PACE (2008c) using the SCS (Soil Conservation Service) method using average monthly precipitation:

Infiltration (I) = P-Q ……(1)

$$Q = \frac{(P - 0.2S)^2}{P + 0.8S} \text{.....(2)}$$

$$S = \frac{1000}{CN} - 10 \text{.....(3)}$$

where:

P = Average monthly precipitation (inches)

Q = Average monthly runoff depth (inches)

S = Potential retention

CN = Curve number (based on the soil group and landuse, see Appendix A)

In the months when precipitation is low (i.e., May – October), the initial abstraction (0.2*S*) is greater than the precipitation depth *P*, and therefore the runoff volume (*Q*) is zero. During these months when there is no runoff, existing and proposed project infiltration will be the same.

The tables below summarize results of the SCS method to estimate infiltration (Pace, 2008c).

Summary of Average Monthly Infiltration Estimated Using the SCS Method
Neighborhood 1

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
		Existing			**Proposed**		
Month	***P* (in.)**	***Q* (in.)**	***I* (in.)**	**Infiltration Volume (acre-ft)**	***Q* (in.)**	***I* (in.)**	**Infiltration Volume (acre-ft)**
Jan	3.14	0.39	2.75	95.8	0.70	2.44	84.8
Feb	3.44	0.51	2.93	102.0	0.87	2.57	89.5
Mar	2.61	0.21	2.40	83.6	0.44	2.17	75.6
Apr	1.45	0.00	1.45	50.3	0.05	1.40	48.7
May	0.44	0.00	0.44	15.3	0.00	0.44	15.3
Jun	0.1	0.00	0.10	3.5	0.00	0.10	3.5
Jul	0.04	0.00	0.04	1.4	0.00	0.04	1.4
Aug	0.17	0.00	0.17	5.9	0.00	0.17	5.9
Sep	0.37	0.00	0.37	12.9	0.00	0.37	12.9
Oct	0.73	0.00	0.73	25.4	0.00	0.73	25.4
Nov	1.15	0.00	1.15	40.0	0.01	1.14	39.7
Dec	2.81	0.27	2.54	88.4	0.53	2.28	79.2
Total		1.37	15.08	524.42	2.59	13.86	481.74

Change due to project: 481.74-524.42 = -43 acre-ft/yr

Summary of Average Monthly Infiltration Estimated Using the SCS Method
Neighborhood 2

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
		Existing			**Proposed**		
Month	***P* (in.)**	***Q* (in.)**	***I* (in.)**	**Infiltration Volume (acre-ft)**	***Q* (in.)**	***I* (in.)**	**Infiltration Volume (acre-ft)**
Jan	3.14	0.21	2.93	197.6	0.53	2.61	176.5
Feb	3.44	0.30	3.14	211.9	0.67	2.77	187.1
Mar	2.61	0.09	2.52	170.1	0.31	2.30	155.6
Apr	1.45	0.00	1.45	98.0	0.02	1.43	96.8
May	0.44	0.00	0.44	29.7	0.00	0.44	29.7
Jun	0.1	0.00	0.10	6.8	0.00	0.10	6.8
Jul	0.04	0.00	0.04	2.7	0.00	0.04	2.7
Aug	0.17	0.00	0.17	11.5	0.00	0.17	11.5
Sep	0.37	0.00	0.37	25.0	0.00	0.37	25.0
Oct	0.73	0.00	0.73	49.3	0.00	0.73	49.3
Nov	1.15	0.00	1.15	77.7	0.00	1.15	77.7
Dec	2.81	0.13	2.68	180.9	0.39	2.42	163.8
Total		0.74	15.71	1061.24	1.91	14.54	982.57

Change due to project: 982.57-1061.24 = -79 acre-ft/yr

Summary of Average Monthly Infiltration Estimated Using the SCS Method
Neighborhood 3

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
		Existing			**Proposed**		
Month	***P* (in.)**	***Q* (in.)**	***I* (in.)**	**Infiltration Volume (acre-ft)**	***Q* (in.)**	***I* (in.)**	**Infiltration Volume (acre-ft)**
Jan	3.14	0.28	2.86	230.6	0.72	2.42	195.1
Feb	3.44	0.39	3.05	246.5	0.89	2.55	205.7
Mar	2.61	0.14	2.47	199.7	0.45	2.16	174.0
Apr	1.45	0.00	1.45	117.1	0.05	1.40	112.6
May	0.44	0.00	0.44	35.5	0.00	0.44	35.5
Jun	0.1	0.00	0.10	8.1	0.00	0.10	8.1
Jul	0.04	0.00	0.04	3.2	0.00	0.04	3.2
Aug	0.17	0.00	0.17	13.7	0.00	0.17	13.7
Sep	0.37	0.00	0.37	29.9	0.00	0.37	29.9
Oct	0.73	0.00	0.73	58.9	0.00	0.73	58.9
Nov	1.15	0.00	1.15	92.8	0.01	1.14	92.0
Dec	2.81	0.19	2.62	211.8	0.55	2.26	182.4
Total		0.99	15.46	1247.83	2.69	13.76	1111.21

Change due to project: 1111.21-1247.83 = -137 acre-ft/yr

Summary of Average Monthly Infiltration Estimated Using the SCS Method
Neighborhood 4

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
		Existing			**Proposed**		
Month	***P* (in.)**	***Q* (in.)**	***I* (in.)**	**Infiltration Volume (acre-ft)**	***Q* (in.)**	***I* (in.)**	**Infiltration Volume (acre-ft)**
Jan	3.14	0.39	2.75	59.5	0.67	2.47	53.3
Feb	3.44	0.51	2.93	63.4	0.84	2.60	56.3
Mar	2.61	0.21	2.40	52.0	0.42	2.19	47.4
Apr	1.45	0.00	1.45	31.3	0.04	1.41	30.4
May	0.44	0.00	0.44	9.5	0.00	0.44	9.5
Jun	0.1	0.00	0.10	2.2	0.00	0.10	2.2
Jul	0.04	0.00	0.04	0.9	0.00	0.04	0.9
Aug	0.17	0.00	0.17	3.7	0.00	0.17	3.7
Sep	0.37	0.00	0.37	8.0	0.00	0.37	8.0
Oct	0.73	0.00	0.73	15.8	0.00	0.73	15.8
Nov	1.15	0.00	1.15	24.9	0.01	1.14	24.7
Dec	2.81	0.27	2.54	54.9	0.51	2.30	49.8
Total		1.38	15.07	325.92	2.49	13.96	301.99

Change due to project: 301.99-325.92 = -24 acre-ft/yr

Explanation of Table Data

[1]	Month
[2]	Average monthly precipitation from California Data Exchange Center (2008) for San Bernardino Med Center precipitation station
[3] and [6]	See Equation 2
[4] and [7]	See Equation 1
[5] and [8]	[4] or [7] /12*Neighborhood area (Neighborhood 1 = 417.2 acres; Neighborhood 2 = 801.8; Neighborhood 3 = 968.8, Neighborhood 4 = 259.5)

Given the pathway stormwater will take through each neighborhood, the use of extended dry detention basins will allow for some infiltration to the underlying aquifers, and ultimate discharge into Lytle or Sycamore Creek. The impacts of the proposed project on ground water storage are summarized below:

Neighborhood 1 The change in landuse and use of stormwater drains will reduce the potential for infiltration, however all onsite and offsite flow will discharge to the existing open space area and dry extended detention basin east of I-15. Overall there will be a decrease in infiltration of approximately 42 acre-ft per year (i.e., 8% reduction from existing conditions).

Neighborhood 2 Runoff may have a chance to infiltrate and recharge the underlying aquifers basin in the extended dry detention basins. Ponds that are lined will not allow infiltration, and will result in more discharge to surface water (Lytle Creek). Overall there will be a decrease in infiltration of approximately 79 acre-ft per year (i.e., 7% reduction from existing conditions).

Neighborhood 3 As the drainage corridor and some ponds will be lined, there will be less infiltration and recharge to the underlying aquifers. Additionally, recirculation will result in more evaporation. The portion of runoff in the southeast of the neighborhood that is conveyed through Neighborhood. 2

will not have an opportunity to infiltrate after leaving Neighborhood 3 as it will be conveyed in a storm drain and discharged into Lytle Creek adjacent to Neighborhood 2. As a result of these stormwater controls, an increase in surface discharge is expected. Overall there will be a decrease in infiltration of approximately 152 acre-ft per year (i.e., 11% reduction from existing conditions).

Neighborhood 4 Water may have a chance to infiltrate and recharge the underlying aquifers if ponds are unlined. Offsite catchment runoff will behave the same until Lytle Creek Road, thereafter as it will be collected in a storm drain, which will lessen the chance of infiltration. The result will be increased discharge to Lytle Creek. Onsite runoff will only have a chance to infiltrate and recharge the underlying aquifers when in the dry extended detention basins. Overall there will be a decrease in infiltration of approximately 24 acre-ft per year (i.e., 7% reduction from existing conditions).

The total change in infiltration from existing to proposed project conditions for all four neighborhoods amounts to a decrease of just less than 300 acre-ft per year.

3.2 Impact on Nearby Wells

Figure 5 shows the locations of production wells in the vicinity of the development. Collectively, the wells in the Lytle Creek wash area are planned to produce over 20,000 acre-ft per year[2]. The natural and planned artificial recharge required to sustain this production in the future is large compared to the relatively small amount of infiltration lost due to the project. In

[2] Upper Santa Ana River Integrated Regional Water Management Plan (2008).

addition, the 300 acre-ft per year infiltration loss will be more than made up by new artificial recharge planned as part of the offset program (see Section 3.3).

Similarly, wells downgradient from the development should not be impacted by the small reduction in infiltration (due to the project). Firstly, a portion of the lost recharge will be recovered by infiltration of the increased project surface flow in Lytle Creek, and secondly, the downgradient wells will benefit from additional recharge provided by the offset program.

3.3 Mitigation of Reduced Ground Water Recharge

3.3.1 Mitigation Due to Increased Surface Run-off

Even though there is a decrease in infiltration due to the development, there is an increase in runoff to surface water (i.e., Lytle and Sycamore Creeks). As an example, the post project 100 year storm estimated by PACE (2008b) for Lytle Creek is 7,789 cubic feet per second (cfs) which can be compared to 5,799 cfs prior to the development, an increase of 34 %. The average time of concentration (Tc) is 30 minutes resulting in an additional volume of 82 acre-feet for the 30 minute period. The post project 100 year storm estimated by PACE (2008b) for Sycamore Creek watershed is 2,771 feet per second (cfs) which can be compared to 2,028 cfs prior to the development, an increase of 26.8 % or an additional volume of approximately 23 A-F for the 22.4 minute time of concentration period.

According to PACE (2008b), the storm water control system is designed to hold the 2-day, one hour storm as well as dry weather flows. Surface flow through the water quality control system will, as stated previously, result in some infiltration as the water flows through the series of planned dry detention basins and biofilters. Water not infiltrated will result in increased run-off to Lytle and Sycamore Creeks. Dry weather flows including nuisance water, not present before the project development will be infiltrated and evaporated. Flows beyond the 2 day, 1-hour flow will be directed to the Lytle and Sycamore Creek streambeds.

Given the fact that Lytle Creek Wash consists of highly permeable materials with a percolation rate of approximately 3 ft/day, the additional water discharged to the Sycamore and Lytle Creeks creek will be recovered by infiltration through the Sycamore and Lytle Creek wash areas becoming ground water recharge.

3.3.2 Mitigation Due to Proposed Stream flow Diversions

The minor reduction in ground water recharge (a portion of the 300 acre-ft per year) due to development will be further mitigated by increased recharge of native Lytle Creek flow through the proposed TDS offset program[3]. The TDS offset program has been developed to enable San Bernardino County Special Districts Department (who are responsible for treatment of wastewater from the project) to offset discharges of total dissolved solids (TDS) from the Lytle Creek North Wastewater Recycling Plant (WRP) that exceed both the Basin Plan water quality objective of 260 mg/L and current ambient concentration of 240 mg/L.

In lieu of assigning assimilative capacity to the WRP, the Santa Ana Regional Water Quality Control Board (Regional Board) has mandated a TDS offset program as part of the draft Waste Discharge Requirements (WDRs) for the plant (Order No. R8-2007-0004). The proposed offset program will consist of a number of artificial recharge facilities that would divert Lytle Creek stream flow in excess of diversions by both Southern California Edison Company (SCE) for its hydroelectric project and by Fontana Water Company for water supply. The CEMEX gravel mining pits overlying Lytle Creek Wash (see Figure 6) are the planned location of the proposed recharge basins for the offset program.

GEOSCIENCE (2007) prepared a TDS Offset Report that outlined the proposed program. Figure 7 shows the quantity of recharge that would be required for recharge water of variable TDS concentration, under the estimated full capacity WRP operations of 1,953 acre-ft/yr

[3] Santa Ana Regional Water Quality Control Board Order No. R8-2007-0004 and report titled Proposed TDS Offset Program for Lytle Creek North Wastewater Recycling Plant (GEOSCIENCE, 2007).

discharges containing 470 mg/L TDS. For example, if recharge water contained 169 mg/L TDS (average value), it would take 6,325 acre-ft/yr of recharge to offset the plant discharges to the proposed effluent limitation of 240 mg/L.

Based on planned discharges from the Lytle Creek North WRP, the proposed offset credit will be calculated to be percolation of ground water that would not have occurred in the absence of the engineered recharge facilities (e.g., basins and pits). It is important to note that in years of average or below-normal precipitation, there may be little to no additional Lytle Creek stream flow available for recharge to Lytle Basin. However, during normal and above-normal precipitation in the Lytle Creek drainage area, there will be more than sufficient recharge available to be diverted into the new engineered artificial recharge basins.

Based on the planned amount of recharge to offset plant discharges (i.e., over 2,000 acre-ft per year), this amount will be more than enough to mitigate the loss of infiltration potential due to the changed landuse caused by the development.

4.0 POTENTIAL PROJECT IMPACTS TO GROUND WATER QUALITY

The WQMP prepared by PACE (2008a) identifies that the pollutants of concern for the proposed development in its existing condition are pathogens. The report further identifies the following pollutants of concern after development:

- Bacteria/virus,
- Heavy metals,
- Nutrients,
- Pesticides,
- Organic compounds,
- Sediments,
- Trash and debris,
- Oxygen demanding substances, and
- Oil and grease.

PACE includes the following treatment control BMPs in the WQMP (2008a) to address the pollutants of concern:

1. Biofilters: Submerged gravel bed biofilters beneath the lake. Water is drawn from one end of the lake by a biofilter pump and discharged via pipeline under the lake, to each biofilter. The biofilter has a high surface area that provides high biological activity that has the ability to convert ammonia to nitrites and then to nitrogen gas, reduce biological oxygen demand, add oxygen, remove carbon dioxide, remove excess nitrogen and other inert gases, remove turbidity and clarify water, and remove various organics.
2. Extended Dry Detention Basins: Aid in removal of pollutants by settling or sedimentation, infiltration, adsorption to sediments, vegetation or detritus, filtration by plants, microbial uptake and/or transformation, and uptake by wetlands plants or algae.
3. Vegetated Swales: Open shallow channels with vegetated bottom and side slopes that collect and slowly convey runoff to downstream discharge points. Runoff is treated through filtering by the vegetation in the channel, and filtering through the subsoil.

4. Wet Ponds or Wetlands: Uses physical and biological methods of treatment. The system will consist of aquatic vegetation essential to promote pollutant removal by sedimentation and root penetration. As runoff bypasses aquatic vegetation in the ponds, flow velocity is reduced allowing pollutants to settle for enhanced percolation or be absorbed by the plant root structure in the vadose zone through biological uptake. Pollutants captured in the soil are allowed to degrade or recharge into the ground water.

Neighborhood 1 Ground water quality will be addressed by water quality basins and vegetated swales

Neighborhood 2 Ground water quality will be addressed by water quality basin and vegetated swales

Neighborhood 3 Ground water quality will be addressed by water quality basins, vegetated swales, biofilters and wetlands treatment

Neighborhood 4 Ground water quality will be addressed by water quality basin and vegetated swales

Given the proposed treatment controls provided for in the WQMP, there still may be a relatively small fraction of pollutants, which discharge from the development. However, regular maintenance of detention basins (i.e., removal and disposal of accumulated sediments), as outlined in the WQMP, will help minimize loading of pollutants in underlying soils. Depth to ground water can also vary between 50 to 400 ft below ground surface (see Figure 3), which provides for natural filtration prior to reaching ground water. The rise of ground water levels, during periods of active recharge, may have the effect of re-mobilizing pollutants in the vadose zone. However, given the large volume of aquifer storage relative to the runoff volumes, pollutant loading impacts, if any are expected to be insignificant.

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FIGURES

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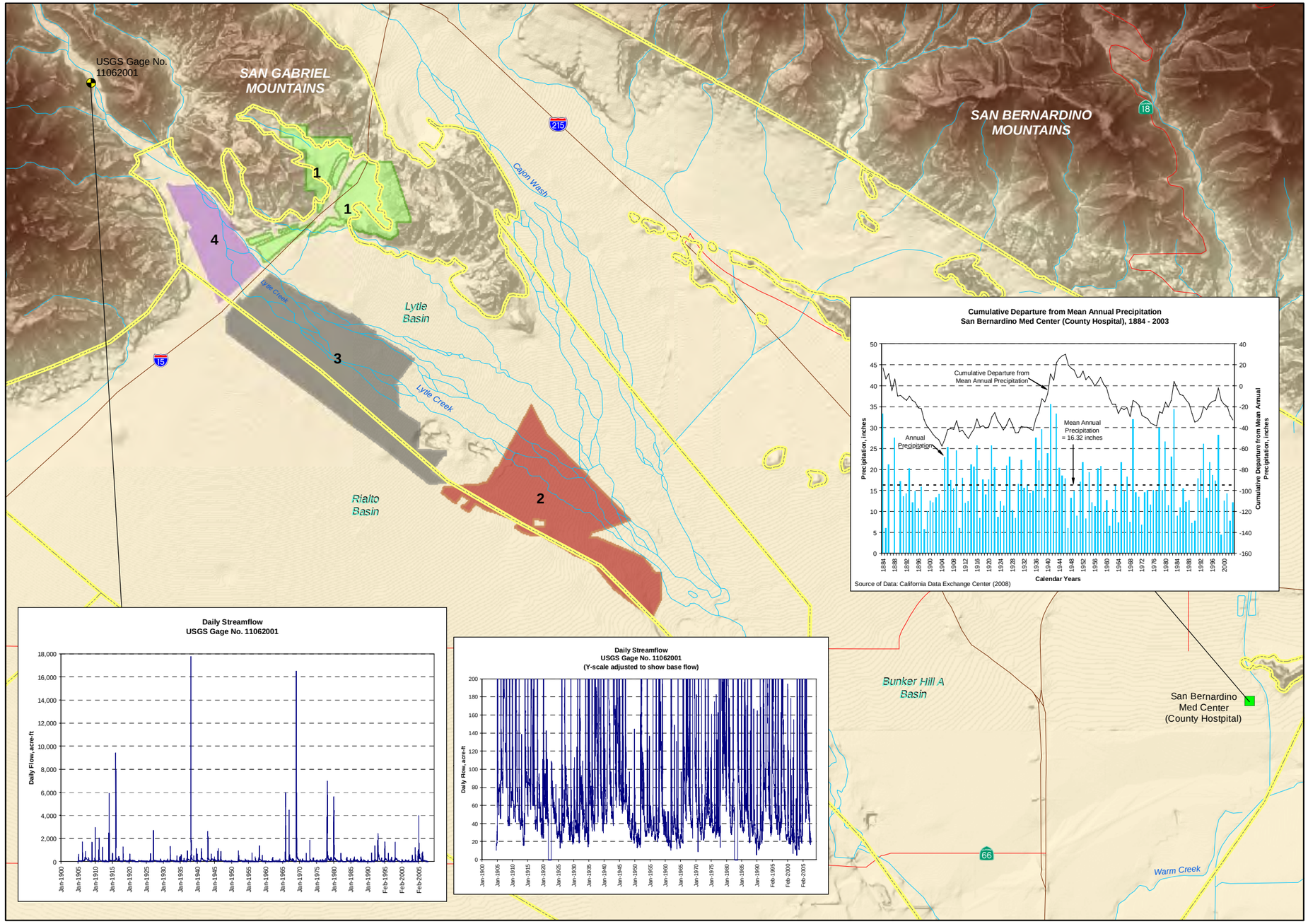
LYTLE DEVELOPMENT COMPANY

EVALUATION OF GROUND WATER IMPACTS
FROM THE PROPOSED LYTLE CREEK RANCH DEVELOPMENT



LYTLE CREEK RANCH PROJECT AREA

EXPLANATION

Lytle Creek Ranch Development Neighborhood Areas

- 1
- 2
- 3
- 4

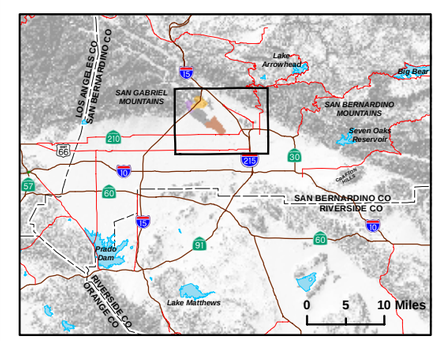
USGS Stream Gage

San Bernardino Med Center Precipitation Station

Ground Water Basins

Creeks and Streams

Sources of Data:
Precipitation - California Data Exchange Center (2008)
Streamflow - USGS (2008)
Lytle Creek Ranch Neighborhoods - Lytle Dev. Co.
Ground Water Basins - Wildermuth (2000)



30-Sep-08

Prepared by: DWB

Map Projection:
State Plane Zone V, NAD27, feet

NORTH

0 1 2 Miles

GEOSCIENCE

GEOSCIENCE Support Services, Inc.
P.O. Box 220, Claremont, CA 91711
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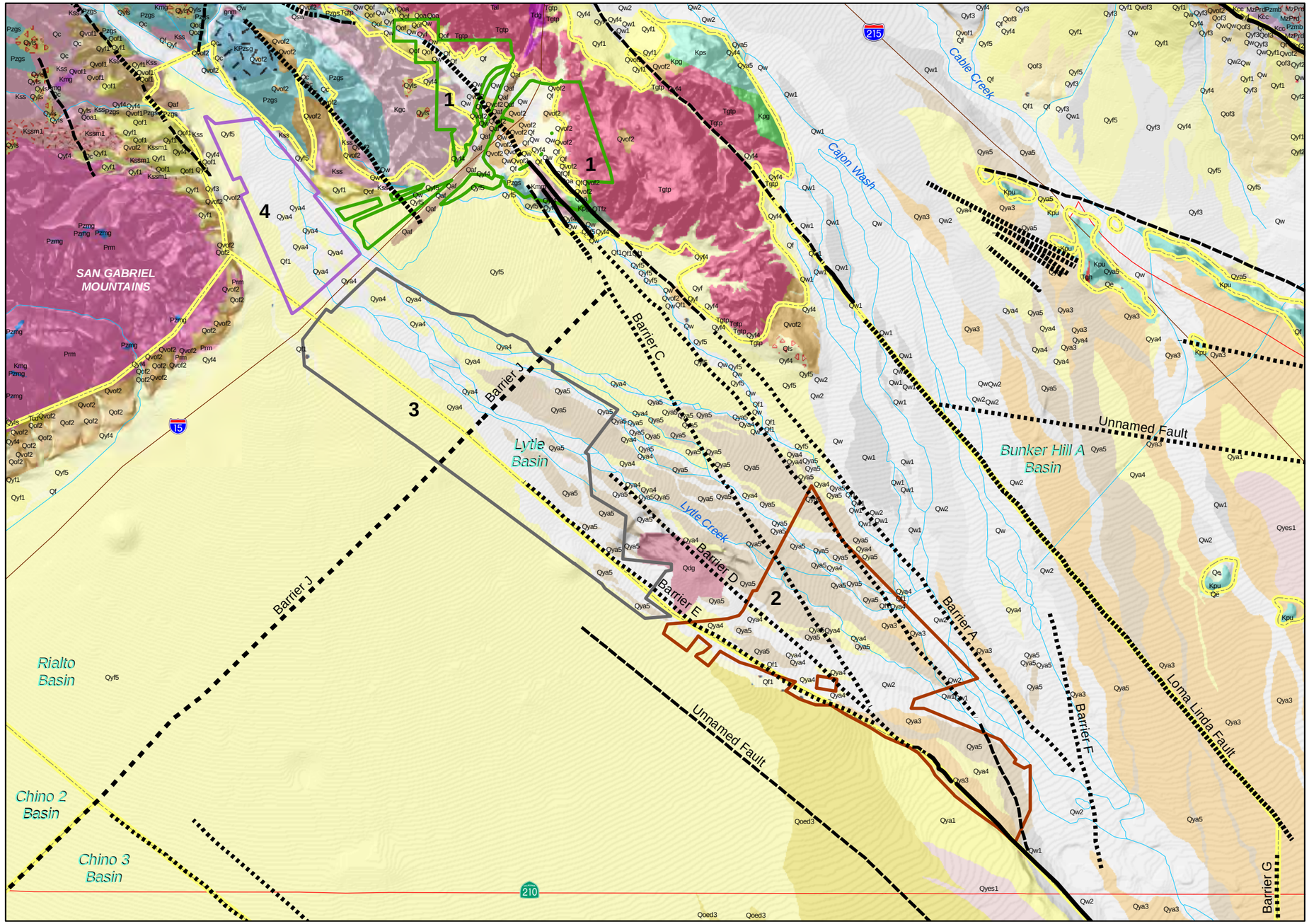
Figure 1

GIS_proj/lytle_development_gw_impact_rpt_9-08/0_lytle_Fig_1_gen_loc_9-08.mxd



GEOLOGY AND FAULTS

EXPLANATION

Lytle Creek Ranch Development Neighborhood Areas

- 1
- 2
- 3
- 4

Ground Water Basins

Fault Classifications

- Accurately Located
- Approximately Located
- Suspected Fault (Ground Water Barrier)
- Inferred
- Concealed

Creeks and Streams

Sources of Data:
Faults - Wildermuth (2000)
Geology - USGS (2006)
Lytle Creek Ranch Neighborhoods - Lytle Dev. Co.
Ground Water Basins - Wildermuth (2000)

NOTE:
Faults and barriers were delineated by Wildermuth (2000) for use in defining management zone boundaries. The report that this figure is from does not include analysis of the activity of the faults, but rather focuses on their influence on ground water movement. Reports on the age of last fault movement, seismic activity, and required setbacks for the neighborhoods have been prepared by GeoSoils, Inc. (1994, 2006, 2007, and 2008)
See Figure 2b for legend.

30-Sep-08

Prepared by: DWB

Map Projection:
State Plane Zone V, NAD27, feet

NORTH

0 0.5 1 Miles

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Figure 2a

GIS_proj/lytle_development_gw_impact_rpt_6-08/0_lytle_Fig_2a_geology_7-08.mxd

Geology from: "Geologic map of the San Bernardino and Santa Ana 30' x 60' quadrangles, California." USGS Open-File Report 2006-1217

Qdg	Disturbed ground (late Holocene)
Qaf	Artificial fill (late Holocene)
Qw	Very young wash deposits (late Holocene)
Qw2	Very young wash deposits, Unit 2
Qw1	Very young wash deposits, Unit 1
Qf	Very young alluvial-fan deposits (late Holocene)
Qf1	Very young alluvial-fan deposits, Unit 1
Qc	Very young colluvial deposits (late Holocene)
Qsw	Very young slope-wash deposits (late Holocene)
Qls	Very young landslide deposits (late Holocene)
Qe	Very young eolian deposits (late Holocene)
Qyf	Young alluvial-fan deposits (Holocene and late Pleistocene)
Qyf5	Young alluvial-fan deposits, Unit 5 (late Holocene)
Qyf4	Young alluvial-fan deposits, Unit 4 (late Holocene)
Qyf3	Young alluvial-fan deposits, Unit 3 (middle Holocene)
Qyf1	Young alluvial-fan deposits, Unit 1 (early Holocene and late Pleistocene)
Qya5	Young axial-channel deposits, Unit 5 (late Holocene)
Qya4	Young axial-channel deposits, Unit 4 (late Holocene)
Qya3	Young axial-channel deposits, Unit 3 (middle Holocene)
Qya1	Young axial-channel deposits, Unit 1 (early Holocene and late Pleistocene)
Qyls	Young landslide deposits (Holocene and late Pleistocene)
Qyes1	Young eolian deposits (sheet sand), Unit 1 (early Holocene and late Pleistocene)
Qof	Old alluvial-fan deposits (late to middle Pleistocene)
Qof3	Old alluvial-fan deposits, Unit 3 (late to middle Pleistocene)
Qof2	Old alluvial-fan deposits, Unit 2 (late to middle Pleistocene)
Qof1	Old alluvial-fan deposits, Unit 1 (middle Pleistocene)
Qoa	Old axial-channel deposits (late to middle Pleistocene)
Qoa1	Old axial-channel deposits, Unit 1 (late to middle Pleistocene)
Qoed3	Old eolian deposits (dune sand), Unit 3 (late to middle Pleistocene)
Qvof3	Very old alluvial-fan deposits, Unit 3 (middle to early Pleistocene)
Qvof2	Very old alluvial-fan deposits, Unit 2 (early Pleistocene)
Qvof1	Very old alluvial-fan deposits, Unit 1 (early Pleistocene)
Qvols	Very old landslide deposits (middle to early Pleistocene)
QTfz	Crushed rock in fault zones (Quaternary to Tertiary)
Tcd	Conglomerate and sandstone, San Sevaine Canyon area (Pliocene and Miocene)
Tdg	Olivine diabase and gabbro (Miocene)
Tal	Andesite dike rocks (Miocene)
Tgtp	Granodiorite of Telegraph Peak (Oligocene)
Tgh	Hypabyssal granitic rocks (Oligocene)
Kpu	Pelona Schist, undifferentiated (Mesozoic)
Kpg	Pelona Schist, greenstone unit
Kps	Pelona Schist, muscovite schist unit
Kmg	Monzogranite and granodiorite (Cretaceous)
Kgc	Mylonitized leucogranite (Cretaceous)
Kmm	Leucocratic muscovite monzogranite (Cretaceous)
Kss	Tonalite of San Sevaine Lookout (Cretaceous)
Kssm1	Mylonitized tonalite of San Sevaine Lookout, Unit 1 (Cretaceous)
Kpu	Pelona Schist, undifferentiated (Mesozoic)
Kpg	Pelona Schist, greenstone unit
Kps	Pelona Schist, muscovite schist unit
Kmg	Monzogranite and granodiorite (Cretaceous)
Kgc	Mylonitized leucogranite (Cretaceous)
Kmm	Leucocratic muscovite monzogranite (Cretaceous)
Pzgs	Metasedimentary schist and gneiss (Paleozoic)
Pzmg	Marble, San Gabriel Mountains (Paleozoic)
gnm	Cataclastic gneiss (age unknown)
Kcc	Monzogranite of City Creek (Cretaceous)
Pzmb	Marble, San Bernardino Mountains (Paleozoic)

GEOLOGY LEGEND

30-Sep-08

Prepared by: DWB

GIS_proj/lytle_development_gw_impact_rpt_9-08/0_lytle_Fig_2a_geology_legend_9-08.mxd

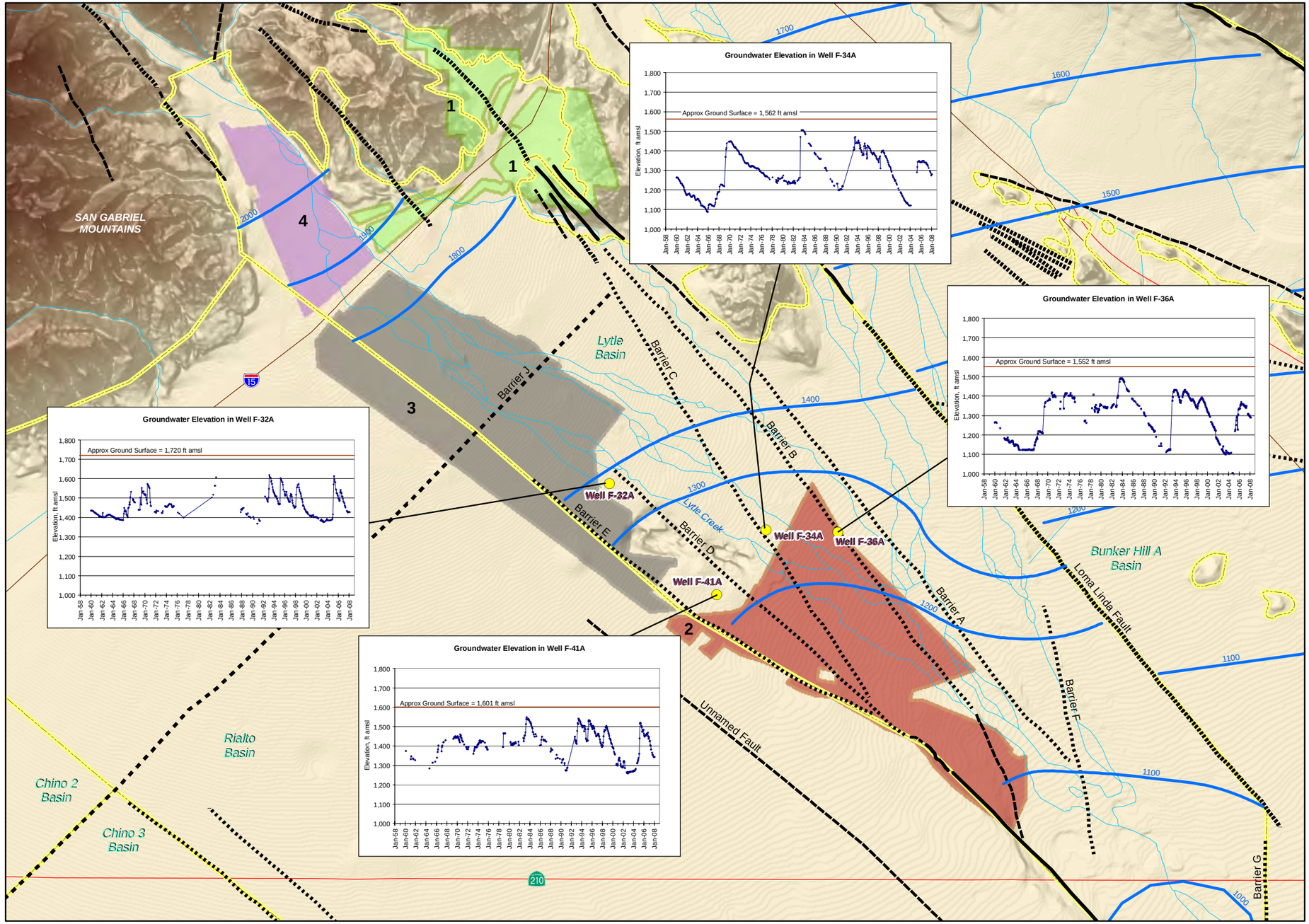
GEOSCIENCE

GEOSCIENCE Support Services, Inc.
P.O. Box 220, Claremont, CA 91786
Tel: (909) 920-0707 Fax: (909) 920-0403
www.gssiwater.com

Figure 2b

LYTLE DEVELOPMENT COMPANY

EVALUATION OF GROUND WATER IMPACTS
FROM THE PROPOSED LYTLE CREEK RANCH DEVELOPMENT



GROUND WATER ELEVATIONS AND HYDROGRAPHS

EXPLANATION

Lytle Creek Ranch Development Neighborhood Areas

- 1
- 2
- 3
- 4

1100 — 1991 Ground Water Elevation (ft amsl)

Fontana Water Company Well

Ground Water Basins

Fault Classifications

- Accurately Located
- Approximately Located
- Suspected Fault (Ground Water Barrier)
- Inferred
- Concealed

Creeks and Streams

Sources of Data:
Faults - Wildermuth (2000)
Ground Water Basins - Wildermuth (2000)
Ground Water Elevation Contours - GEOSCIENCE (2004)
Lytle Creek Ranch Neighborhoods - Lytle Dev. Co.

30-Sep-08

Prepared by: DWB

Map Projection:
State Plane Zone V, NAD27, feet

NORTH

0 0.5 1 Miles

GEOSCIENCE

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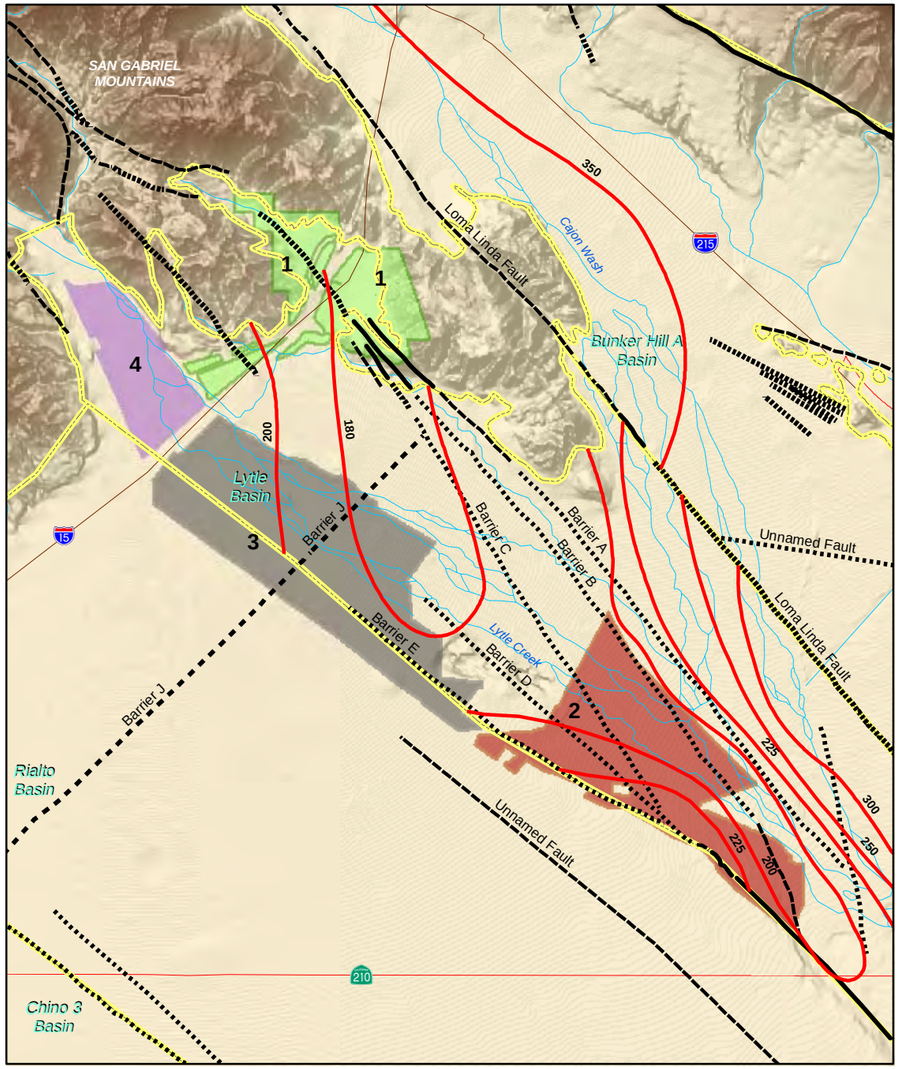
Figure 3

GIS_proj/lytle_development_gw_impact_rpt_9-08/0_lytle_Fig_3_gw_levels_9-08.mxd

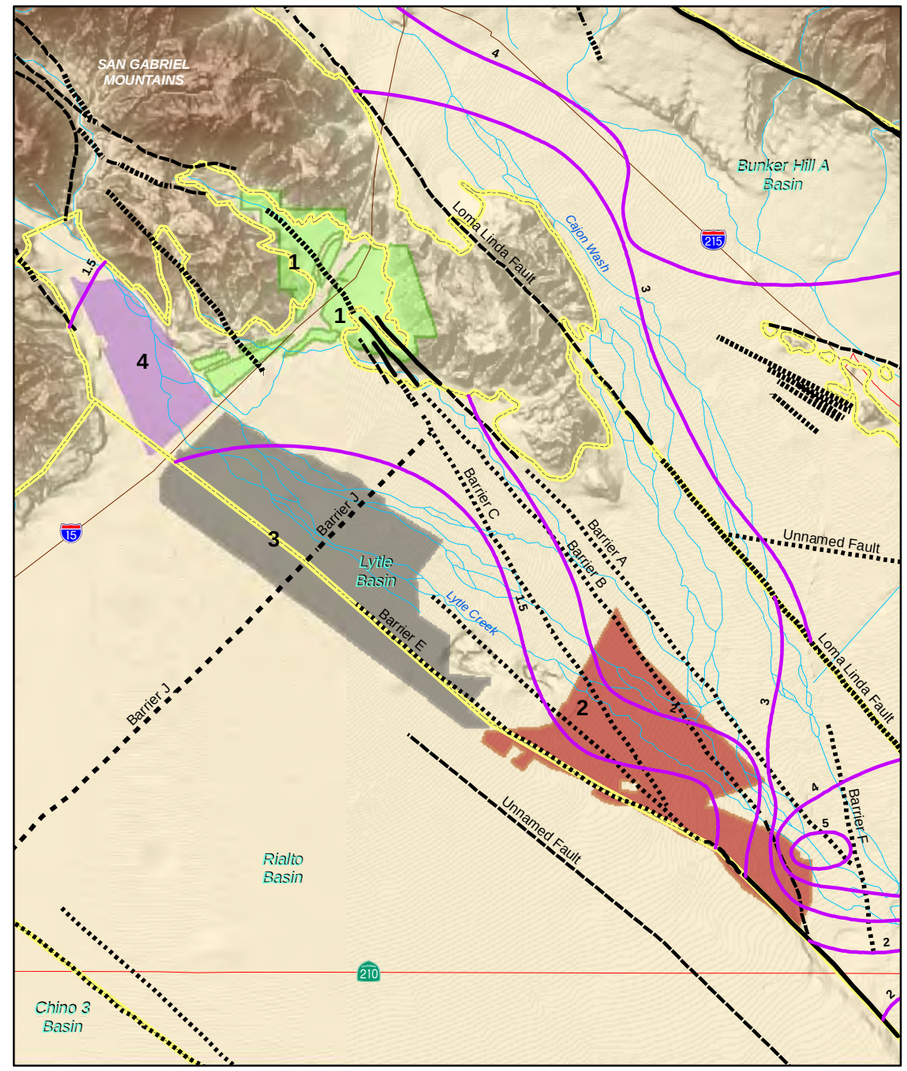
LYTLE DEVELOPMENT COMPANY

EVALUATION OF GROUND WATER IMPACTS
FROM THE PROPOSED LYTLE CREEK RANCH DEVELOPMENT

CURRENT AMBIENT TDS AND NITRATE CONCENTRATIONS



TOTAL DISSOLVED SOLIDS



NITRATE

EXPLANATION

Lytle Creek Ranch Development Neighborhood Areas
- 1
- 2
- 3
- 4

180 Average 1997 Total Dissolved Solids (TDS) Concentrations (mg/L)

2.0 Average 1997 Nitrate (as N) Concentrations (mg/L)

Ground Water Basins

Fault Classifications
- Accurately Located
- Approximately Located
- Suspected Fault (Ground Water Barrier)
- Inferred
- Concealed

Creeks and Streams

Sources of Data:
Faults - Wildermuth (2000)
Ground Water Basins - Wildermuth (2000)
Lytle Creek Ranch Neighborhoods - Lytle Dev. Co.
Nitrate and TDS Contours - GEOSCIENCE (2004)

30-Sep-08

Prepared by: DWB

Map Projection:
State Plane Zone V, NAD27, feet

NORTH

0 1 2 Miles

GEOSCIENCE

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Tel: (909) 920-0707 Fax: (909) 920-0403
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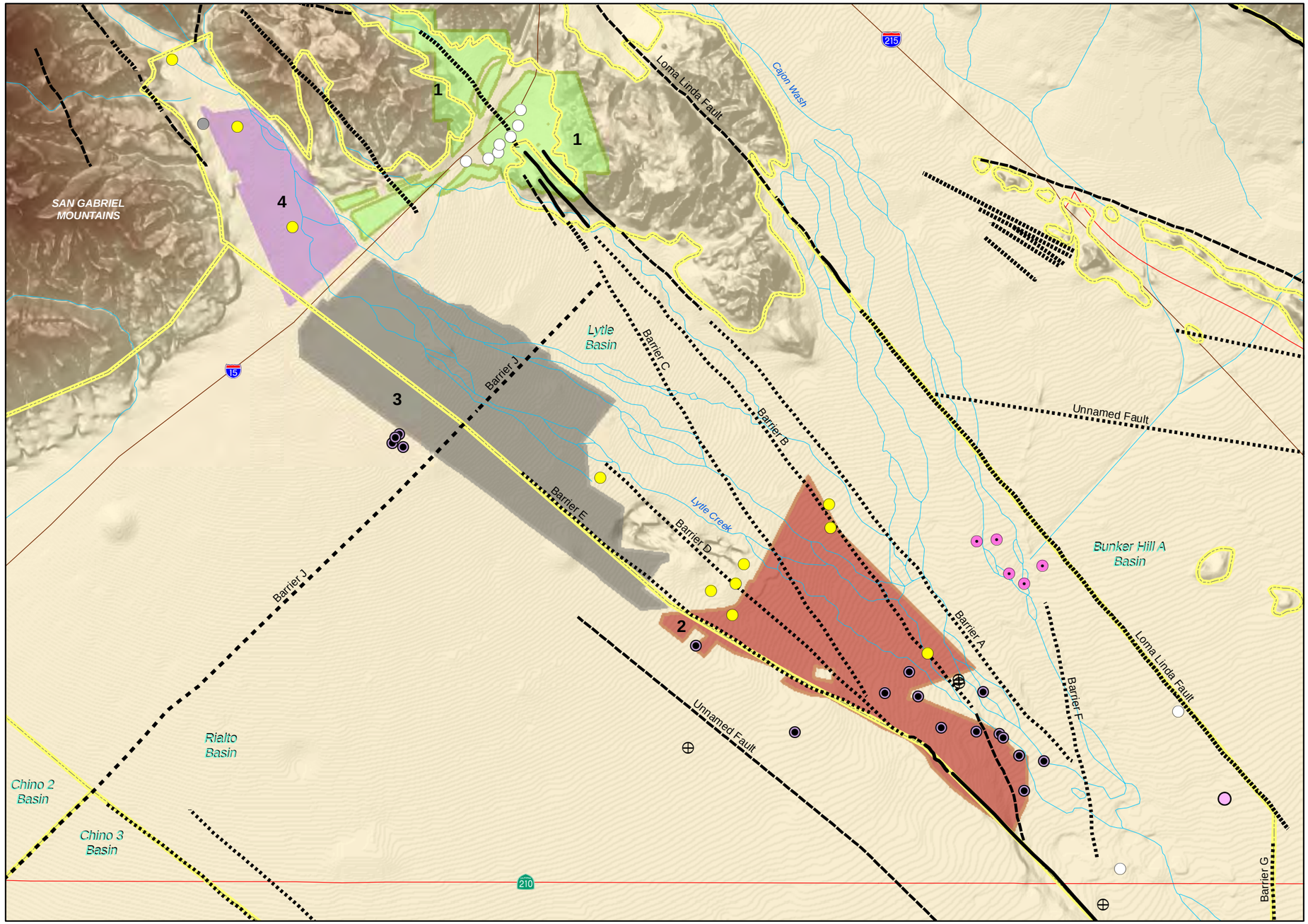
Figure 4

GIS_proj/lytle_development_gw_impact_rpt_6-08/0_lytle_Fig_4_TDS_Nitrate_7-08.mxd

LYTLE DEVELOPMENT COMPANY

EVALUATION OF GROUND WATER IMPACTS
FROM THE PROPOSED LYTLE CREEK RANCH DEVELOPMENT



WELL LOCATIONS IN THE VICINITY OF THE LYTLE CREEK RANCH DEVELOPMENT

EXPLANATION

Lytle Creek Ranch Development Neighborhood Areas
- 1
- 2
- 3
- 4

Well Locations
- City of Colton
- City of Rialto
- Fontana Water Company
- Muscoy Mutual Water Company
- Private
- Riverside Highland Water Company
- Unknown
- West Valley Water District

Ground Water Basins

Fault Classifications
- Accurately Located
- Approximately Located
- Suspected Fault (Ground Water Barrier)
- Inferred
- Concealed

Creeks and Streams

Sources of Data:
Faults - Wildermuth (2000)
Ground Water Basins - Wildermuth (2000)
Lytle Creek Ranch Neighborhoods - Lytle Dev. Co.
Wells - San Bernardino Valley Municipal WD Database

30-Sep-08

Prepared by: DWB

Map Projection:
State Plane Zone V, NAD27, feet

NORTH

0 0.5 1 Miles

GEOSCIENCE

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Tel: (909) 920-0707 Fax: (909) 920-0403
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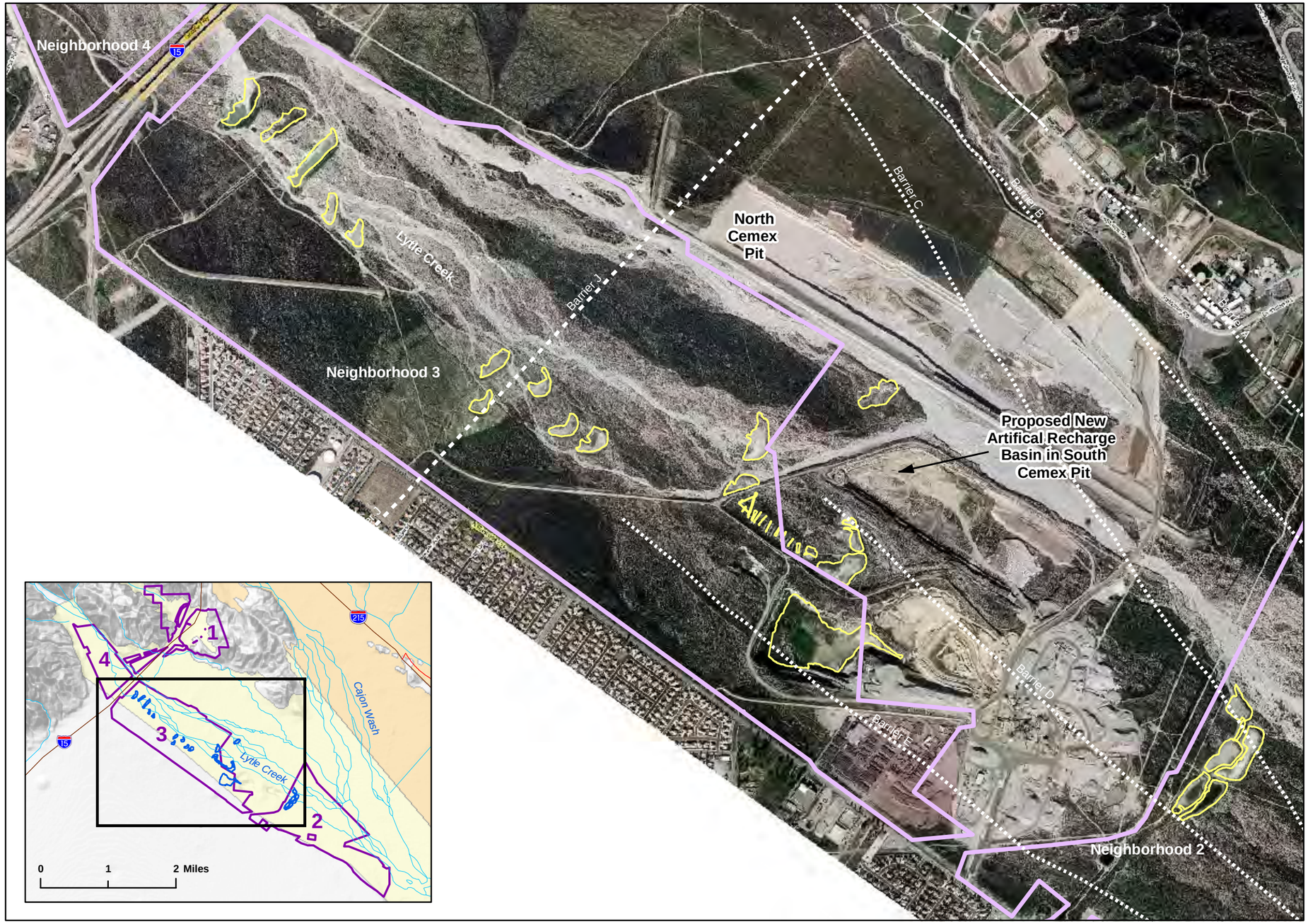
Figure 5

GIS_proj/lytle_development_gw_impact_rpt_9-08/0_lytle_Fig_5_well_locs_near_developmnt_9-08.mxd

LYTLE DEVELOPMENT COMPANY

EVALUATION OF GROUND WATER IMPACTS
FROM THE PROPOSED LYTLE CREEK RANCH DEVELOPMENT



HISTORICAL RECHARGE AND PROPOSED SPREADING LOCATIONS

EXPLANATION

Lytle Creek Ranch Development Neighborhood Boundaries

Recharge Basins Used in 1995

Sources of Data:
Lytle Creek Ranch Neighborhoods - Lytle Dev. Co.
Ground Water Basins - Wildermuth (2000)

30-Sep-08

Prepared by: DWB

Map Projection:
State Plane Zone V, NAD27, feet

NORTH

0 1,500 3,000 Feet

GEOSCIENCE

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Tel: (909) 920-0707 Fax: (909) 920-0403
www.gssiwater.com

Figure 6

GIS_proj/lytle_development_gw_impact_rpt_9-08/0_lytle_Fig_6_spreading_locs_9-08.mxd

Lytle Creek Recharge Offset Amounts vs. TDS of Recharge Water
Lytle Creek North Wastewater Recycling Plant
Effluent Discharge Rate = 1,953 acre-ft/yr and TDS = 470 mg/L

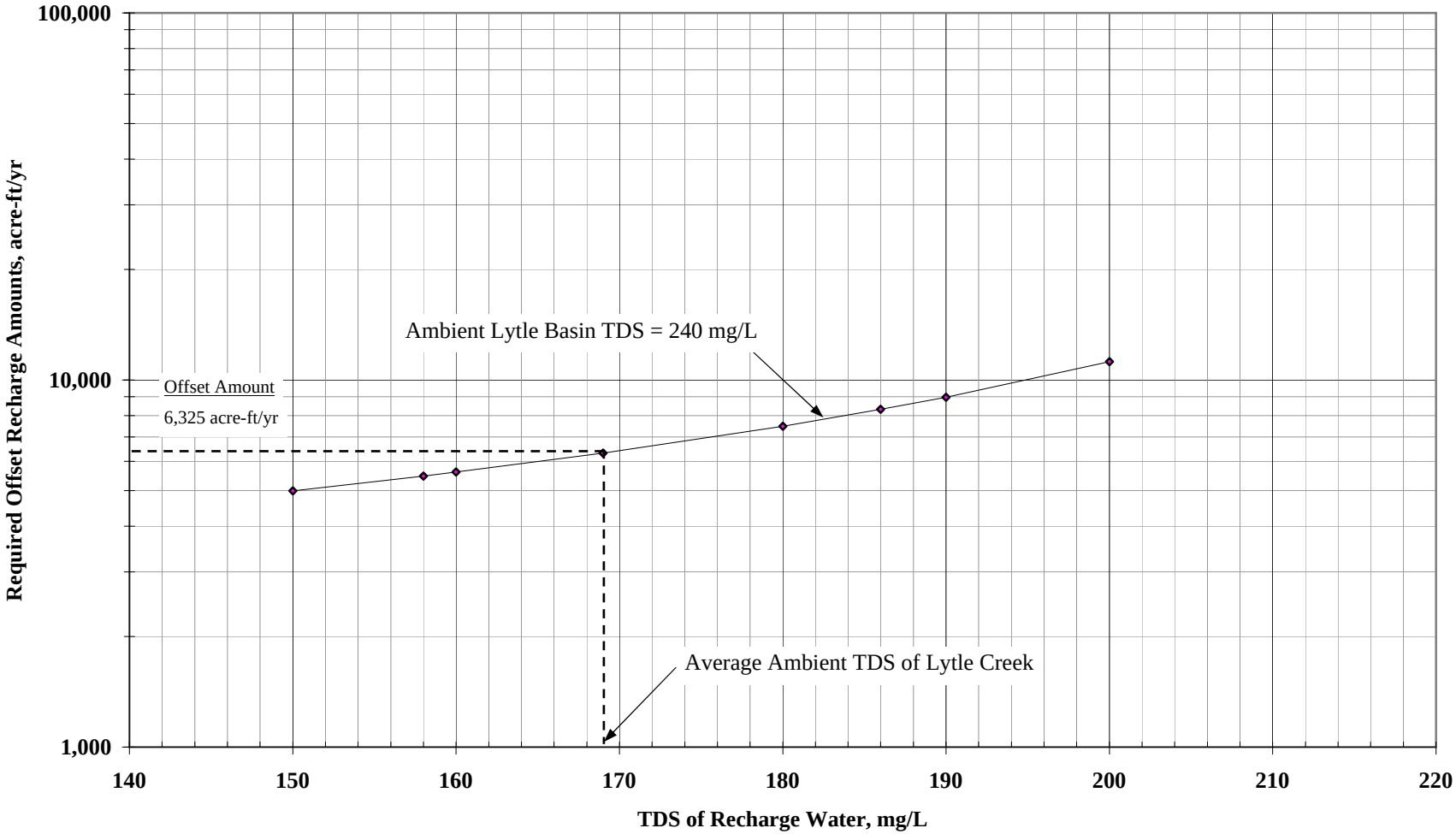

Figure 7

APPENDIX A

Curve Number Values Used for Existing and Proposed Project Conditions

GEOSCIENCE Support Services, Inc.

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Existing Condition CN Values

[1] Neighborhood	[2] Landuse	[3] Area [Acres]	[4] Soils Group	[5] CN	[6] ImpPerc	[7] CN WeightAve	[8] % Imp WeightAve	[9] S
N01	open space undeveloped	208.20	A	46	0			
N01	open space undeveloped	120.70	B	66	0			
N01	open space undeveloped	54.49	C	77	0			
N01	open space undeveloped	0.27	D	83	0			
N01	road	31.52	A	98	100			
N01	road	1.35	B	98	100			
N01	road	0.68	C	98	100			
N01 Total		**417.20**				**60.0**	**8.0**	
N02	open space undeveloped	465.84	A	46	0			
N02	open space undeveloped	334.99	B	66	0			
N02	water	0.96	W	0	0			
N02 Total		**801.79**				**54.3**	**54.3**	
N03	open space undeveloped	443.67	A	46	0			
N03	open space undeveloped	525.13	B	66	0			
N03 Total		**968.80**				**56.8**	**0.0**	
N04	open space undeveloped	86.43	A	46	0			
N04	open space undeveloped	166.80	B	66	0			
N04	open space undeveloped	0.40	C	77	0			
N04	open space undeveloped	0.25	D	83	0			
N04	road	1.60	A	98	100			
N04	road	4.06	B	98	100			
N04 Total		**259.54**				**60.1**	**2.2**	

Source: PACE (2008c)

Explanation:
[1] Neighborhood Number
[2] Landuse per subbasin from PACE (2008c)
[3] Area of subbasin in acres
[4] Soils group per San Bernardino County Flood Control Manual
[5] Curve Number based on soil type and landuse
[6] Percent impervious based on landuse
[7] Curve Number weighted average $([5]_1 x[3]_1)+_{(}[5]_2 x[3]_2)+...+[5]_n x[3]_n] / ([3]_1+([3]_2.....+[3]_n)$
[8] Percent Impervious weighted average $([6]_1 x[3]_1)+([6]_2 x[3]_2)+...+[6]_n x[3]_n] / ([3]_1+([3]_2.....+[3]_n)$
[9] S =(1000/[7])-10

Proposed Condition CN Values

[1] Neighborhood	[2] Landuse	[3] Area [Acres]	[4] Soils Group	[5] CN	[6] ImpPerc	[7] CN WeightAve	[8] % Imp WeightAve
N01	MU	12.29	A	84.8	80		
N01	open space residential	11.21	A	32	0		
N01	open space undeveloped	61.70	A	46	0		
N01	open space undeveloped	66.81	B	66	0		
N01	open space undeveloped	50.56	C	77	0		
N01	open space undeveloped	0.10	D	83	0		
N01	road	31.51	A	98	100		
N01	road	1.35	B	98	100		
N01	road	0.68	C	98	100		
N01	SFR-01	81.39	A	58.4	40		
N01	SFR-01	53.78	B	72.8	40		
N01	SFR-01	3.92	C	80.6	40		
N01	SFR-03	41.73	A	84.8	80		
N01	SFR-03	0.17	D	93.4	80		
N01 Total		**417.21**				**68.0**	**31.8**
N02	MU	8.20	A	84.8	80		
N02	MU	21.52	B	89.6	80		
N02	open space residential	150.12	A	32	0		
N02	open space residential	74.34	B	56	0		
N02	open space undeveloped	88.89	A	46	0		
N02	open space undeveloped	96.44	B	66	0		
N02	road	13.02	A	98	100		
N02	road	18.23	B	98	100		
N02	SFR-01	8.23	A	58.4	40		
N02	SFR-02	145.22	A	71.6	60		
N02	SFR-02	48.52	B	81.2	60		
N02	SFR-03	52.16	A	84.8	80		
N02	SFR-03	70.70	B	89.6	80		
N02	water	0.96	W	0	0		
N02	water tank	5.23	B	98	100		
N02 Total		**801.79**				**63.9**	**34.7**
N03	MFR	32.85	A	74.9	65		
N03	MFR	31.30	B	83.3	65		
N03	MU	53.08	A	84.8	80		
N03	MU	35.04	B	89.6	80		
N03	open space residential	17.64	A	32	0		
N03	open space residential	4.16	B	56	0		
N03	open space undeveloped	131.60	A	46	0		
N03	open space undeveloped	289.50	B	66	0		
N03	park	8.71	A	41.9	15		
N03	park	4.73	B	62.3	15		

Proposed Condition CN Values

[1] Neighborhood	[2] Landuse	[3] Area [Acres]	[4] Soils Group	[5] CN	[6] ImpPerc	[7] CN WeightAve	[8] % Imp WeightAve
N03	road	24.34	A	98	100		
N03	road	8.37	B	98	100		
N03	school	21.35	A	58.4	40		
N03	school	9.90	B	72.8	40		
N03	SFR-01	22.40	A	58.4	40		
N03	SFR-01	43.72	B	72.8	40		
N03	SFR-02	88.13	A	71.6	60		
N03	SFR-02	38.24	B	81.2	60		
N03	SFR-03	30.74	A	84.8	80		
N03	SFR-03	44.15	B	89.6	80		
N03	slope	0.02	A	35.3	5		
N03	slope	8.20	B	58.1	5		
N03	water body	7.99	A	32	0		
N03	water body	12.65	B	56	0		
N03 Total		**968.81**				**68.5**	**33.2**
N04	MFR	40.99	A	74.9	65		
N04	MFR	17.58	B	83.3	65		
N04	MU	17.08	A	84.8	80		
N04	MU	0.71	B	89.6	80		
N04	open space residential	16.88	A	32	0		
N04	open space residential	3.07	B	56	0		
N04	open space undeveloped	11.48	A	46	0		
N04	open space undeveloped	145.44	B	66	0		
N04	open space undeveloped	0.40	C	77	0		
N04	open space undeveloped	0.25	D	83	0		
N04	road	1.60	A	98	100		
N04	road	4.06	B	98	100		
N04 Total		**259.54**				**67.4**	**22.3**

Source: PACE (2008c)

Explanation:
[1] Neighborhood Number
[2] Landuse per subbasin from PACE (2008c)
[3] Area of subbasin in acres
[4] Soils group per San Bernardino County Flood Control Manual
[5] Curve Number based on soil type and landuse
[6] Percent impervious based on landuse
[7] Curve Number weighted average $([5]_1 x[3]_1)+([5]_2 x[3]_2)+...+[5]_n x[3]_n] / ([3]_1+([3]_2.....+[3]_n)$
[8] Percent Impervious weighted average $([6]_1 x[3]_1)+([6]_2 x[3]_2)+...+[6]_n x[3]_n] / ([3]_1+([3]_2.....+[3]_n)$

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Appendix III-C-C

Pacific Advanced Civil Engineering Water Quality Management Plan for Lytle Creek Ranch Neighborhood I-4

February 2008

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San Bernardino County Stormwater Program

WATER QUALITY MANAGEMENT PLAN (PRELIMINARY)

LYTLE CREEK RANCH

WATER QUALITY MANAGEMENT PLAN (WQMP-P)

For compliance with Santa Ana Regional Water Quality Control Board

Order Number R8-2002-0012 (NPDES Permit No. CAS618036)

for

Lytle Creek Ranch
Neighborhood 1-4

Prepared for:
Lytle Development Company
c/o Jan C. Dabney
One Lakeshore Center
3281 East Guasti Road, Suite 330
Ontario, CA 91761

Prepared By:
Pacific Advanced Civil Engineering, Inc. (PACE)
17520 Newhope Street, Suite 200
Fountain Valley, CA 92708
Tel. 714.481.7300
Fax 714.481.7300
Contact: Deborah de Chambeau

WQMP Preparation Date
February 2008

WATER QUALITY MANAGEMENT PLAN (WQMP)

PROJECT SITE INFORMATION

Name of Project: Lytle Creek Ranch; Neighborhood 1 -4

Project Location: Neighborhood 1 is located along Highway 15 at Glen Helen Parkway. Neighborhood 2 is located east of the 15 Freeway at Sierra Avenue and bounded by El Rancho Verde golf course to the southeast. Neighborhood 3 is located east of the 15 Freeway at Sierra Avenue. Neighborhood 4 is located west of Highway 15 at Sierra Avenue.

Size of Significant Re-Development on an Already Developed Site (in feet^2): N/A

Size of New Development (in feet^2): Neighborhood 1: 18,173,304.7 feet^2 (417.2 acres); Neighborhood 2: 34,926,547.7 feet^2 (801.8 acres); Neighborhood 3: 42,201,096.8 feet^2 (968.8 acres); Neighborhood 4: 11,303,865.2 feet^2 (259.5 acres); Total Neighborhood 1-4: 106,604,814.4 feet^2 (2,447.3 acres)

Number of Home Subdivisions: Neighborhood 1: 1,278 du; Neighborhood 2: 2,931 du; Neighborhood 3: 3,329 du; Neighborhood 4: 869 du; Total Neighborhood 1-4: 8,407 du

SIC Codes: 8811 Private Households; 8211 Elementary and Secondary Schools; 5399 Miscellaneous General Merchandise Stores

Erosive Site Conditions?: No

Natural Slope More Than 25%?: Yes

WATER QUALITY MANAGEMENT PLAN (WQMP)

Check the appropriate project category below:

Check below	**Project Categories**
	1. All significant re-development projects. Significant re-development is defined as the addition or creation of 5,000 or more square feet of impervious surface on an already developed site. This includes, but is not limited to, additional buildings and/or structures, extension of existing footprint of a building, construction of parking lots, etc. Where redevelopment results in an increase of less than fifty percent of the impervious surfaces of a previously existing development, and the existing development was not subject to SUSMPs, the design standards apply only to the addition, and not the entire development. When the redevelopment results in an increase of more than fifty percent of the impervious surfaces, then a WQMP is required for the entire development (new and existing).
X	2. Home subdivisions of 10 units or more. This includes single family residences, multi-family residence, condominiums, apartments, etc.
X	3. Industrial/commercial developments of 100,000 square feet or more. Commercial developments include non-residential developments such as hospitals, educational institutions, recreational facilities, mini-malls, hotels, office buildings, warehouses, and light industrial facilities.
	4. Automotive repair shops (with SIC codes 5013, 5014, 5541, 7532- 7534, 7536-7539).
	5. Restaurants where the land area of development is 5,000 square feet or more.
X	6. Hillside developments of 10,000 square feet or more which are located on areas with known erosive soil conditions or where the natural slope is twenty-five percent or more.
	7. Developments of 2,500 square feet of impervious surface or more adjacent to (within 200 feet) or discharging directly into environmentally sensitive areas such as areas designated in the Ocean Plan as areas of special biological significance or waterbodies listed on the CWA Section 303(d) list of impaired waters.
X	8. Parking lots of 5,000 square feet or more exposed to storm water. Parking lot is defined as land area or facility for the temporary storage of motor vehicles.
	The project does not fall into any of the categories described above. (If the project requires a precise plan of development [e.g. all commercial or industrial projects, residential projects of less than 10 dwelling units, and all other land development projects with potential for significant adverse water quality impacts] or subdivision of land, it is defined as a Non-Category Project.)

Section 1
Introduction and Project Description

1.1 Project Information

Project Owner/ Contact

Lytle Development Company
Contact: Jan C. Dabney
One Lakeshore Center
3281 East Guasti Road, Suite 330
Ontario, CA 91761
Tel: 909-937-4735
Fax: 909-974-0176

Project Site

- The 2,447.3 acre project site is located in unincorporated part of San Bernardino County and consists of four neighborhoods.
- Figure 1 is the vicinity map of the site.
- Project Watershed: Santa Ana River
- Sub-Watershed: Lytle Creek South
- Project Site Size : Neighborhood 1: 18,173,304.7 feet^2 (417.2 acres); Neighborhood 2: 34,926,547.7 feet^2 (801.8 acres); Neighborhood 3: 42,201,096.8 feet^2 (968.8 acres); Neighborhood 4: 11,303,865.2 feet^2 (259.5 acres); Total Neighborhood 1-4: 106,604,814.4 feet^2 (2,447.3 acres)

1.2 Permits

Permits for the project include:

- Regional Water Quality Control Board, 401 Permit
- San Bernardino County Flood Control District
- City of Rialto and Fontana

1.3 Project Description

- The 2,447.3 acre project site is located in unincorporated part of San Bernardino County and consists of four neighborhoods. Neighborhood 1 is located along the Highway 15 at Glen Helen Parkway, and under existing conditions is mostly undeveloped except for Glen Helen Parkway, Clearwater Parkway, and the drainage culverts beneath them. Neighborhoods 2 and 3 are located east of the 15 Freeway at Sierra Avenue. Neighborhood 2 is currently undeveloped and is bounded by El Rancho Verde golf course to the southeast. Neighborhood 3, under existing conditions, is mostly undeveloped except for a portion that is currently being used as an office complex for Hanson Aggregate, Inc. Neighborhood 4 is located west of Highway 15 at Sierra Avenue; the site under existing conditions is mostly undeveloped.
- See location map, site plan, and permanent water quality facility map identifying storm drain facilities and structures, structural BMPs, stormwater flow (drainage), and the receiving water bodies.
- Formation of Homeowners association (HOA) or property owner association (POA): Yes, there will be a HOA and POA for the project.
- Land use summary:

LAND USE SUMMARY				
Neighborhood	**Land Use**	**Acreage**	**No. of dwellings**	**Retail Sq. Footage**
1	Open Space	176.0	-	-
	OS/Recreation	11.0	-	-
	Residential	172.0	942	-
	Mixed Use	12.0	336	-
	Roadways	46.2	-	-
2	Open Space	176.0	-	-
	OS/Recreation	226.0	-	-
	Residential	334.0	2,567	-
	Mixed Use	24.2	364	102,452
	Roadways	41.6	-	-
3	Open Space	396.0	-	-
	OS/Recreation	70.8	-	-
	OS/Park/School	17.0	-	
	Residential	334.0	2,704	-
	Mixed Use	87.8	625	566,279
	Roadways	39.2	-	-
	School	24.0	-	-
4	Open Space	160.0	-	-
	OS/Recreation	21.0	-	-
	Residential	54.0	869	-
	Mixed Use	17.0	-	180,689
	Roadways	7.5	-	-

1.4 Site Description

The watershed associated with the Lytle Creek Ranch Development is located within the Lytle Creek basin in unincorporated San Bernardino County. In the existing condition, each of the planned Neighborhood sites is either undeveloped alluvial floodplain or undeveloped foothills. Each site currently features a moderate density of native scrub-type vegetation with a high density of rounded and smooth granite rocks, cobbles and small boulders. The existing site soils are very pervious consisting of graded sand ranging from coarse to very coarse.

Each of the planned neighborhoods will include proposed onsite stormwater management system improvements. The improvements will consist of a closed conduit storm drain system capable of conveying debris from the offsite watershed, onsite closed conduit storm drain and/or open channel conveyance systems, and a water quality management system to treat non-storm and small storm runoff before discharge to the Sycamore and/or Lytle Creeks.

Water Quality Management System

The water quality management system is composed of several elements or BMPs that will treat storm and non-storm runoff to reduce pollutants from the onsite watershed to acceptable levels

prior discharging to Lytle and/or Sycamore Creeks. The BMPs to be constructed as a part of the Lytle Creek Ranch project are dry extended detention basins, wet ponds/basins, wetland filters, a recirculating stream with pond biofiltration system, and vegetated swales. Each of the BMP types were placed or selected to coincide logically with the landuse plan. Treatment capacity and pollutant removal efficiency along with expected pollutant loading from a particular typical landuse were the primary considerations in selecting and placing BMPs. The wet pond and dry extended detention BMPs were preliminarily sized according to the requirements of the San Bernardino County General NPDES Permit. The wetland filters and recirculating stream with biofiltration have much higher treatment capacity and removal efficiency than the standard NPDES General Permit BMPs provided in the CASQA Manual. These BMPs (wetland filters, recirculating stream) have been preliminarily sized based upon data garnered by PACE from long-term studies of the performance of these BMPs as constructed on past projects throughout California. Because it will receive polluted runoff discharged from the onsite storm drain system, the water quality management system will treat the first flush storm volume and/or dry weather non-storm runoff from the onsite watershed only. Because the basins are not on a passive bypass storm drain system, but rather on a direct connection to the main storm drain system, each basin will be surcharged in a larger storm event with a runoff volume potentially exceeding the basin capacity. Each basin will include an overflow spillway to discharge excess captured runoff safely downstream to a receiving channel to be conveyed eventually to Lytle or Sycamore Creek. Each water quality basin spillway will be constructed from a suitable armoring material such as site rock, grout, concrete, turf reinforcement matting, or similar, or combination thereof. The water quality basin spillways have been preliminarily sized using the broad crested weir equation, $Q= CLH^{1.5}$. The spillway sizes are shown for each proposed basin in Exhibits 3, 4, 5, and 6 for Neighborhoods 1 – 4, respectively.

Neighborhood 1

Planning Areas 1 to 5

In the existing condition, both on and offsite runoff are intercepted in a natural channel. The vertical profile of the existing channel has a high point such that a portion of the channel drains south and discharges to an existing 12’x 8’ (W x H) box culvert. The other portion of the channel drains north and discharges to an existing 60” RCP culvert beneath the I-15 Freeway. Both culverts convey storm runoff underneath the I-15 Freeway from the west side to the east side and discharge to an undeveloped open space area adjacent to the freeway, between Clearwater Parkway and the I-15. This area drains from north to south and discharges to the north fork of Sycamore Creek at the existing Clearwater Parkway / Sycamore Creek North Fork culvert. This area will remain as undeveloped open space in the proposed condition as well.

In the proposed condition, storm runoff from the offsite and onsite open space area will be intercepted in proposed trapezoidal open channels. The north channel will have a 5’ base width, 2’ wall height and 2:1 side slopes. The south channel will have a 10’ base width, 3.5’ wall height and 3:1 side slopes. The channel alignments are shown in Figure 8. Storm runoff conveyed in the channels will be discharged to the existing freeway culverts described above. The north channel will discharge to the existing 60” freeway culvert and the south channel will discharge to the existing 12’x8’ freeway culvert. The freeway culvert alignments and discharge points will remain the same as the existing condition. Storm runoff generated in the proposed development area or onsite area will be captured via curb opening catch basins and discharged to the onsite subterranean storm drain system. The onsite storm drain system was preliminarily sized to convey the 25-year storm peak flowrate from the onsite watershed. The proposed streets within the development area will be designed and utilized to convey storm runoff within

the roadway right-of-way exceeding the 25-year storm peak flowrate up to the 100-year flowrate creating a combined 100-year conveyance system (storm drain and street section surcharge). The resultant level of protection provided to the development pads will be 100-year plus a minimum of 1' of freeboard, in compliance with FEMA requirements as well as SBCFCD design requirements. The proposed onsite storm drain pipes will range in size from 18" to 78" in diameter. The proposed storm drains will be constructed in public right-of-way, within the street section of streets that will be dedicated to San Bernardino County in the future. Therefore, the storm drains will be designed and constructed to meet San Bernardino County minimum standards for performance, materials, and workmanship. Storm drain manholes will be provided at the maximum allowable spacing to provide access for maintenance and inspection of the underground facilities. The onsite storm drain system will be connected to a water quality basin or a series of water quality basins to treat onsite generated non-storm related runoff and first flush storm runoff. All storm runoff generated onsite will be treated in at least one of the BMPs prior to being discharged to Lytle and/or Sycamore Creeks. The proposed Neighborhood 1 concept level storm drain and water quality system alignment and configuration are shown on Exhibit 3.

Planning Area 8

In the existing condition, the entire watershed of Neighborhood 1 Planning Area 8 drains from east to west to the open space area enclosed by the I-15 Freeway on the west, Glen Helen Parkway on the north, and Clearwater Parkway on the east. Storm runoff is conveyed through this area from north to south to the existing Sycamore Creek north fork culvert at Clearwater Parkway, see Figure 3. The existing culvert is a reinforced concrete Conspan soft bottom arch structure. The culvert is 12' wide and 10' tall and drains directly to Sycamore Creek. The open space areas, the Clearwater Parkway culverts, and Sycamore Creek will remain unchanged from their existing condition.

In the proposed condition, there will be a dual storm drain and channel conveyance system to capture and convey runoff through the proposed development area to the open space area between the I-15 Freeway and Clearwater Parkway. The offsite open channel conveyance system will be designed to capture runoff from the 100-year storm event including a 50% bulking factor to allow for debris bulking in the flow and convey it through the development area in an above ground open channel and discharge to a proposed culvert at Clearwater Parkway. The channel cross sections have been preliminarily sized for the 100-year peak flowrate as a part of this study. The open channel section will end at the east side of Clearwater Parkway and will discharge to a close conduit culvert that will discharge to the open space area described above at or near the existing condition discharge point. The flow patterns in the open space area will remain unchanged from the existing condition.

Runoff generated from onsite open space areas will be intercepted into proposed closed conduit storm drain systems. The closed conduit storm drain will be designed for the 25-year storm and surcharge the street cross section up to the street right-of-way to provide a combined 100-year storm drain and street cross section conveyance system as described in previous sections. The proposed onsite storm drain has been preliminary sized for the 25-year storm clearwater runoff as a part of this study.

Non-storm and storm runoff captured in the onsite storm drain system will be conveyed and discharged to a water quality basin(s) for treatment and pollutant removal. Once runoff is discharged from the water quality basin it will be joined together with the proposed offsite system storm drain culvert via a storm drain lateral at Clearwater Parkway and conveyed to the

open space area between the I-15 Freeway and Clearwater Parkway. The onsite storm drain pipes will range in size from 18" to 36". The existing Clearwater Parkway / Sycamore Creek north fork culvert was designed to intercept and convey the developed condition runoff from Neighborhood 1 as indicated in the report by *RBF Consulting* titled, "*Basis of Design Report – Lytle Creek Area Clearwater Parkway Culverts,*" dated November 2004.

Planning Areas 13 and 15

In the existing condition, concentrated flow from the tributary watershed is intercepted and conveyed to the west of Glen Helen Parkway via existing channels and culverts. The culverts discharge storm runoff into an open space area on the east side adjacent to the I-15 Freeway. Both onsite and offsite runoff will then be intercepted into existing culverts under the I-15 Freeway, then outlet into an existing dry extended detention basin open space area on the east side of the I-15 Freeway. Storm runoff discharged from the basin will be conveyed to the east side of the I-15 Freeway via an existing 48" RCP culvert (Exhibit 3). This culvert discharges to an existing swale in open space area that currently drains to the existing Tract 15900 water quality basin #4. Treated runoff is then discharged from this basin to the north fork of Sycamore Creek just upstream of Clearwater Parkway.

In the proposed condition, the proposed offsite flow path will remain the same as in the existing conditions. The open space adjacent to the freeway will remain undeveloped. The onsite flow will be intercepted into a storm drain system and then routed through a water quality basin. The flow will then be intercepted into existing culverts underneath the freeway, identical the existing conditions. Our analysis demonstrates the existing culverts will be able to handle the proposed conditions runoff.

Neighborhood 2

In the existing condition, storm runoff from this area is conveyed mostly via sheet flow through the site, with an exception of a few small natural drainage ditches and swales. All storm runoff from this area is tributary to Lytle Creek. In general, this site drains from south to north and from west to east.

In the proposed condition, the storm conveyance system will consist of underground storm drains, golf course channels, and detention/conveyance ponds. The layout of the storm drain system is intended to maximize the use of surface flow channels and swales through the golf course and minimize the use of underground storm drains. This configuration is both cost effective and beneficial to water quality and use of storm water. The storm drain reaches were minimized to the extent practicable and were preliminarily designed to discharge runoff to either a golf course basin or channel. The fairways, tees, and greens of the golf course will discharge storm runoff as sheet flow either to a golf course channel/swale or a lake/basin. The lakes will serve multiple purposes. They will provide aesthetic benefits of the golf course, function as water hazards to the course, and will also be utilized as water quality basins for nuisance, low flow, and irrigation runoff from the course and tributary areas. The basins will also function as reservoirs for irrigation water for the golf course and potentially the local greenbelt areas. Some of the lakes are interconnected by storm drain or channels and will ultimately discharge to Lytle Creek. An overflow spillway and path has been preliminarily sized for each water quality basin. In the event of an overflow, ultimately, the overflow path will discharge to Lytle Creek. There will be one dry extended detention BMP water quality basin that will be located in the northeast portion of Neighborhood 2 adjacent to Lytle Creek. This basin will receive storm and nuisance runoff from the tributary developed area.

The proposed storm drain sizes in this area range from 18" to 72." Each of the storm drains will be located within the public right-of-way beneath the roadway surface and have been preliminarily sized for the 25-year storm event. The storm drain system along with the streets will provide 100-year storm protection and will function as a dual system as described in the preceding paragraphs. The locations and sizes of the storm drain and lakes are shown in Figure 4.

There is a proposed regional storm drain connecting Neighborhoods 2 and 3. This storm drain will convey runoff from the southeasterly portion of Neighborhood 3 in a proposed storm drain that will be located in the public right-of-way beneath the roadway of Riverside Drive. The storm drain will connect to Neighborhood 2 and the southwesterly most corner, adjacent to Hansen Aggregates Quarry, traverse through Neighborhood 2, and ultimately discharge to Lytle Creek (Figure 4). This storm drain has been preliminarily sized to convey the 100-year clearwater peak flowrate.

Neighborhood 3

In the existing condition, storm runoff from this area is conveyed mostly via sheet flow through the site, with an exception of a few small natural drainage ditches and swales. All storm runoff from this area is tributary to Lytle Creek. In general, this site drains from south to north and from west to east.

In the proposed condition, a drainage corridor/channel will traverse the area conveying non-storm and storm runoff from west to east across the site and ultimately discharge to Lytle Creek (Exhibit 5). This drainage corridor will feature a series of interconnected small ponds, vegetated corridors, walking trails that connect a series of parks and open space areas. The drainage corridor will provide the main conveyance for nuisance runoff and storm runoff up to the 100-year event. The channel system has been preliminarily sized for the tributary 100-year storm peak flowrate. The ponds and stream system will feature a recirculating stream that is both aesthetically pleasing and provides treatment of the nuisance flows and small storms. Each pond in the system functions as a wet BMP basin and will include vegetated wetland filters and/or biofilters to provide superior water quality treatment. The low flow section of the channel will be lined with grouted site rocks/cobbles and underlain with a plastic liner system to achieve a natural looking stream consistent in appearance with the site. The plastic liner system is intended to prevent excessive water loss from the stream system. When nuisance and storm runoff is insufficient to maintain flows in the stream system the ponds and stream will be supplemented with irrigation water. The stream and pond system will also function as a reservoir system for irrigation water. Details of the water quality basins and drainage corridors are shown in Figure 5.

Nuisance flows and storm runoff will be intercepted into curb opening catch basins and conveyed to the channel / drainage corridor through an underground storm drain system. This storm drain system has been preliminarily sized for the 25-year storm event and will work in combination with the street surface to provide 100-year capacity and protection to the development pads consistent with FEMA and SBCFCD flood protection requirements. The street section will either discharge 100-year storm runoff to the channel corridor or Lytle Creek, which will outlet into water quality basins along the drainage corridor. Most of the runoff generated in Neighborhood 3 will be discharged to Lytle Creek adjacent the Neighborhood 3 at the terminus of the drainage corridor (Figure 5). The remaining 165 acres of Neighborhood 3 will be captured in a proposed storm drain and conveyed easterly beneath Riverside Drive roadway to Neighborhood 2 as discussed in the preceding paragraphs.

The proposed storm drain sizes range from 18” to 54”. The proposed locations and sizes for of the storm drain pipes are shown in Figure 5.

Neighborhood 4

In the existing condition, there is an 1103-acre watershed tributary to the southerly boundary of Neighborhood 4. This area is largely undeveloped natural foothills with some low density residential adjacent to Lytle Creek Road. These areas discharge storm and nuisance runoff that is generated offsite, across Neighborhood 4, and then to Lytle Creek. In general, storm runoff is conveyed across the site from south to north as sheet flow to Lytle Creek. The offsite undeveloped hillsides are capable of producing a considerable amount of debris due to the steepness of the terrain, existing soil types, type of vegetation, and the susceptibility to wildfire burns.

In the proposed condition, the offsite watershed will not be changed by this project. Runoff will be intercepted on the upstream side (southerly) of Lytle Creek Road and conveyed via a proposed closed conduit storm drain within the public right-of-way beneath the road surface of Lytle Creek Road. The proposed Lytle Creek Road Offsite Storm drain has been preliminarily sized to intercept and convey the 100-year bulked peak flowrate. The Clearwater peak flowrate is bulked by 50% as required by SBCFCD to account for the presence of debris in the runoff from the offsite watershed. The alignment of the offsite storm drain systems will by cut across Neighborhood 4 either within the right-of-way of proposed public roadways or within easements to be dedicated for public use.

Non-storm and storm related runoff from the onsite watershed will be captured in curb opening catch basins and conveyed to the onsite storm drain system. The onsite storm drain system has been preliminarily sized for the 25-year storm peak flowrate and will utilize a combined conveyance system to surcharge the street section below the street right-of-way in a larger storm event up to and including the 100-year event. The onsite storm drains will discharge runoff to the proposed water quality basins for treatment. Runoff will be discharged from the water quality basins to Lytle Creek. Storm flow tributary to the basins and exceeding the 2-year storm event and/or the capacity of the water quality basin will be discharged to Lytle Creek via an overflow spillway provided at each basin. The proposed storm drain sizes range from 18” to 102”. The locations and sizes for of the storm drain pipes are shown in Figure 6.

Section 2
Pollutants of concern and hydrologic conditions of concern

2.1 Pollutants of Concern

Stormwater pollutants that are potential and expected to be generated by the proposed Lytle Ranch Development Neighborhood 1 - 4 are provided in the table below:

Table 2-1 (adapted from OC 2003)
Pollutants of Concern for Project Categories and Land Uses

Project Categories/Land Uses	General Pollutant Categories								
	Sediments	Nutrients	Organic Compounds	Pesticides	Trash & Debris	Oxygen Demanding Substances	Bacteria/ Virus	Oil & Grease	Heavy Metals
Detached Residential Development	E	E	N	E	E	E	E	E	N
Attached Residential Development	E	E	N	E	P	P	P	E	N
Commercial/ Industrial Development	P	P	P	E	P	P	E	P	P
Hillside Development (>10,000 ft^2)	E	E	N	E	E	E	E	E	N
Parking Lots	P	P	E	E	P	P	E	P	E
Streets, Highways & Freeways	E	P	E	E	P	P	E	P	E

E = Expected

P = Potential

N = Not Expected

Stormwater runoff from the site includes stormwater runoff, irrigation water overflows, and urban runoff from residential lots, retail development, open space, school and streets. No other potential pollutants of concern are expected from the project site.

Receiving Waters	303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
Sycamore Creek	None	None	Adjacent to Neighborhood 1 and tributary to Lytle Creek
Lytle Creek	Pathogens	MUN, AGR, IND, PROC, GWR, POW, REC1, REC2, COLD, WILD, RARE	Project is adjacent to Lytle Creek which has RARE Beneficial Use
Santa Ana Reach 4	Pathogens	GWR, REC1, REC2, WARM, WILD	
Santa Ana Reach 3	Pathogens	AGR, GWR, REC1, REC2, WARM, WILD, RARE	

Receiving Waters	303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
Santa Ana Reach 2		AGR, GWR, REC1, REC2, WARM, WILD, RARE	
Santa Ana Reach 1		REC1, REC2	

1. For each of the proposed project discharge points, the proximate Receiving Water is specified using the hydrologic unit basin numbers as identified in the most recent version of the Water Quality Control Plan for the Santa Ana region.

Neighborhood 1

Proximate Receiving Water for Project Discharge Point		
Receiving Water Order	**Hydrologic Unit Basin Number**	**Receiving Water Name**
1st	801.21	Sycamore Creek
2nd	801.41	Lytle Creek
3rd	801.27	Santa Ana Reach 4
4th	801.21	Santa Ana Reach 3
5th	801.11	Santa Ana Reach 2
6th	801.11	Santa Ana Reach 1

Neighborhood 2, 3 and 4

Proximate Receiving Water for Project Discharge Point		
Receiving Water Order	**Hydrologic Unit Basin Number**	**Receiving Water Name**
1st	801.41	Lytle Creek
2nd	801.27	Santa Ana Reach 4
3rd	801.21	Santa Ana Reach 3
4th	801.11	Santa Ana Reach 2
5th	801.11	Santa Ana Reach 1

2. For each proximate receiving water identified above, the pollutant, if any, for which the proximate Receiving Waters are impaired is provided in the following table.

Pollutants for which the Proximate Receiving Waters are impaired	
Receiving Water	**Pollutant for which impaired**
Sycamore Creek	N/A
Lytle Creek	Pathogens
Santa Ana Reach 4	Pathogens

Pollutants for which the Proximate Receiving Waters are impaired	
Receiving Water	**Pollutant for which impaired**
Santa Ana Reach 3	Pathogens
Santa Ana Reach 2	N/A
Santa Ana Reach 1	N/A

3. A comparison of the list of pollutants for which the proximate Receiving Waters are impaired with the pollutants expected to be generated by the project is provided in the table below.

Pollutant of Concern Summary Table				
Pollutant Type	**Expected**	**Potential**	**Not Expected**	**Present in Impaired Waterbody**
Sediment/Turbidity	X			
Nutrients	X			
Organic Compounds	X			
Trash & Debris	X			
Oxygen Demanding Substances	X			
Bacteria & Viruses	X			X
Oil & Grease	X			
Pesticides	X			
Metals	X			

4. A list of all the pollutants that are expected or potential from the project site, and for which the receiving waters are impaired are listed below.

Pathogens – Pathogens (bacteria and viruses) are ubiquitous microorganisms that thrive under certain environmental conditions. Their proliferation is typically caused by the transport of animal or human fecal wastes from the watershed. Water, containing excessive bacteria and viruses can alter the aquatic habitat and create a harmful environment for humans and aquatic life. Also, the decomposition of excess organic waste causes increased growth of undesirable organisms in the water.

5. Summarize identified pollutants of concern by checking the applicable boxes in the following table. (For identified pollutants of concern that are causing an impairment in receiving waters, the project WQMP shall incorporate one or more Treatment Control BMPs of medium or high effectiveness in reducing those pollutants.)

Pollutant of Concern Summary Table

Pollutant Type	Expected	Potential	Listed for Receiving Water
Bacteria/Virus	**X**		Pathogens for Lytle Creek, Santa Ana River Reach 3 & 4
Heavy Metals	**X**		
Nutrients	**X**		
Pesticides	**X**		
Organic Compounds	**X**		
Sediments	**X**		
Trash & Debris	**X**		
Oxygen Demanding Substances	**X**		
Oil & Grease	**X**		
Other—specify pollutant(s):			

2.2 Hydrologic Conditions of Concern (Not Required for Non-Category Projects)

All Category projects must identify any hydrologic condition of concern (HCOC) that will be caused by the project, and implement Site Design, Source Control, and/or Treatment Control BMPs to address identified impacts. Project proponents must follow the procedure for identifying HCOCs specified in Section 2.3 of the Model WQMP. Use the following Table and instructions as a guide.

1. (from Section 2.3, Part 2): Determine if the project will create a Hydrologic Condition of Concern. Check "yes" or "no" as applicable and proceed to the appropriate section as outlined below.	**Yes**	**No**
A. All downstream conveyance channels, that will receive runoff from the project, are engineered, hardened (concrete, riprap or other), and regularly maintained to ensure design flow capacity, and no sensitive stream habitat areas will be affected. Engineered, hardened, and maintained channels include channel reaches that have been fully and properly approved (including CEQA review, and permitting by USACOE, RWQCB and California Dept. of Fish & Game) by June 1, 2004 for construction and hardening to achieve design capacity, whether construction of the channels is complete. Discharge from the project will be in full compliance with Agency requirements for connections and discharges to the MS4, including both quality and quantity requirements, and the project will be permitted by the Agency for the connection or discharge to the MS4.		X
B. Project runoff rates, volumes, velocities, and flow duration for the post-development condition will not exceed those of the pre-development condition for 1-year, 2-year and 5-year frequency storm events. This condition will be substantiated with hydrologic modeling methods that are acceptable to the Agency, to the U.S. Army Corps of Engineers (USACOE), and to local watershed authorities. See method described below in Parts B1- B3.		X
C. Can the conditions in part A or B above be demonstrated for the project?		X
▪ If the answer for A, B, and/or C above is yes, then the project does not create a HCOC—in this case go to Section 3 (page A-12). ▪ If the answer for C above is no, the go to section 2.3. Part 3, below.		

2. (from Section 2.3, Part 3): The WQMP for projects that create a HCOC must include an evaluation of whether the project will adversely impact downstream erosion, sedimentation or stream habitat. The Agency may require that the evaluation be conducted by a registered civil engineer in the State of California, with experience in fluvial geomorphology. Perform the required evaluation as specified in A – F below. Check the boxes "yes" or "no" to verify a complete report and proceed to appropriate section based on results.

Does the evaluation include:	Yes	No
A. An evaluation of potential impacts to all downstream channel reaches.	X	
B. Consideration of the hydrology of the entire watershed. Review all applicable drainage area master plans to the extent available, to identify BMP requirements for new development that address cumulative inputs from development in the watershed.	X	
C. Consultation with all applicable agencies including the USACOE; local watershed authorities (e.g. San Timoteo Watershed Management Authority and SAWPA [Santa Ana Watershed Project Authority]); U.S. Geological Survey (USGS); California Dept. of Fish & Game (CDFG); and the San Bernardino County Flood Control District; to determine any areas of potential hydrologic impact.	X	
D. An evaluation of any available hydrologic modeling results. Modeling may have been performed by USGS, USACOE, local watershed authorities, the San Bernardino County Flood Control District, or other local jurisdiction.	X	
E. A field reconnaissance to evaluate any natural or partially natural downstream reaches, or other sensitive habitat. The field reconnaissance must evaluate representative downstream conditions, including undercutting erosion, slope/bank stability, vegetative stress (due to flooding, erosion, water quality degradation, or loss of water supplies), and the area's susceptibility to adverse impacts resulting from an altered flow regime or change in sediment supply and/or sediment transport .	X	
F. A report that summarizes the findings of evaluation components A through E above, and that considers the project's location, topography, soil and vegetation conditions, proportion of impervious surfaces, natural and infrastructure drainage features, and any other relevant hydrologic and environmental factors to be protected specific to the project's watershed. The report must provide a determination of whether the project will adversely impact any downstream erosion, sedimentation or stream habitat, and identify any areas where adverse impacts are expected.	X	

3. (from Section 2.3, Part 4)**:** If the evaluation specified in (3) above, determines that adverse impacts to downstream erosion, sedimentation or stream habitat will occur, then the project proponent must perform the requirements specified in A, B, and C, below. Check the boxes "yes" or "no" to verify all requirements have been completed.	**YES**	**NO**
A. Conduct hydrologic modeling of the project and the potentially impacted areas, according to modeling standards recommended by the Agency or local watershed authority, for the 1-year, 2-year, and 5-year frequency storm events, at a minimum. Hydrologic modeling results must include determination of peak flow rate, flow velocity, runoff volume, time of concentration, and retention volume for the project area.		X
B. Ensure that the project will be consistent with any approved master plans of drainage or analogous plans or programs.	X	
C. Implement Site Design BMPs as specified in Section 2.5.1, and recommend any additional BMPs that will be implemented to mitigate the adverse impacts identified in (3.F) above.	X	
The requirements for Section 2.3 Part 4 are not complete. The hydrologic modeling of the project has not been completed yet for the 1-year, 2-year and 5-year frequency storm events. The project will be consistent with the Master Plan of Drainage. BMPs recommended in the Master Plan of Drainage to mitigate any impacts include dry extended detention basins, vegetated swales, wet ponds and biofilters and water quality filters.		

2.3 Watershed Impact of Project

As mentioned in Section 2.1, the pollutants of concern for Lytle Creek as it currently exists today in the pre-developed condition are pathogens. Additional pollutants expected because of the proposed development include the following: bacteria/virus, nutrients, pesticides, sediment, trash and debris, organic compounds, oxygen demanding substances, metals and oil & grease. However, the proposed treatment train of BMPs will capture and treat polluted nuisance flow and the first flush runoff for 2-year or less storm events before the stormwater reaches Lytle Creek.

The BMPs will consist of (a) dry extended detention basins, (b) wet ponds/basins, (c) wetland filters, (d) a recirculating stream with pond biofiltration system and (e) vegetated swales. The target capture volume of runoff for each watershed area was calculated using the guidelines presented in the, San Bernardino County Water Quality Management Plan (WQMP) Attachment D. The basins were designed using a volume-based BMP design criteria. Flow-based BMP design is was used for sizing the vegetated swales. The volume-based BMP design from Attachment D requires three calculations: a composite runoff coefficient, maximized detention volume, and target capture volume. The NOAA Atlas 14 precipitation depth for 2-year, 1-hour rainfall is required to size the basins. (See attached NOAA Atlas 14, 2-year Isohyetal Map)

The function of these water quality BMPs (Best Management Practice) is to properly manage stormwater runoff that contain onsite pollutants which will potentially cause a decline in water quality, in addition to reducing erosion and sedimentation. Since the stormwater runoff from this proposed development will drain downstream of the project into Sycamore/Lytle Creeks, efforts are made to ensure proper onsite water quality management.

The proposed Lytle Creek Ranch Development project will not impact stream habitat at the downstream receiving waters. Erosion and sedimentation will be prevented at the downstream receiving waters by the placement of outfall structures from the BMP basins as well as energy dissipaters at the outlets of the overflow storm drain pipes that discharge into Lytle Creek for storm events larger than the 2-year storm event. The BMP basins will also capture first flush storm water runoff from the developed area and contain the runoff before release into Sycamore Creek.

SECTION 3
BEST MANAGEMENT PRACTICE SELECTION PROCESS

3.1 Site Design BMPs

For listed Site Design BMPs, indicate in the following table whether it will be used (yes/no) and describe how used, or, if not used, provide justification/alternative. Provide detailed descriptions of planned Site Design BMPs, if applicable.

1. Minimize Stormwater Runoff, Minimize Project's Impervious Footprint, and Conserve Natural Areas		
Maximize the permeable area. This can be achieved in various ways, including but not limited to, increasing building density (number of stories above or below ground) and developing land use regulations seeking to limit impervious surfaces.		
Yes X	No	
Describe actions taken or justification/alternative: Roof drains will be required that will outlet stormwater onto resident landscape and sheet flow to the curb. The layout of the project provides for clustering of homes or commercial in various areas with the clusters separated by the open space.		
Runoff from developed areas may be reduced by using alternative materials or surfaces with a lower Coefficient of Runoff, or "C-Factor".		
Yes X	No	
Describe actions taken or justification/alternative: Vegetative control to the maximum possible level will be implemented into the proposed development. The extensive open space areas will effectively reduce the C-Factor for the project.		
Conserve natural areas. This can be achieved by concentrating or clustering development on the least environmentally sensitive portions of a site while leaving the remaining land in a natural, undisturbed condition.		
Yes X	No	
Describe actions taken or justification/alternative: Several areas within the proposed development will be left as a combination of natural areas and landscaped open space. The layout of the project development provides for clustering structures on lesser sensitive portions of the project site separated by the open space.		

Construct walkways, trails, patios, overflow parking lots, alleys, driveways, low-traffic streets, and other low-traffic areas with open-jointed paving materials or permeable surfaces, such as pervious concrete, porous asphalt, unit pavers, and granular materials.		
Yes	No X	
Describe actions taken or justification/alternative: These items will be constructed at the minimum allowable standard in order to reduce the amount of impervious area due to the construction of these components. The natural areas and significant landscaping throughout the site will reduce the directly connected impervious areas through the use of landscaped areas and vegetated swales.		
Construct streets, sidewalks, and parking lot aisles to the minimum widths necessary, provided that public safety and a pedestrian friendly environment are not compromised[1]. Incorporate landscaped buffer areas between sidewalks and streets.		
Yes X	No	
Describe actions taken or justification/alternative: These items will be constructed at the minimum allowable standard in order to reduce the amount of impervious area due to the construction of these components. Parkways will be planted with street trees and landscaping.		
Reduce widths of street where off-street parking is available[2].		
Yes X	No	
Describe actions taken or justification/alternative: Street widths will be constructed at minimum allowable standard in order to reduce the amount of impervious area. Off-street parking is provided in enclosed garages with each residential lot.		
Maximize canopy interception and water conservation by preserving existing native trees and shrubs, and planting additional native or drought tolerant trees and large shrubs.		
Yes X	No	
Describe actions taken or justification/alternative: Existing native trees and shrubs will be preserved where feasible. Drought tolerant plant material will be used in the vegetated swales. Drought tolerant and erosion resisting plants will be planted on slopes.		

[1] Sidewalk widths must still comply with Americans with Disabilities Act regulations and other life safety requirements.

[2] However, street widths must still comply with life safety requirements for fire and emergency vehicle access.

Other comparable site design options that are equally effective.		
Describe actions taken _or justification/alternative: Runoff from the residential lots will be directed into the landscaped areas around the lot, which will be configured as vegetated swales. The landscaped areas and vegetated swales will allow for the settlement of sediment, as well as the removal of oil and grease from the lot runoff. The vegetated swales direct runoff in the parkway areas downstream towards street gutters and downstream catch basins.		
Minimize the use of impervious surfaces, such as decorative concrete, in the landscape design.		
Yes X	No	
Describe actions taken _or justification/alternative: Decorative concrete will be minimized on the proposed development. Landscaped areas, parkways, slopes, and common areas will be planted with trees, shrubs, and turf and will not be impervious. Where possible, the pedestrian trails will be decomposed granite or native, which are both pervious.		
Use natural drainage systems.		
Yes X	No	
Describe actions taken or justification/alternative: The natural watershed drainage will be kept in place where possible. Runoff from the residential lots will be directed into the onsite landscaped areas, which will serve as vegetated swales and then toward parkways. The parkway areas will also serve as secondary swales. Also, runoff flows will flow into detention basins, vegetated swales and wet ponds prior to discharge of the adjacent receiving waters.		
Where soils conditions are suitable, use perforated pipe or gravel filtration pits for low flow infiltration[3].		
Yes	No X	
Describe actions taken or justification/alternative: Perforated pipe or gravel filtration pits will not be used for this development. Minimal infiltration is desired to ensure that minimal pollutants will seep into the ground as a result of the proposed project.		
Construct onsite ponding areas, rain gardens, or retention facilities to increase opportunities for infiltration, while being cognizant of the need to prevent the development of vector breeding areas.		
Yes X	No	
Describe actions taken or justification/alternative: Onsite ponding areas, rain gardens, or retention facilities will be constructed where suitable.		

2. Minimize Directly Connected Impervious Areas

Where landscaping is proposed, drain rooftops into adjacent landscaping prior to discharging to the storm drain.

Yes	No	
X		

Describe actions taken or justification/alternative:

Runoff from rooftops will be directed into landscaped areas throughout the project site. Flows from landscaped areas will be directed into vegetated swales.

Where landscaping is proposed, drain impervious sidewalks, walkways, trails, and patios into adjacent landscaping.

Yes	No	
X		

Describe actions taken or justification/alternative:

Landscaped areas will be provided along the site perimeter and directed into vegetated swales provided on each lot. Sidewalks will also drain toward parkway areas, which will be planted with street trees and turf to accept runoff from individual lots and sidewalks.

Increase the use of vegetated drainage swales in lieu of underground piping or imperviously lined swales.

Yes	No	
X		

Describe actions taken or justification/alternative:

Landscaped areas will be provided in the front yards and in open space throughout the project. These areas will allow for ground percolation of surface runoff. Vegetated drainage swales will be used in lieu of underground piping or imperviously lined swales where feasible.

Use one or more of the following:

Yes	No	Design Feature
	X	Rural swale system: street sheet flows to vegetated swale or gravel shoulder, curbs at street corners, culverts under driveways and street crossings
	X	Urban curb/swale system; street slopes to curb; periodic swale inlets drain to vegetated swale/biofilter.
X		Dual drainage system: First flush captured in street catch basins and discharged to adjacent vegetated swale or gravel shoulder, high flows connect directly to municipal storm drain systems.
X		Other comparable design concepts that are equally effective.

Describe actions taken or justification/alternative:

Runoff from individual lots will drain toward vegetated swales within the front yards, with flows directed over the sidewalks and into the parkway areas, which will be planted with street trees and turf. Flows in the parkway areas will be directed into the street gutter for conveyance to downstream catch basins interception, eventually leading to the various BMP swales or BMP basin designed within the project. Extended dry detention basins, wet ponds, vegetated swales, biofilters and water quality filters will be provided throughout the project site to capture nuisance flow, runoff from a 2-year storm or less, and the first flush stormwater runoff from storms larger than the 2-year storm event.

Use one or more of the following features for design of driveways and private residential parking areas:		
Yes	No	Design Feature
X		▪ Design driveways with shared access, flared (single lane at street) or wheel strips (paving only under tires); or, drain into landscaping prior to discharging to the municipal storm drain system.
	X	▪ Uncovered temporary or guest parking on private residential lots may be paved with a permeable surface; or designed to drain into landscaping prior to discharging to the municipal storm drain system.
		▪ Other comparable design concepts that are equally effective.
Describe actions taken or justification/alternative: The suggested design features will be implemented into the proposed development where feasible. It is necessary to pass the polluted runoff through BMP basins before discharge into the designated water bodies.		

Use one or more of the following design concepts for the design of parking areas:		
Yes	**No**	Design Feature
X		Where landscaping is proposed in parking areas, incorporate landscape areas into the drainage design.
	X	Overflow parking (parking stalls provided in excess of the Agency's minimum parking requirements) may be constructed with permeable paving.
X		Other comparable design concepts that are equally effective.
Describe actions taken or justification/alternative: The suggested design features will be implemented into the proposed development where feasible. It is necessary to pass the polluted runoff through BMP basins before discharge into the designated water bodies.		

3.2 Source Control BMPs

Several of the Source Control BMPs listed in the BMP handbook will be implemented for the proposed Lytle Creek Ranch Development. Source controls such as public education, planning management, material use controls, material exposure and disposal controls, spill prevention and clean-up, illegal dumping controls, and street/storm drain maintenance controls will be put in place.

The Homeowner's Association and Property Owner's Association will be given a copy of the Water Quality Management Plan. Annually, the representatives of the Lytle Creek Ranch Homeowner's Association and Property Owner's Association; their employees, landscapers, property managers, and other parties responsible for proper functioning of the BMPs will receive verbal and written training regarding the function and maintenance of the project BMPs. The homeowners will be reminded annually of water quality issues through an Association newsletter.

There will be vegetated buffer strips that will be properly maintained with vegetation, yet not over-fertilized. These grass swales or vegetated buffer zones will be placed between driveways and streets to capture runoff from driveways containing vehicle oils and other vehicle related pollutants.

Resident education and participation will be implemented to manage pollutants that contribute to BOD, for example, requiring residents to keep pets on leashes and to remove feces in order to limit organic material in storm water runoff. Residents will be required to irrigate their properties at certain times of the day for a range of time in order to limit nuisance flow runoff carrying pesticides and other organic material.

Household hazardous waste collection facilities will be put into place for proper disposal of fertilizers, pesticides, cleaning solutions, paint products, automotive products, and swimming pool chemicals. Safer alternative products will be recommended to residents. Proper material storage control will be required to keep materials from causing groundwater contamination, soil contamination, and storm water contamination.

Vehicle leak and spill control will be implemented by educating and requiring vehicle and equipment maintenance, proper vehicle and maintenance fueling, and education of how to handle accidental spills. Stringent fines will be applied to those who violate these requirements and participate in illegal dumping of hazardous material.

Street and storm drain maintenance controls will be put in place with clear signs indicating illegal dumping into street and storm drains.

Source Control BMP Selection Matrix*

Project Category	Source Control BMPs																								
	Education of Property Owners	*Activity Restrictions*	*Spill Contingency Plan*	*Employee Training/Education Program*	*Street Sweeping Private Street and Parking Lots*	*Common Areas Catch Basin Inspection*	*Landscape Planning (SD-10)*	*Hillside Landscaping*	*Roof Runoff Controls (SD-11)*	*Efficient Irrigation (SD-12)*	*Protect Slopes and Channels*	*Storm Drain Signage (SD-13)*	*Inlet Trash Racks*	*Energy Dissipaters*	*Trash Storage Areas (SD-32) and Litter Control*	*Fueling Areas (SD-30)*	*Air/Water Supply Area Drainage*	*Maintenance Bays and Docks (SD-31)*	*Vehicle Washing Areas (SD-33)*	*Outdoor Material Storage Areas (SD-34)*	*Outdoor Work Areas (SD-35)*	*Outdoor Processing Areas (SD-36)*	*Wash Water Controls for Food Preparation Areas*	*Pervious Pavement (SD-20)*	*Alternative Building Materials (SD-21)*
Significant Re-development																									
Home subdivisions of 10 or more units	X	X		X	X	X	X	X	X	X	X	X	X	X											X
Commercial/ Industrial Development >100,000 ft^2	X	X	X	X	X	X	X		X	X	X	X	X		X			X		X					
Automotive Repair Shop																									
Restaurants																									
Hillside Development >10,000 ft^2	X	X		X	X	X	X	X	X	X	X	X	X	X											X
Development of impervious surface >2,500 ft^2																									
Parking Lots >5,000 ft^2 of exposed storm water	X	X		X	X	X	X			X		X	X		X										

* Provide justification of each Source Control BMP that will not be incorporated in the project WQMP, or explanation of proposed equally effective alternatives in the following table.

Justification for Source Control BMPs not incorporated into the project WQMP			
Source Control BMP	Used in Project (yes/no)?	Justification/Alternative*	Implementation Description
Education of Property Owners	Yes		See Page 28
Activity Restrictions	Yes		See Page 28
Spill Contingency Plan	Yes		See Page 28
Employee Training/Education Program			
Street Sweeping Private Street and Parking Lots	No	Public Streets	See Page 28
Common Areas Catch Basin Inspection	Yes		Minimum allowable standard will be provided
Landscape Planning (SD-10)	Yes		See Page 28
Hillside Landscaping	Yes		See Page 28
Roof Runoff Controls (SD-11)	Yes		See Page 29
Efficient Irrigation (SD-12)	Yes		See Page 29
Protect Slopes and Channels	Yes		See Page 29
Storm Drain Signage (SD-13)	Yes		See Page 29
Inlet Trash Racks	Yes		See Page 29
Energy Dissipaters	Yes		See Page 29
Trash Storage Areas (SD-32) and Litter Control	Yes		See Page 29
Fueling Areas (SD-30)	No	Not a Project Feature	
Air/Water Supply Area Drainage	No	Not a Project Feature	
Maintenance Bays and Docks (SD-31)	Yes		Minimum allowable standard will be provided
Vehicle Washing Areas (SD-33)	No	Not a Project Feature	
Outdoor Material Storage Areas (SD-34)	Yes		Minimum allowable standard will be provided
Outdoor Work Areas (SD-35)	No	Not a Project Feature	
Outdoor Processing Areas (SD-36)	No	Not a Project Feature	
Wash Water Controls for Food Preparation Areas	No	Not a Project Feature	
Pervious Pavement (SD-20)	No	Not a Project Feature	
Alternative Building Materials (SD-21)	Yes		See Page 29
*Attach additional sheets if necessary for justification.			

DETAILED DESCRIPTIONS OF SOURCE CONTROL BMP IMPLEMENTATION:

Education for Property Owners: The project owner will implement an education program to the new homeowners during the purchasing of their new home. This education program includes disclosing to the buyer that he or she is responsible for the proper use of pesticides, herbicides, fertilizers, proper disposal of wastes and other storm water pollution prevention programs. The homebuyers will receive and will sign an acknowledgment stating that the materials were received during both the purchase and disclosure process and the final walk-through of their homes. The following materials obtained from the San Bernardino County Flood Control District will be provided:

- Household Hazardous Waste Guide
- A Home Garden Care Guide
- A Stormwater Pollution Brochure

Activity Restrictions: Conditions, Covenants and Restrictions (CC&Rs) will be prepared for and recorded against all lots within Lytle Creek Ranch. The CC&Rs will include activity restrictions intended to prevent stormwater pollution. They will read as follows:

BMP Compliance. Each Owner shall be responsible for compliance with all applicable Best Management Practices and corresponding City Ordinances.

Hazardous or Toxic Waste. Nothing other than natural rain water may be discharged into the storm drains and storm drainage system located on private or public property. The National Pollutant Discharge Elimination System and Section 5650 of the California Fish and Game Code prohibit, among other things, discharging anything other than natural rain water into storm

drainage systems. Toxic chemicals or hydrocarbon compounds such as gasoline, motor oil, antifreeze, solvents, paints, paint thinners, wood preservative and other such fluids shall not be discharged into any street, public or private, or into storm drains or storm water conveyance systems. Uses and disposal of pesticides, fungicides, herbicides, insecticides, fertilizers and other such chemical treatments shall meet federal, state, County and City requirements as prescribed on their respective containers. All Owners within the Project are required to comply with such restrictions.

Spill Contingency Plan: Any spills of chemicals shall be properly cleaned up and the waste properly disposed of per all State, County and Local requirements.

Street Sweeping: The streets and parking lots within the project site are all public streets, and therefore will be sweeped regularly in accordance with the local street sweeping policy. Street sweeping will remove small particle size sediments with absorbed pollutants.

Landscape Planning: The project is subject to the local agency review process for proper planning and placement of drought-tolerant, fire-wise and erosion resistant vegetation throughout the site. A licensed landscape architect prepares the landscape plan that is then evaluated and reviewed by City Staff. The landscape plan includes landscaping of the front yards of all lots, as well as the landscaping portions of the common areas.

Hillside Landscaping: The project has significant hillside terrain within Neighborhood 1. The landscape plan prepared by a licensed landscape architect includes efficient irrigation and planting of many of the slopes with drought-tolerant, fire-wise and erosion resistant plant material. Some of the hillside will remain undisturbed with its native vegetation. As discussed above, the landscape plan is subject to the City's review process for landscaping proposed throughout the site.

DETAILED DESCRIPTIONS OF SOURCE CONTROL BMP IMPLEMENTATION (CONTINUED):

Roof Runoff Controls: The proposed homes will be equipped with gutters and downspouts that will be discharged to an erosion-resistant material within the landscaped area surrounding the structure. This roof runoff will then be directed through the vegetated swales within in each front yard. The proposed commercial/industrial structures will be equipped with gutters and downspouts that will be discharged to an erosion-resistant material within the landscaped area surrounding the structure.

Efficient Irrigation: As discussed above, a landscape plan will be prepared by a licensed landscape architect that includes efficient irrigation and planting of many of the slopes with drought-tolerant, fire-wise and erosion resistant plant material. Some of the hillside will remain undisturbed with its native vegetation. As discussed above, the landscape plan is subject to the City's review process for landscaping proposed throughout the site.

Protect Slopes and Channels: At various intervals along the slopes, v-ditches and terrace drains will be installed to safely convey runoff from tops of slopes and to provide protection from erosion. The v-ditches and terrace drain designs and placement were prepared by a licensed Civil Engineer and are reflected in the grading plan for the project. Additionally, as discussed above, a landscape plan will be prepared by a licensed landscape architect that includes efficient irrigation and planting of many of the slopes with drought-tolerant, fire-wise and erosion resistant plant material. Some of the hillside will remain undisturbed with its native vegetation. Both the grading plan and the landscape plan are subject to the City's review process for improvements proposed throughout the site.

Storm Drain Signage: Catch basins will be stenciled to read, "NO DUMPING-ONLY RAIN IN DRAIN" as specified in the storm drain plans prepared for the project. The storm drain plan is subject to the local agency review process for improvements proposed throughout the site.

Inlet Trash Racks: Inlet trash racks will be installed as specified in the storm drain plans prepared for the project. The storm drain plan is subject to the local agency review process for improvements proposed throughout the site.

Energy Dissipaters: Energy dissipaters are proposed at the termination of the down drains, transition from terrace drains to vegetated swales, and in areas where runoff could cause excessive erosion. Rip-rap features have been incorporated in these areas and will be installed as specified in the grading and storm drain plans prepared for the project. These plans are subject to the local agency review process for improvements proposed throughout the site.

Trash Storage Areas: Each residence will have its own trash bin to contain trash and litter as provided by the City of Redlands Municipal Utilities Department. Covered trash receptacles will be provided along the trails and within the park sites.

Alternative Building Materials: Each residence will have a tile roof which is virtually maintenance free. The gutters and downspouts will not be bare metal, but will be coated to eliminate contact of bare metal with rainfall. For homes with architectural features that include siding, a fiber-cement siding material is used as an alternative material to simulate wood siding. These alternative building materials will reduce potential sources of pollutants by reducing the need for painting and other maintenance.

3.3 Treatment Control BMPS (Not required for Non-Category projects)

- Complete the following Treatment Control BMP~~s~~ Selection Matrix. For each pollutant of concern enter "yes" if identified in Section 2.1, above, or "no" if not identified for the project. Check the boxes of selected BMPs that will be implemented for the project to address each pollutant of concern from the project as listed above in section 2.1. Treatment Control BMPs must be selected and installed with respect to identified pollutant characteristics and concentrations that will be discharged from the site. For any identified pollutants of concern not listed in the Treatment Control BMP Selection Matrix, provide an explanation of how they will be addressed by Treatment Control BMPs. For identified pollutants of concern that are causing an impairment in receiving waters (as identified in Section 2.1, above), the project WQMP shall incorporate one or more Treatment Control BMPs of medium or high effectiveness in reducing those pollutants. It is the responsibility of the project proponent to demonstrate, and document in the project WQMP, that all pollutants of concern will be fully addressed. The Agency may require information beyond the minimum requirements of this WQMP to demonstrate that adequate pollutant treatment is being accomplished.

- In addition to completing the Selection Matrix, provide detailed descriptions on the location, implementation, installation, and long-term O&M of planned Treatment Control BMPs.

Each respective BMP shall be implemented prior to occupancy of those residential structures which they serve within the project. There is no actual start-up procedure for the extended detention basin and the vegetated swale. However, the irrigation facilities necessary to maintain the vegetation proposed within the facilities shall be constructed and fully functional prior to occupancy of the residential and industrial/commercial structures that those BMPs serve.

Refer to Section 4 for the proposed BMP's and their operation and maintenance for each planned treatment control BMPs for Lytle Creek Ranch.

Treatment Control BMP Selection Matrix

Pollutant of Concern		Treatment Control BMP Categories							
		Biofilters	**Detention Basins(2)**	**Infiltration Basins(3)**	**Wet Ponds or Wetlands**	**Filtration**	**Water Quality Inlets**	**Hydrodynamic Separator Systems (4)**	**Manufactured/ Proprietary Devices**
Sediment/Turbidity		H/M	M	H/M	H/M	H/M	L	H/M (L for turbidity)	U
Yes/No?	Yes	X	X		X				
Nutrients		L	M	H/M	H/M	L/M	L	L	U
Yes/No?	Yes	X	X		X				
Organic Compounds		U	U	U	U	H/M	L	L	U
Yes/No?	Yes	X	X		X				
Trash & Debris		L	M	U	U	H/M	M	H/M	U
Yes/No?	Yes	X	X		X				
Oxygen Demanding Substances		L	M	H/M	H/M	H/M	L	L	U
Yes/No?	Yes	X	X		X				
Bacteria & Viruses		U	U	H/M	U	H/M	L	L	U
Yes/No?	Yes	X	X		X				
Oils & Grease		H/M	M	U	U	H/M	M	L/M	U
Yes/No?	Yes	X	X		X				
Pesticides (non-soil bound)		U	U	U	U	U	L	L	U
Yes/No?	Yes	X	X		X				
Metals		H/M	M	H	H	H	L	L	U
Yes/No?	Yes	X	X		X				

3.4 BMP Design Criteria

- The following Treatment Control BMP(s) (Flow Based or Volume Based) will be implemented for this project (***check "Implemented" box, if used***):

Design Basis of Treatment Control BMPs

Implemented	Treatment Control BMP	Design Basis
	Vegetated Buffer Strips	Flow Based
X	Vegetated Swale	
	Multiple Systems	
	Manufactured/Proprietary	
	Bioretention	Volume Based
X	Wet Pond	
	Constructed Wetland	
X	Extended Detention Basin	
	Water Quality Inlet	
	Retention/Irrigation	
	Infiltration Basin	
	Infiltration Trench	
	Media Filter	
	Manufactured/Proprietary	

3.4.1 Flow Based Design Criteria

The vegetated swales considered for the proposed project indicated in the above table for flow based design are intended for passive control measures only. These measures are intended for consideration in site design and landscape planning where the vegetation in the community will maximize infiltration, provide retention, slow the runoff, and minimize impervious land coverage. These vegetated areas include resident yards, parks, and street medians.

3.4.2 Volume-Based Design Criteria

The Maximized Volume Method was used to determine the target capture volume of the water quality basins. The Water Quality Volume is the found by using the following equation.

WQV = Water Quality Event Depth x Runoff Coefficient x Tributary Area

Where:

Water Quality Event Depth = 0.8 in" (NOAA Atlas-14 2-year, 1-hour precipitation depths) (2-yr, 24-hour storm value established by Regional Water Quality Control Boards, Region 8)

Runoff Coefficient = Calculated using land use type and San Bernardino County Hydrology Manual.

The following table contains the proposed BMP calculations. In each case, the regression constant for P_6 is 1.909, the 6-hour mean storm rainfall (P_6) is 1.527 inches and the 24-hour drawdown (a) is 1.582 (San Bernardino County Water Quality Management Plan , 2005, Attachment D).

BMP Calculations

Neighborhood number	Basin Number	Watershed area (acres)	Watershed Impervious Ratio, i	Composite Runoff Coefficient, C_{BMP}	Max Detention Volume, P_0 (in)	Target Capture Volume (ac-ft)
1	1	5.6	0.40	0.28	0.68	0.3
1	2	10.0	0.90	0.73	1.76	1.5
1	3	36.3	0.40	0.28	0.68	2.0
1	4	2.8	0.90	0.73	1.76	0.4
1	5	26.6	0.40	0.28	0.68	1.5
1	6	54.5	0.40	0.28	0.68	3.1
2	1	226.0	0.75	0.54	1.31	24.7
2	2	163.0	0.75	0.54	1.31	17.8
2	3	40.4	0.90	0.73	1.76	5.9
2	4	20.0	0.90	0.73	1.76	2.9
2	5	85.0	0.90	0.73	1.76	12.5
2	6	75.0	0.90	0.73	1.76	11.0
3	1	67.8	0.75	0.54	1.31	7.4
3	2	22.9	0.75	0.54	1.31	2.5
3	3	56.2	0.90	0.73	1.76	8.3
3	4	38.2	0.90	0.73	1.76	5.6
3	5	49.4	0.90	0.73	1.76	7.3
3	6	96.2	0.90	0.73	1.76	14.1
3	7	49.9	0.90	0.73	1.76	7.3
3	8	25.9	0.90	0.73	1.76	3.8
3	9	42.3	0.90	0.73	1.76	6.2
3	10	5.5	0.90	0.73	1.76	0.8
3	11	51.4	0.90	0.73	1.76	7.6

Neighborhood number	Basin Number	Watershed area (acres)	Watershed Impervious Ratio, i	Composite Runoff Coefficient, C_{BMP}	Max Detention Volume, P_0 (in)	Target Capture Volume (ac-ft)
3	12	21.0	0.90	0.73	1.76	3.1
3	13	13.6	0.90	0.73	1.76	2.0
3	14	24.0	0.90	0.73	1.76	3.5
3	15	6.0	0.90	0.73	1.76	0.9
4	1	15.8	0.75	0.54	1.31	1.7
4	2	40.0	0.75	0.54	1.31	4.4
4	3	34.5	0.50	0.34	0.82	2.4

NOAA Atlas 14 Precipitation Depth for 2-yr 1-hr Rainfall = 0.8

Regression Coefficient for P6 = 1.909

6-hr Mean Storm Rainfall, P6 = 1.5272 in

24-hr Drawdown, a = 1.582

Section 4
Operation and Maintenance

4.1 Operations and Maintenance

Dry Extended Detention Basin BMP Description

The purpose of the dry extended detention basin is to aid in the removal of pollutants. Water Quality basins provide the following pollutant removal mechanisms: settling or sedimentation; infiltration; adsorption to sediments, vegetation, or detritus; filtration by plants; microbial uptake and/or transformations; and uptake by wetland plants or algae.

Operation and Maintenance Practices

Water Quality Basin Preventive Maintenance and Routine Inspections			
Design Criteria, Routine Actions	**Maintenance Indicator**	**Inspection Frequency**	**Maintenance Activity**
Drain time	Less than 48 hours or more than 72 hours for full basin Goal is to have a drain time of 48 hours	One storm per year which results in a full basin	If time too long, open riser cap and discharge remaining volume, within 1 day. Remove and dispose of debris/trash from outlet/outlet screen
Basin side slope planted for erosion protection and planted invert	Average plant height greater than 18-inches	Bi-monthly	Cut vegetation to an average height of 18-inches and remove trimmings. Vegetation along the side slopes can remain, and periodically thinned to allow access to the basin invert and visual observation of the operation of the basin inlets and outlets from the maintenance access points.
Inspect for adequate vegetative cover	Less than 70 percent coverage on invert and side slopes	October each year	Reseed/replant barren spots, scarify surface if needed. Reseed/replant preferably prior to the rainy season. If reseeding/replanting is not successful, install erosion blanket along barren spots
Inspect for possible vector harborage	Standing water for more than 72 hours	About monthly, 72 hours after a storm event	Immediately notify Vector Control Agency for vector abatement assessment
Inspection for trash and debris at inlet and outlet structures	Debris/trash present	About monthly and before a storm. Before and after onset of wet season.	Remove and dispose of trash and debris

Water Quality Basin Preventive Maintenance and Routine Inspections			
Design Criteria, Routine Actions	**Maintenance Indicator**	**Inspection Frequency**	**Maintenance Activity**
Inspection for sediment management and characterization of sediment for removal	Sediment depth averages 18-inches or 10 percent of basin volume which ever is less	Each Summer	Remove and dispose of sediment when maintenance indicator has been exceeded. Regrade and revegetate
Inspect for burrowing rodent activity	Ground squirrel holes, vole or gopher mounds	As needed, for rodent activity with abatement immediately if the activity affects the performance of the BMP otherwise abate annually in September	Abate or control rodents as necessary
Inspect for standing water	Water accumulation in any structure or other location within the basin	Annually in Spring	Where gravity draining is possible, drain the standing water
General Maintenance Inspection	Inlet structures, outlet structures, side slopes or other features damaged, significant erosion, emergence of trees or woody vegetation, graffiti or vandalism, fence damage, etc.	Bi-monthly.	Take corrective action.

Operation and Maintenance Cost

The following table summarizes average annual operation and maintenance cost which may be used as the basis for estimating total O&M cost for the proposed BMP within the property. These rates may vary depending upon the rates of the company contracted to perform the O&M of the BMPs. These values are sufficient for budgeting purposes. However, it should be noted that the estimated costs may vary depending upon the size of the BMP, approved labor rates, the watershed characteristics, and location of the BMP.

Maintenance Costs for each Water Quality Basin	
Item	**Cost**
Sediment Removal	$22/cy
Inlet & Outlet Maintenance (Annual Labor)	$7,700/year

Long-Term Maintenance Responsibilities
The party or parties that will be responsible for each BMP O&M will be determined by conditions of approval and by articles of incorporation.

<u>Vegetated Swale BMP Description</u>

Vegetated swales are an accepted method of treating runoff. Vegetated swales are open, shallow channels with vegetation covering the side slopes and bottom that collect and slowly convey runoff flow to downstream discharge points. They are designed to treat runoff through

filtering by the vegetation in the channel, filtering through a subsoil matrix, and/or infiltration into the underlying soils. Swales can be natural or manmade. They trap particulate pollutants (suspended solids and trace metals), promote infiltration, and reduce the flow velocity of stormwater runoff. Vegetated swales can serve as part of a stormwater drainage system and can replace curbs, gutters and storm sewer systems. If properly designed, vegetated, and operated, swales can serve as an aesthetic, potentially inexpensive urban development or roadway drainage conveyance measure with significant collateral water quality benefits.

Operation and Maintenance Practices

Bioswales Preventive Maintenance and Routine Inspections			
Design Criteria, Routine Actions	**Maintenance Indicator**	**Inspection Frequency**	**Maintenance Activity**
Side slope planted for erosion protection and planted invert	Average plant height greater than 12-inches	Bi-monthly	Cut vegetation to an average height of 6-inches and remove trimmings or per HMP approved criteria
Inspect for adequate vegetative cover	Less than 70 percent coverage on invert and side slopes	October each year	Reseed/replant barren spots, scarify surface if needed. Reseed/replant preferably prior to the rainy season. If reseeding/replanting is not successful, install erosion blanket along barren spots
Inspection for trash and debris at entrance and exit	Debris/trash present	About monthly and before a storm. Before and after onset of wet season.	Remove and dispose of trash and debris
Inspection for sediment management and characterization of sediment for removal	Sediment depth averages 18-inches or 10 percent of basin volume which ever is less	*Each Summer*	Remove and dispose of sediment when maintenance indicator has been exceeded. Regrade and revegetate if vegetation coverage drops below 70 percent.

Operation and Maintenance Costs

The following table summarizes average annual operation and maintenance cost which may be used as the basis for estimating total O&M cost for the BMPs within the property. These rates may vary depending upon the rates of the company contracted to perform the O&M of the BMPs. These values are sufficient for budgeting purposes. However, it should be noted that the estimated costs may vary depending upon the size of the BMP, approved labor rates, the watershed characteristics, and location of the BMP.

Maintenance Costs for Bioswales	
Item	**Cost**
Routine Maintenance (Per 100 linear feet)	$150/year

An estimated annual expense for bioswale maintenance is $450.

Long-Term Maintenance Responsibilities

The party or parties that will be responsible for each BMP O&M will be determined by conditions of approval and by articles of incorporation.

Irrigation/Landscape Common Area Including Trash

Maintenance Item:	Maintenance Need When:	When to Inspect:	Maintenance Needed:
Irrigation System	Spray heads missing or over sprays.	Weekly as part of the routine landscape maintenance.	Adjust or replace spray heads as necessary.
Landscaping/Common Area	Landscaping requires mowing or trimming.	Weekly	Mow and trim landscaping. Also, pick up loose trash.
Trash Storage Areas	Insure trash is within covered containers	Weekly	Pick up loose trash and insure containers are covered and closed

Wet Pond BMP Description

The wet BMP retention ponds utilize physical and biological techniques as treatment forms for storm water runoff and nuisance flow. The wet BMP basin will consist of aquatic vegetation essential to promote pollutant removal by sedimentation and root penetration. As runoff bypasses aquatic vegetation in wet BMPs, flow velocity is reduced allowing pollutants to settle for enhanced percolation or be absorbed by the plant root structure (vadose zone) through biological uptake. A minimum detention period is necessary to allow wet BMPs to improve storm water quality. Pollutants captured in the soil are allowed to degrade or recharge into the groundwater.

Wet retention ponds will be constructed in existing natural depressions within the stream corridor and/or excavated depressions creating ponds within the stream corridor. At Lytle Creek Ranch West, wet ponds are expected to be replenished by irrigation water drawn from onsite wells and/or from the local water purveyor. Continuous base flow is necessary in wet ponds to sustain a habitat for vegetative growth which is required for pollutant removal.

Between storm events, the evaporation process results in concentrated levels of pollutants, salts, and algae. With subsequent storm events, existing pond water is flushed and diluted with the influent stormwater runoff. Wet BMP basins are designed to remain permanent ponds during dry conditions between storm events.

Operation and Maintenance Practices

Wet Ponds Preventive Maintenance and Routine Inspections			
Design Criteria, Routine Actions	**Maintenance Indicator**	**Inspection Frequency**	**Maintenance Activity**
Drain time	Less than 48 hours or more than 72 hours for full basin Goal is to have a drain time of 48 hours	One storm per year which results in a full basin	If time too long, open riser cap and discharge remaining volume, within 1 day. Remove and dispose of debris/trash from outlet/outlet screen

Wet Ponds Preventive Maintenance and Routine Inspections			
Design Criteria, Routine Actions	**Maintenance Indicator**	**Inspection Frequency**	**Maintenance Activity**
Inspect emergent and perimeter shoreline vegetation	Vegetation too dense to allow mosquito fish access	Annual inspection in summer	Harvest vegetation annually to allow mosquito fish to provide the needed control. Maintain site vegetation to facilitate vector surveillance and control activities.
Inspect for adequate vegetative cover	Less than 70 percent coverage on invert and side slopes	October each year	Reseed/replant barren spots, scarify surface if needed. Reseed/replant preferably prior to the rainy season. If reseeding/replanting is not successful, install erosion blanket along barren spots
Inspect for possible vector harborage		About monthly, 72 hours after a storm event	Immediately notify Vector Control Agency for vector abatement assessment; where permitted stock with mosquito fish (Gambusia spp.) to enhance natural mosquito and midge control
Inspection for trash and debris at inlet and outlet structures	Debris/trash present	About monthly and before a storm. Before and after onset of wet season.	Remove and dispose of trash and debris
Inspection for sediment management and characterization of sediment for removal	Sediment depth averages 18-inches or 10 percent of basin volume which ever is less	Each Summer	Remove and dispose of sediment when maintenance indicator has been exceeded. Regrade and revegetate
Inspect for burrowing rodent activity	Ground squirrel holes, vole or gopher mounds	As needed, for rodent activity with abatement immediately if the activity affects the performance of the BMP otherwise abate annually in September	Abate or control rodents as necessary
General Maintenance Inspection	Inlet structures, outlet structures, side slopes or other features damaged, significant erosion, emergence of trees or woody vegetation, graffiti or vandalism, fence damage, etc.	Bi-monthly.	Take corrective action.

Operation and Maintenance Cost

The following table summarizes average annual operation and maintenance cost which may be used as the basis for estimating total O&M cost for the proposed BMP within the property. These rates may vary depending upon the rates of the company contracted to perform the O&M of the BMPs. These values are sufficient for budgeting purposes. However, it should be noted that the estimated costs may vary depending upon the size of the BMP, approved labor rates, the watershed characteristics, and location of the BMP.

Maintenance Costs for Wet Ponds	
Item	**Cost**
Sediment Removal	$22/cy
Vegetation harvest for vector control (Annual Labor)	$17,000/year
Litter Removal (Annual Labor)	$3,000/year

Long-Term Maintenance Responsibilities

The party or parties that will be responsible for each BMP O&M will be determined by conditions of approval and by articles of incorporation.

Biofilter and Water Quality Filter Description

The lake system will incorporate submerged gravel bed biofilters. Water is drawn from one end of the lake by a biofilter pump and discharged via pipelines under the lake, to each biofilter. The heart of the biofilter is the filter media, which has a high surface area to provide as much biological activity as possible. As the biofilter matures, then the biomass of bacteria steadily increases and the layer of bacteria that cover all surfaces becomes thicker. Only the outermost layer of the bacteria will be operating at peak efficiency and if the layer becomes thick enough, the inside layer may become anaerobic. The total surface area available for bacterial growth is a good predictor of the biofilter to convert ammonia.

Resistance to plugging or clogging is important since this is a serious problem for biofilters. Plugging or clogging of a filter can occur through mechanical trapping of particles. Plugging can also result from growth of the biomass and bridging across the spaces within the media. Light attenuation is important for the biofilter since nitrifying bacteria are sensitive to light.

The biofilter ponds are typically 3 to 4 feet deep, filled with gravel, and submerged 18 to 24 inches below the lake water surface. Water is distributed through the biofilter gravel bed via a herringbone slotted pipe system. A naturally occurring biological mass (microorganisms) will coat the gravel and serve to strip the water passing through the filter of nutrients (such as nitrogen and phosphorous) that would otherwise promote algae growth within the lake. Biofilters are situated in locations in the lake where circulation is limited. Pumping reintroduces oxygen into the lake system, thereby increasing the overall dissolved oxygen levels and promoting a healthy natural environment. The combination of a limited food supply and aerobic conditions within the lake creates an inhospitable environment for undesirable organisms and reduces the potential for eutrophication. Biofilters have the ability to accomplish the following functions:

- Convert ammonia to nitrites and then to nitrogen gas
- Reduce BOD
- Add oxygen
- Remove carbon dioxide
- Remove excess nitrogen and other inert gases
- Remove turbidity and clarify water
- Remove various organics

SECTION 5
FUNDING

5.1 Funding

The Permit requires that for all Treatment Control BMPs, a funding source or sources for operation and maintenance of each BMP be identified within the WQMP.

Responsible Party

Name:

Address:

Contact Name:

Telephone Number:

SECTION 6
WQMP Certification

6.1 Certification

- The applicant is required to sign and certify that the WQMP is in conformance with Santa Ana Regional Water Quality Control Board Order Number R8-2002-0012 (NPDES Permit No. CAS618036).

- The applicant is required to sign and date the following statement 'word-for-word' certifying that the provisions of the WQMP have been accepted by the applicant and that the applicant will have the plan transferred to future successors (transferability statement). The certification must be signed by the property owner, unless a written designation by the owner allows a designee to sign on the owner's behalf.

"This Water Quality Management Plan has been prepared for (Owner/Developer Name) by (Consulting /Engineering Firm Name). It is intended to comply with the requirements of the City of (name city or county) for Tract/Parcel Map No. _____, Condition Number(s) _____ requiring the preparation of a Water Quality Management Plan (WQMP). The undersigned is aware that Best Management Practices (BMPs) are enforceable pursuant to the City's/County's Water Quality Ordinance No. _____. The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan and will ensure that this plan is amended as appropriate to reflect up-to-date conditions on the site consistent with San Bernardino County's Municipal Stormwater Management Program and the intent of the NPDES Permit for San Bernardino County and the incorporated cities of San Bernardino County within the Santa Ana Region. Once the undersigned transfers its interest in the property, its successors in interest and the city/county shall be notified of the transfer. The new owner will be informed of its responsibility under this WQMP. A copy of the approved WQMP shall be available on the subject site in perpetuity. "

"I certify under a penalty of law that the provisions (implementation, operation, maintenance, and funding) of the WQMP have been accepted and that the plan will be transferred to future successors."

_____	_____
Applicant's Signature	Date
_____	_____
Applicant's Name	Applicant's Telephone Number

Attachment A-1

Maintenance Mechanisms

A-1.1 The Agency shall not accept stormwater structural BMPs as meeting the WQMP requirements standard, unless an O&M Plan is prepared (see WQMP Section 2.6) and a mechanism is in place that will ensure ongoing long-term maintenance of all structural and non-structural BMPs. This mechanism can be provided by the Agency or by the project proponent. As part of project review, if a project proponent is required to include interim or permanent structural and non-structural BMPs in project plans, and if the Agency does not provide a mechanism for BMP maintenance, the Agency shall require that the applicant provide verification of maintenance requirements through such means as may be appropriate, at the discretion of the Agency, including, but not limited to covenants, legal agreements, maintenance agreements, conditional use permits and/or funding arrangements (OC 2003)

A-1.2 Maintenance Mechanisms

1. **Public entity maintenance**: The Agency may approve a public or acceptable quasi-public entity (e.g., the County Flood Control District, or annex to an existing assessment district, an existing utility district, a state or federal resource agency, or a conservation conservancy) to assume responsibility for operation, maintenance, repair and replacement of the BMP. Unless otherwise acceptable to individual Agencies, public entity maintenance agreements shall ensure estimated costs are front-funded or reliably guaranteed, (e.g., through a trust fund, assessment district fees, bond, letter of credit or similar means). In addition, the Permittees may seek protection from liability by appropriate releases and indemnities.

   The Agency shall have the authority to approve stormwater BMPs proposed for transfer to any other public entity within its jurisdiction before installation. The Permittee shall be involved in the negotiation of maintenance requirements with any other public entities accepting maintenance responsibilities within their respective jurisdictions; and in negotiations with the resource agencies responsible for issuing permits for the construction and/or maintenance of the facilities. The Agency must be identified as a third party beneficiary empowered to enforce any such maintenance agreement within their respective jurisdictions.
2. **Project proponent agreement to maintain stormwater BMPs:** The Agency may enter into a contract with the project proponent obliging the project proponent to maintain, repair and replace the stormwater BMP as necessary into perpetuity. Security or a funding mechanism with a “no sunset” clause may be required.

3. **Assessment districts:** The Agency may approve an Assessment District or other funding mechanism created by the project proponent to provide funds for stormwater BMP maintenance, repair and replacement on an ongoing basis. Any agreement with such a District shall be subject to the Public Entity Maintenance Provisions above.

4. **Lease provisions:** In those cases where the Agency holds title to the land in question, and the land is being leased to another party for private or public use, the Agency may assure stormwater BMP maintenance, repair and replacement through conditions in the lease.

5. **Conditional use permits:** For discretionary projects only, the Agency may assure maintenance of stormwater BMPs through the inclusion of maintenance conditions in the conditional use permit. Security may be required.

6. **Alternative mechanisms:** The Agency may accept alternative maintenance mechanisms if such mechanisms are as protective as those listed above.

Attachment A-2

Water Quality Management Plan and Stormwater BMP Transfer, Access and Maintenance Agreement (adapted from documents from the Ventura County Stormwater Management Program)

Recorded at the request of:

City of _____

After recording, return to:

City of _____

City Clerk _____

Water Quality Management Plan and Stormwater BMP Transfer, Access and Maintenance Agreement

OWNER: _____

PROPERTY ADDRESS: _____

_____

APN: _____

THIS AGREEMENT is made and entered into in

_____, California, this _____day of

_____, by and between

_____, herein after

referred to as "Owner" and the CITY OF _____, a municipal corporation, located in the County of San Bernardino, State of California hereinafter referred to as "CITY";

WHEREAS, the Owner owns real property ("Property") in the City of _____, County of San Bernardino, State of California, more specifically described in Exhibit "A" and depicted in Exhibit "B", each of which exhibits is attached hereto and incorporated herein by this reference;

WHEREAS, at the time of initial approval of development project known as _____within the Property described herein, the City required the project to employ Best Management Practices, hereinafter referred to as "BMPs," to minimize pollutants in urban runoff;

WHEREAS, the Owner has chosen to install and/or implement BMPs as described in the Water Quality Management Plan, on file with the City, hereinafter referred to as "WQMP", to minimize pollutants in urban runoff and to minimize other adverse impacts of urban runoff;

WHEREAS, said WQMP has been certified by the Owner and reviewed and approved by the City;

WHEREAS, said BMPs, with installation and/or implementation on private property and draining only private property, are part of a private facility with all maintenance or replacement, therefore, the sole responsibility of the Owner in accordance with the terms of this Agreement;

WHEREAS, the Owner is aware that periodic and continuous maintenance, including, but not necessarily limited to, filter material replacement and sediment removal, is required to assure peak performance of all BMPs in the WQMP and that, furthermore, such maintenance activity will require compliance with all Local, State, or Federal laws and regulations, including those pertaining to confined space and waste disposal methods, in effect at the time such maintenance occurs;

NOW THEREFORE, it is mutually stipulated and agreed as follows:

1. Owner hereby provides the City of City's designee complete access, of any duration, to the BMPs and their immediate vicinity at any time, upon reasonable notice, or in the event of emergency, as determined by City's Director of Public Works no advance notice, for the purpose of inspection, sampling, testing of the Device, and in case of emergency, to undertake all necessary repairs or other preventative measures at owner's expense as provided in paragraph 3 below. City shall make every effort at all times to minimize or avoid interference with Owner's use of the Property.

2. Owner shall use its best efforts diligently to maintain all BMPs in a manner assuring peak performance at all times. All reasonable precautions shall be exercised by Owner and Owner's representative or contractor in the removal and extraction of any material(s) from the BMPs and the ultimate disposal of the material(s) in a manner consistent with all relevant laws and regulations in effect at the time. As may be requested from time to time by the City, the Owner shall provide the City with documentation identifying the material(s) removed, the quantity, and disposal destination.

3. In the event Owner, or its successors or assigns, fails to accomplish the necessary maintenance contemplated by this Agreement, within five (5) days of being given written notice by the City, the City is hereby authorized to cause any maintenance necessary to be done and charge the entire cost and expense to the Owner or Owner's successors or assigns, including administrative costs, attorneys fees and interest thereon at the maximum rate authorized by the Civil Code from the date of the notice of expense until paid in full.

4. The City may require the owner to post security in form and for a time period satisfactory to the city to guarantee the performance of the obligations state herein. Should the Owner fail to perform the obligations under the Agreement, the City may, in the case of a cash bond, act for the Owner using the proceeds from it, or in the case of a surety bond, require the sureties to perform the obligations of the Agreement. As an additional remedy, the Director may withdraw any previous stormwater-related approval with respect to the property on which BMPs have been installed and/or implemented until such time as Owner repays to City its reasonable costs incurred in accordance with paragraph 3 above.

5. This agreement shall be recorded in the Office of the Recorder of San Bernardino County, California, at the expense of the Owner and shall constitute notice to all successors and assigns of the title to said Property of the obligation herein set forth, and also a lien in such amount as will fully reimburse the City, including interest as herein above set forth, subject to foreclosure in event of default in payment.

6. In event of legal action occasioned by any default or action of the Owner, or its successors or assigns, then the Owner and its successors or assigns agree(s) to pay all costs incurred by the City in enforcing the terms of this Agreement, including reasonable attorney's fees and costs, and that the same shall become a part of the lien against said Property.

7. It is the intent of the parties hereto that burdens and benefits herein undertaken shall constitute covenants that run with said Property and constitute a lien there against.

8. The obligations herein undertaken shall be binding upon the heirs, successors, executors, administrators and assigns of the parties hereto. The term "Owner" shall include not only the present Owner, but also its heirs, successors, executors, administrators, and assigns. Owner shall notify any successor to title of all or part of the Property about the existence of this Agreement. Owner shall provide such notice prior to such successor obtaining an interest in all or part of the Property. Owner shall provide a copy of such notice to the City at the same time such notice is provided to the successor.

9. Time is of the essence in the performance of this Agreement.

10. Any notice to a party required or called for in this Agreement shall be served in person, or by deposit in the U.S. Mail, first class postage prepaid, to the address set forth below. Notice(s) shall be deemed effective upon receipt, or seventy-two (72) hours after deposit in the U.S. Mail, whichever is earlier. A party may change a notice address only by providing written notice thereof to the other party.

IF TO CITY:

_____

_____

_____

_____

IF TO OWNER:

_____

_____

_____

_____

IN WITNESS THEREOF, the parties hereto have affixed their signatures as of the date first written above.

APPROVED AS TO FORM:

_____
City Attorney

_____
CITY OF

_____
Name

_____
Title

ATTEST:

_____
City Clerk Date

OWNER:

_____
Name

_____
Title

OWNER:

_____
Name

_____
Title

NOTARIES ON FOLLOWING PAGE

EXHIBIT A
(Legal Description)

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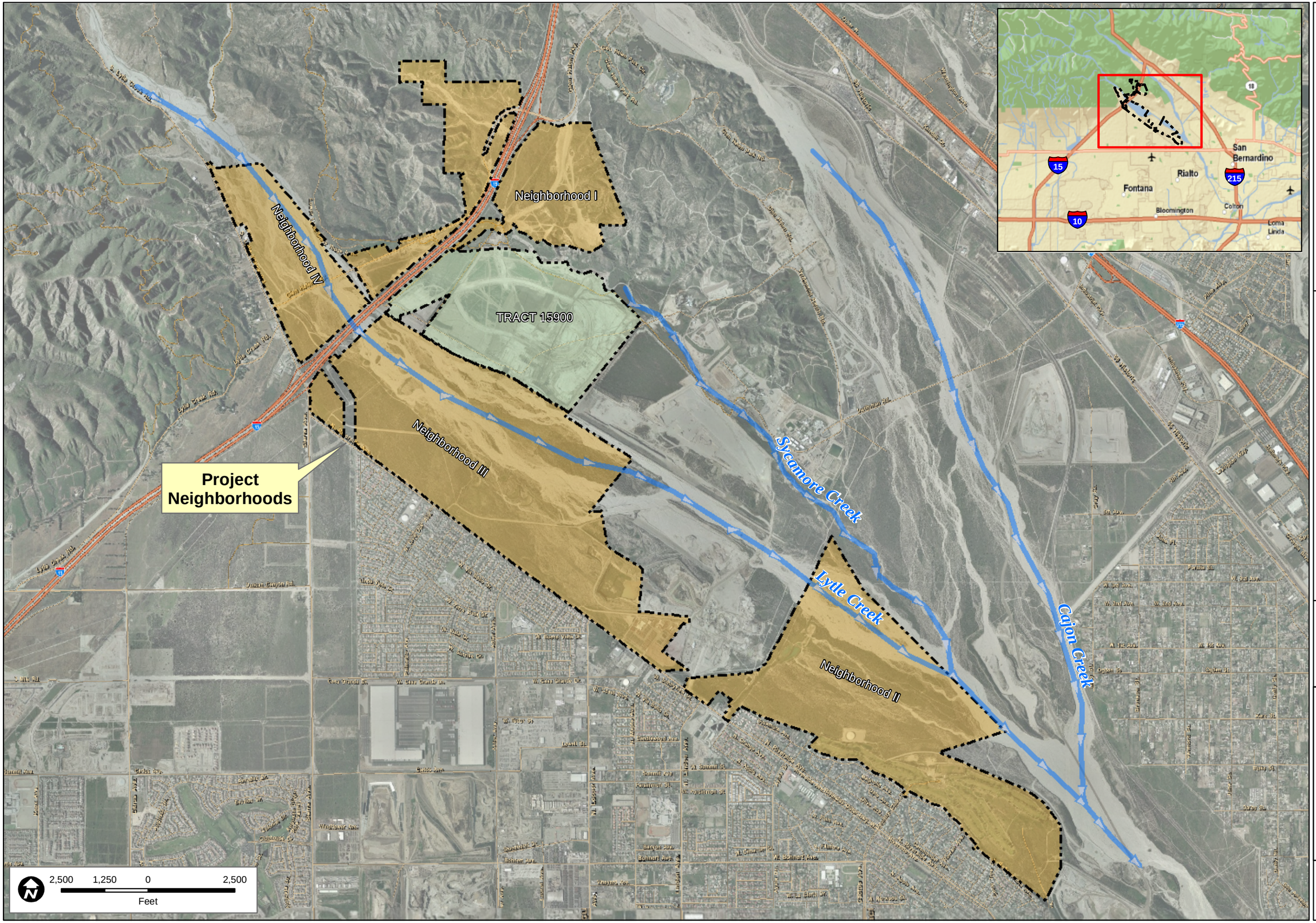

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TITLE

Vicinity Map

JOB

Lytle Creek Ranch

RIALTO CA

SCALE	1"= 2500'
DESIGNED	CD
DRAWING	PC
CHECKED	JS
DATE	02/12/08
JOB NO.	8425-E

PACE
PACIFIC ADVANCED CIVIL ENGINEERING
17822 NEWHOPE STREET, SUITE 200
FOUNTAIN VALLEY, CA 92708
PH (714) 481-7300 FAX (714) 481-7299

FIGURE

1

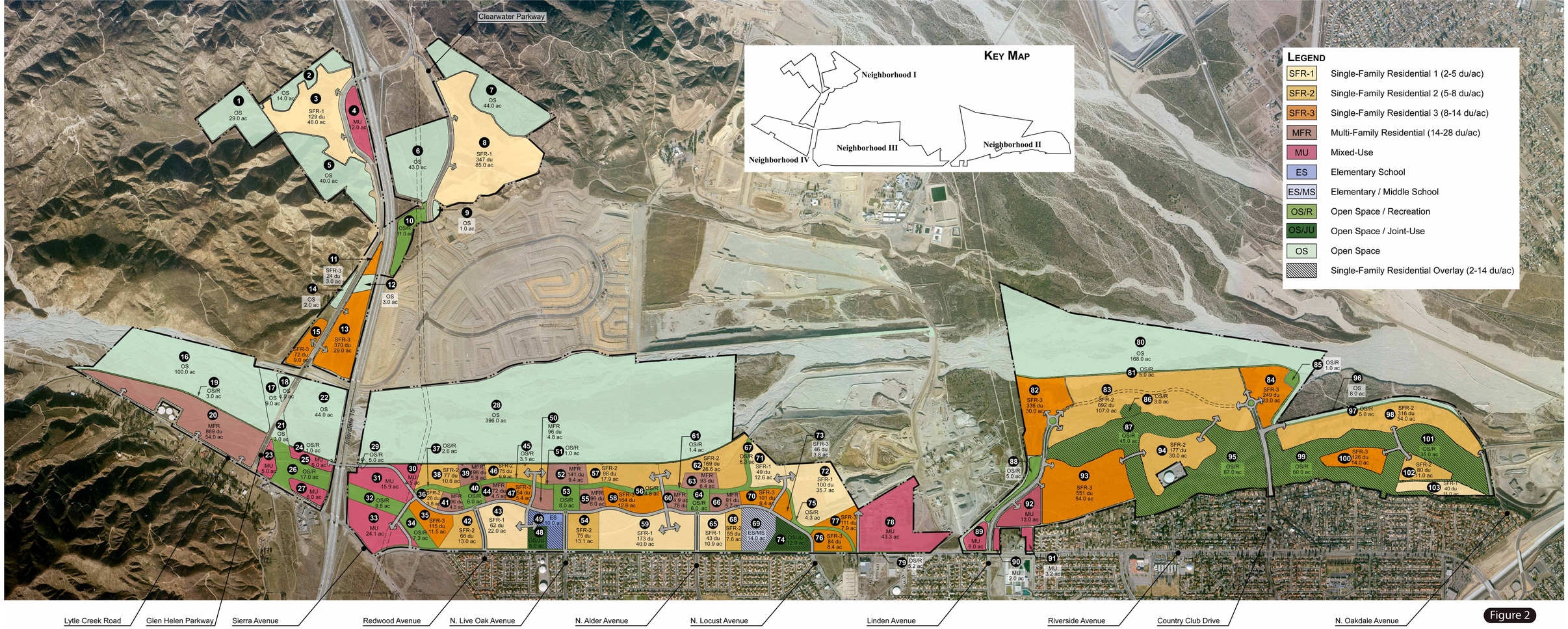

Figure 2

Lytle Development Joint Venture III

Lytle Creek Ranch Land Use Plan

Rialto, California

Note: Planning Areas 82-84, 93-94, 98, 100, and 102-103 will be constructed as Active Adult Housing.

Disclaimer:
This map is conceptual only and subject to change. No warranties, guarantees or representations or warranties of any type are made by this plan.

0' 400' 800' 1,600'

KTGY GROUP, INC. Architecture + Planning

January 14, 2008

\\prod1\AdZICPUD\20070284 Lytle Creek Ranch\Production\Graphics\Site Plans\2008.01.14 Plan\Lytle Creek LUP 2008.1.14 400sc 40x88.ai

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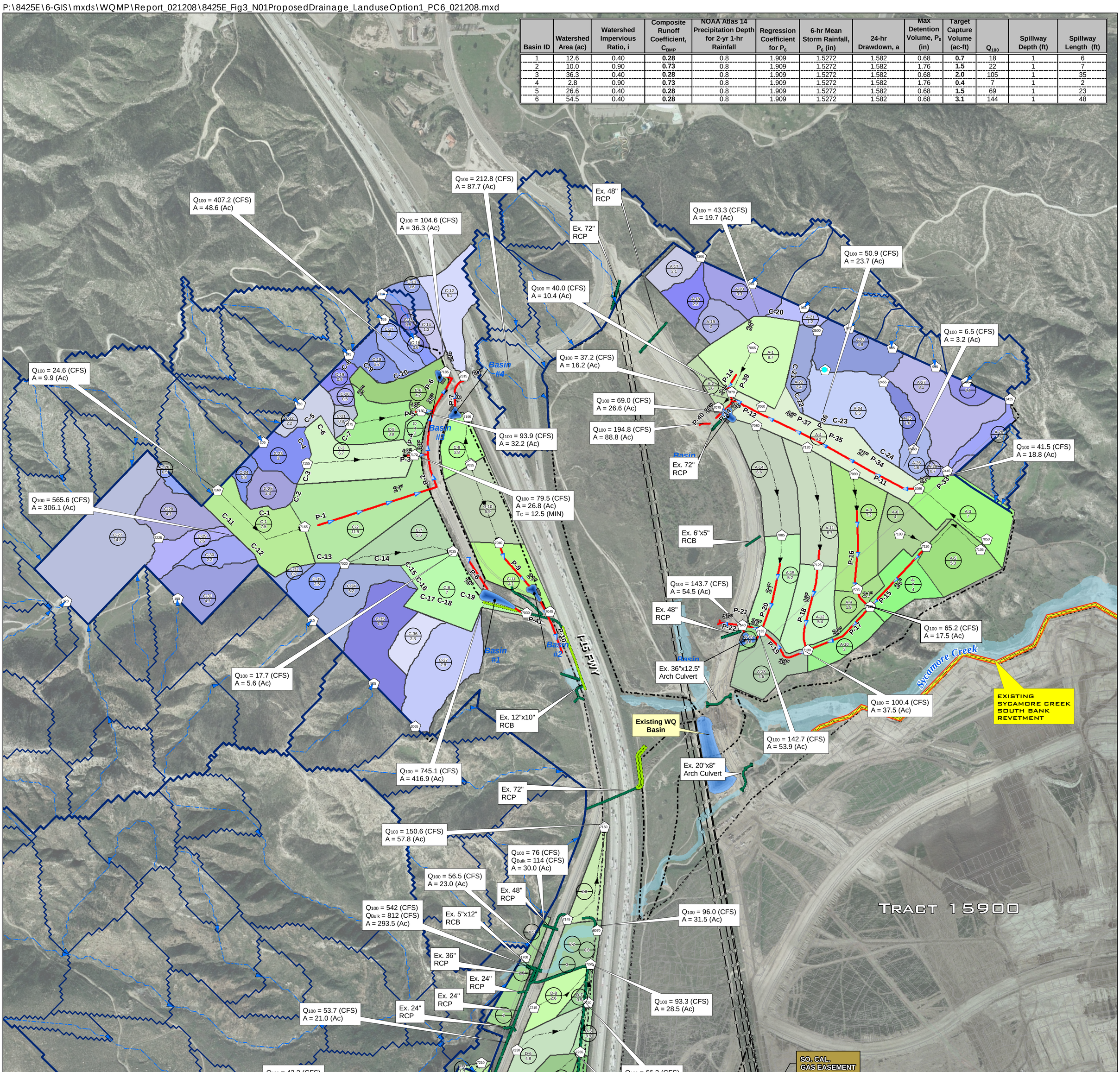
Basin ID	Watershed Area (ac)	Watershed Impervious Ratio, i	Composite Runoff Coefficient, C_{BMP}	NOAA Atlas 14 Precipitation Depth for 2-yr 1-hr Rainfall	Regression Coefficient for P_6	6-hr Mean Storm Rainfall, P_6 (in)	24-hr Drawdown, a	Max Detention Volume, P_0 (in)	Target Capture Volume (ac-ft)	Q_{100}	Spillway Depth (ft)	Spillway Length (ft)
1	12.6	0.40	**0.28**	0.8	1.909	1.5272	1.582	0.68	**0.7**	18	1	6
2	10.0	0.90	**0.73**	0.8	1.909	1.5272	1.582	1.76	**1.5**	22	1	7
3	36.3	0.40	**0.28**	0.8	1.909	1.5272	1.582	0.68	**2.0**	105	1	35
4	2.8	0.90	**0.73**	0.8	1.909	1.5272	1.582	1.76	**0.4**	7	1	2
5	26.6	0.40	**0.28**	0.8	1.909	1.5272	1.582	0.68	**1.5**	69	1	23
6	54.5	0.40	**0.28**	0.8	1.909	1.5272	1.582	0.68	**3.1**	144	1	48



OPEN CHANNEL			
	BASE	SIDE SLOPE (H:V)	DEPTH
C-1	5.0'	2:1	1.0'
C-2	5.0'	2:1	1.0'
C-3	5.0'	2:1	2.0'
C-4	5.0'	2:1	2.0'
C-5	5.0'	2:1	2.0'
C-6	5.0'	2:1	2.0'
C-7	5.0'	2:1	2.0'
C-8	2.0'	2:1	1.0'
C-9	2.0'	2:1	1.0'
C-10	5.0'	2:1	2.5'
C-11	5.0'	2:1	1.0'
C-12	8.0'	3:1	3.0'
C-13	10.0'	3:1	3.5'
C-14	10.0'	3:1	3.5'
C-15	10.0'	3:1	3.5'
C-16	10.0'	3:1	3.5'
C-17	10.0'	3:1	3.5'
C-18	10.0'	3:1	3.5'
C-19	10.0'	3:1	3.5'
C-20	5.0'	2:1	1.0'
C-21	5.0'	2:1	1.0'
C-22	5.0'	2:1	1.0'
C-23	5.0'	2:1	1.0'
C-24	5.0'	2:1	1.0'

NEIGHBORHOOD 1		
PIPE ID	SLOPE	DIAMETER
P-1	3%	18"
P-2	3%	18"
P-3	9%	18"
P-4	3%	30"
P-5	6%	18"
P-6	2%	30"
P-7	4%	18"
P-8	4%	18"
P-9	4%	18"
P-10	2%	Ex.12'x10' RCB
P-11	2%	18"
P-12	1%	24"
P-13	6%	18"
P-14	1%	36"
P-15	3%	24"
P-16	2%	18"
P-17	3%	24"
P-18	3%	18"
P-19	4%	30"
P-20	3%	18"
P-21	5%	30"
P-22	5%	30"
P-29	5%	72"
P-30	4%	30"
P-31	4%	42"
P-32	1%	66"
P-33	2%	30"
P-34	2%	30"
P-35	2%	30"
P-36	0%	48"
P-37	0%	54"
P-38	4%	30"
P-39	6%	30"
P-40	6%	42"
P-41	6%	78"

FIGURE 3

PACE
PACIFIC ADVANCED CIVIL ENGINEERING
17520 NEWHOPE STREET, SUITE 200
FOUNTAIN VALLEY, CA 92708
PH (714) 481-7300 FAX (714)481-7299

SCALE	1"= 400
DESIGNED	CD
DRAWING	PC
CHECKED	JS
DATE	02/12/08
JOB NO.	8425-E

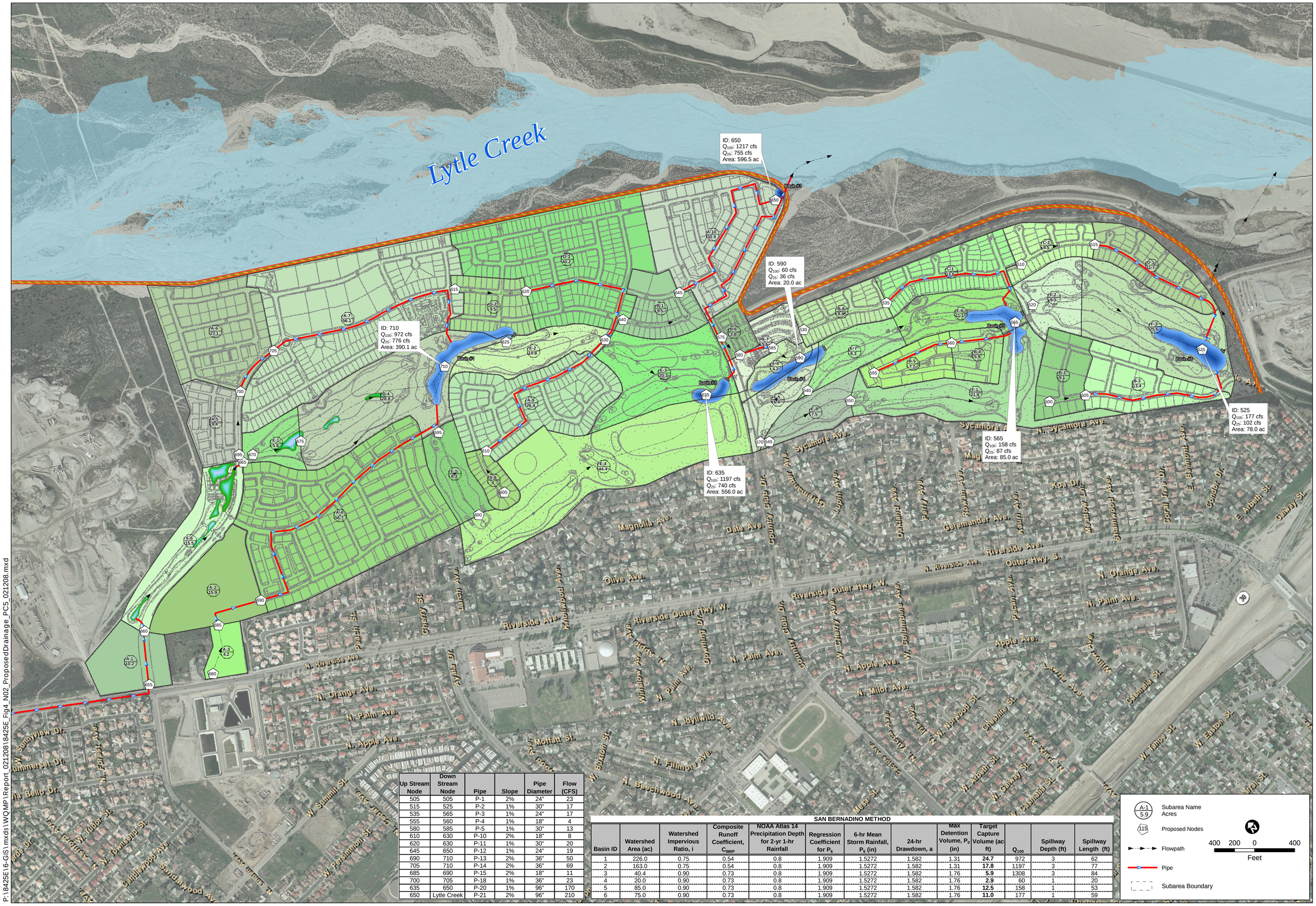
JOB

Lytle Creek Ranch

RIALTO CA

TITLE

Master Drainage Plan
Neighborhood 1



Up Stream Node	Down Stream Node	Pipe	Slope	Pipe Diameter	Flow (CFS)
505	505	P-1	2%	24"	23
515	525	P-2	1%	30"	17
535	565	P-3	1%	24"	17
555	560	P-4	1%	18"	4
580	585	P-5	1%	30"	13
610	630	P-10	2%	18"	8
620	630	P-11	1%	30"	20
645	650	P-12	1%	24"	19
690	710	P-13	2%	36"	50
705	710	P-14	2%	36"	69
685	690	P-15	2%	18"	11
700	705	P-18	1%	36"	23
635	650	P-20	1%	96"	170
650	Lytle Creek	P-21	2%	96"	210

SAN BERNADINO METHOD

Basin ID	Watershed Area (ac)	Watershed Impervious Ratio, i	Composite Runoff Coefficient, C_{BMP}	NOAA Atlas 14 Precipitation Depth for 2-yr 1-hr Rainfall	Regression Coefficient for P_6	6-hr Mean Storm Rainfall, P_6 (in)	24-hr Drawdown, a	Max Detention Volume, P_0 (in)	Target Capture Volume (ac ft)	Q_{100}	Spillway Depth (ft)	Spillway Length (ft)
1	226.0	0.75	0.54	0.8	1.909	1.5272	1.582	1.31	**24.7**	972	3	62
2	163.0	0.75	0.54	0.8	1.909	1.5272	1.582	1.31	**17.8**	1197	3	77
3	40.4	0.90	0.73	0.8	1.909	1.5272	1.582	1.76	**5.9**	1308	3	84
4	20.0	0.90	0.73	0.8	1.909	1.5272	1.582	1.76	**2.9**	60	1	20
5	85.0	0.90	0.73	0.8	1.909	1.5272	1.582	1.76	**12.5**	158	1	53
6	75.0	0.90	0.73	0.8	1.909	1.5272	1.582	1.76	**11.0**	177	1	59

TITLE
Master Drainage Plan
Neighborhood 2

JOB
Lytle Creek Ranch
RIALTO CA

SCALE 1"= 400'
DESIGNED RL
DRAWING PC
CHECKED WN
DATE 02/12/08
JOB NO. 8425-E

PACE
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17520 NEWHOPE STREET, SUITE 200
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PH (714) 481-7300 FAX (714) 481-7299

FIGURE
4

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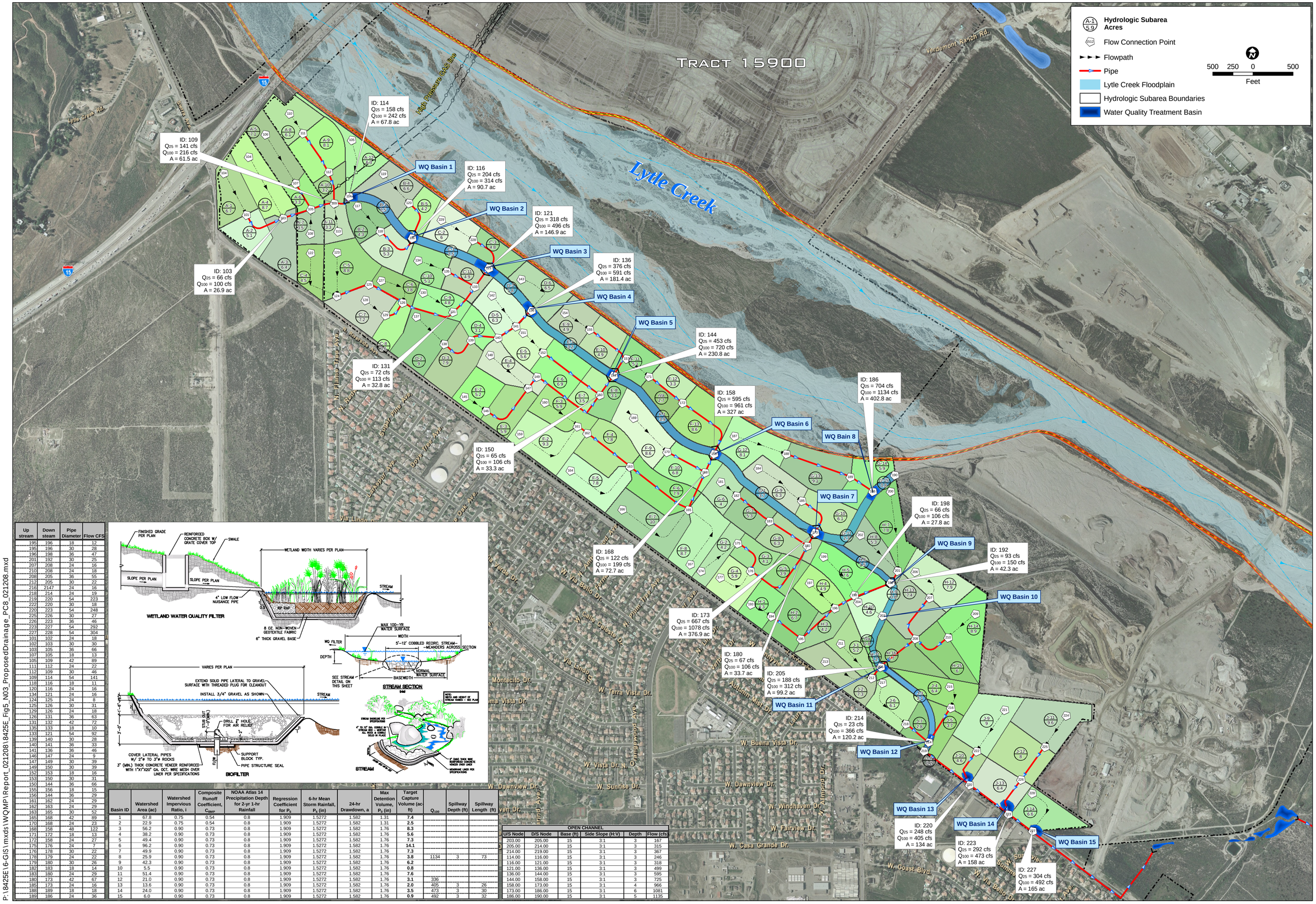

Up stream	Down steam	Pipe Diameter	Flow CFS
195	196	18	12
195	196	30	28
196	198	36	47
201	192	30	25
207	208	24	16
210	208	24	18
208	205	36	55
212	205	30	22
216	2147	24	16
218	214	24	19
222	220	54	223
222	220	30	18
220	223	54	248
225	226	30	27
226	223	36	46
223	227	54	292
227	228	54	304
101	102	24	18
102	103	30	30
103	105	36	66
107	105	18	13
105	109	42	89
111	112	24	22
112	109	30	46
109	114	54	141
118	116	18	11
120	116	24	16
134	121	24	16
124	125	24	8
125	126	30	31
129	126	24	18
126	131	36	63
131	132	42	72
135	133	18	10
133	121	54	92
139	140	30	28
140	141	36	33
141	136	36	46
146	147	24	9
147	149	30	39
149	150	30	39
152	153	18	16
150	144	30	31
150	144	36	66
155	156	18	15
156	144	36	29
161	162	24	29
162	163	24	29
163	165	30	52
165	168	42	89
170	168	24	23
168	158	48	122
171	172	18	13
172	158	24	27
175	176	24	7
176	178	30	22
178	179	24	22
179	180	30	26
182	183	18	14
183	180	24	29
180	173	42	67
185	173	24	16
188	189	18	18
189	186	24	36

Basin ID	Watershed Area (ac)	Watershed Impervious Ratio, i	Composite Runoff Coefficient, C_{NRCS}	NOAA Atlas 14 Precipitation Depth for 2-yr 1-hr Rainfall	Regression Coefficient for P_6	6-hr Mean Storm Rainfall, P_6 (in)	24-hr Drawdown, a	Max Detention Volume, P_D (in)	Target Capture Volume (ac-ft)	Q_{100}	Spillway Depth (ft)	Spillway Length (ft)
1	67.8	0.75	0.54	0.8	1.909	1.5272	1.582	1.31	**7.4**			
2	22.9	0.75	0.54	0.8	1.909	1.5272	1.582	1.31	**2.5**			
3	56.2	0.90	0.73	0.8	1.909	1.5272	1.582	1.76	**8.3**			
4	38.2	0.90	0.73	0.8	1.909	1.5272	1.582	1.76	**5.6**			
5	49.4	0.90	0.73	0.8	1.909	1.5272	1.582	1.76	**7.3**			
6	96.2	0.90	0.73	0.8	1.909	1.5272	1.582	1.76	**14.1**			
7	49.9	0.90	0.73	0.8	1.909	1.5272	1.582	1.76	**7.3**			
8	25.9	0.90	0.73	0.8	1.909	1.5272	1.582	1.76	**3.8**	1134	3	73
9	42.3	0.90	0.73	0.8	1.909	1.5272	1.582	1.76	**6.2**			
10	5.5	0.90	0.73	0.8	1.909	1.5272	1.582	1.76	**0.8**			
11	51.4	0.90	0.73	0.8	1.909	1.5272	1.582	1.76	**7.6**			
12	21.0	0.90	0.73	0.8	1.909	1.5272	1.582	1.76	**3.1**	336		
13	13.6	0.90	0.73	0.8	1.909	1.5272	1.582	1.76	**2.0**	405	3	26
14	24.0	0.90	0.73	0.8	1.909	1.5272	1.582	1.76	**3.5**	473	3	30
15	6.0	0.90	0.73	0.8	1.909	1.5272	1.582	1.76	**0.9**	492	3	32

OPEN CHANNEL						
U/S Node	D/S Node	Base (ft)	Side Slope (H:V)	Depth	Flow (cfs)
203.00	205.00	15	3:1	3	167
205.00	214.00	15	3:1	3	315
214.00	219.00	15	3:1	3	367
114.00	116.00	15	3:1	3	246
116.00	121.00	15	3:1	3	318
121.00	136.00	15	3:1	3	499
136.00	144.00	15	3:1	3	595
144.00	158.00	15	3:1	3	725
158.00	173.00	15	3:1	4	966
173.00	186.00	15	3:1	6	1081
186.00	190.00	15	3:1	5	1135

TITLE
Master Drainage Plan
Neighborhood 3

JOB
Lytle Creek Ranch
CA

SCALE	1"= 600'
DESIGNED	CD
DRAWING	PC
CHECKED	SP
DATE	02/12/08
JOB NO.	8425-E

RIALTO

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FIGURE
5

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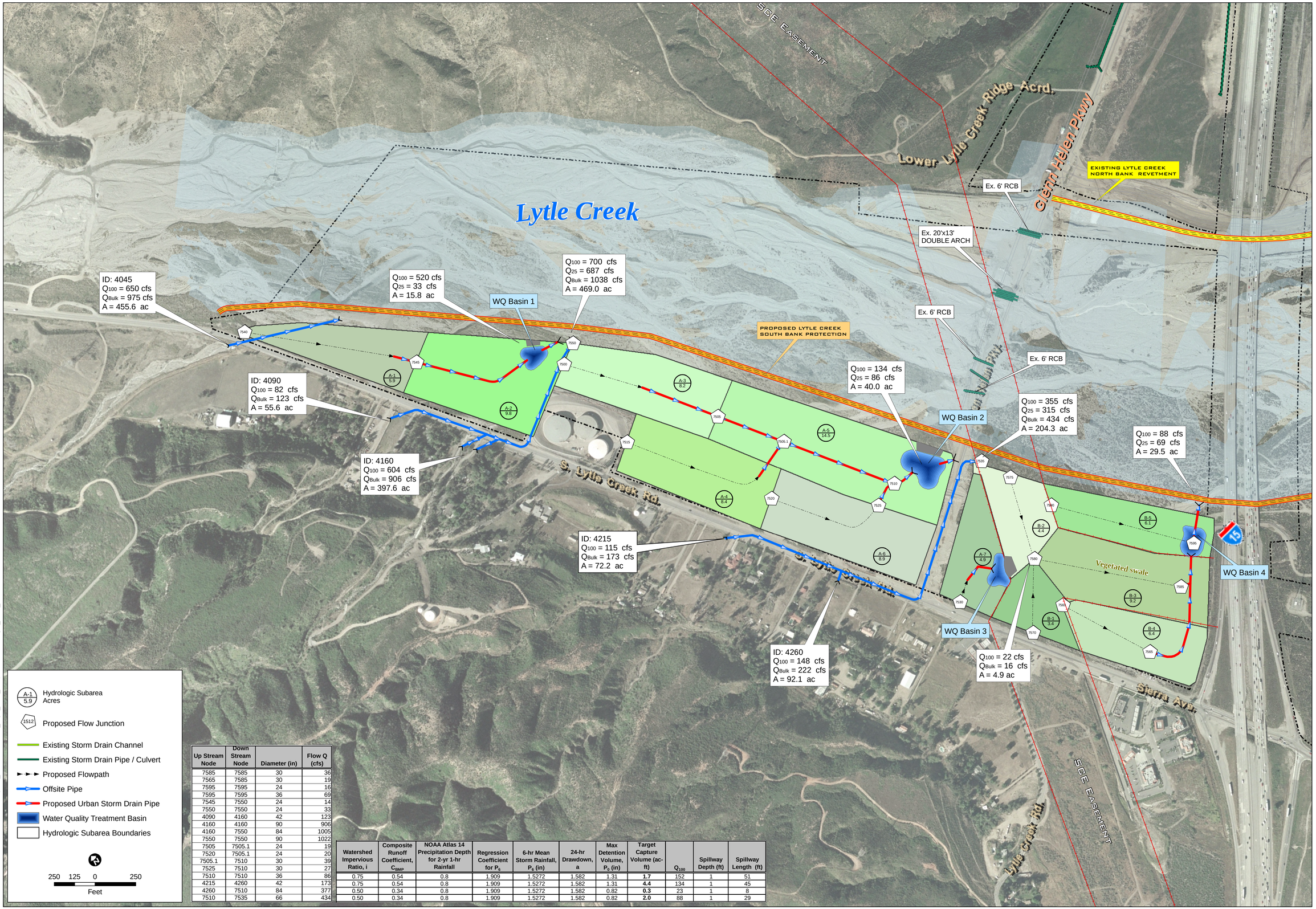

Hydrologic Subarea
Acres

Proposed Flow Junction

Existing Storm Drain Channel

Existing Storm Drain Pipe / Culvert

Proposed Flowpath

Offsite Pipe

Proposed Urban Storm Drain Pipe

Water Quality Treatment Basin

Hydrologic Subarea Boundaries

250 125 0 250
Feet

Up Stream Node	Down Stream Node	Diameter (in)	Flow Q (cfs)
7585	7585	30	36
7565	7585	30	19
7595	7595	24	16
7595	7595	36	69
7545	7550	24	14
7550	7550	24	33
4090	4160	42	123
4160	4160	90	906
4160	7550	84	1005
7550	7550	90	1022
7505	7505.1	24	19
7520	7505.1	24	20
7505.1	7510	30	39
7525	7510	30	27
7510	7510	36	86
4215	4260	42	173
4260	7510	84	377
7510	7535	66	434

Watershed Impervious Ratio, i	Composite Runoff Coefficient, C_{BMP}	NOAA Atlas 14 Precipitation Depth for 2-yr 1-hr Rainfall	Regression Coefficient for P_6	6-hr Mean Storm Rainfall, P_6 (in)	24-hr Drawdown, a	Max Detention Volume, P_0 (in)	Target Capture Volume (ac-ft)	Q_{100}	Spillway Depth (ft)	Spillway Length (ft)
0.75	0.54	0.8	1.909	1.5272	1.582	1.31	**1.7**	152	1	51
0.75	0.54	0.8	1.909	1.5272	1.582	1.31	**4.4**	134	1	45
0.50	0.34	0.8	1.909	1.5272	1.582	0.82	**0.3**	23	1	8
0.50	0.34	0.8	1.909	1.5272	1.582	0.82	**2.0**	88	1	29

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TITLE
Master Drainage Plan
Neighborhood 4

JOB
Lytle Creek Ranch
CA
RIALTO

SCALE 1" = 250'
DESIGNED CD
DRAWING PC
CHECKED SP
DATE 02/12/08
JOB NO. 8425-E

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FIGURE
6

Attachment B
Tables

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Table B-1
303(d) List of Impaired Water Bodies

Waterbody	Pollutant					
	Bacteria Indicators/ Pathogens	Metals	Nutrients	Organic Enrichment	Sedimentation/Siltration	Suspended Solids
Big Bear Lake		X	X		X	
Canyon Lake (Railroad Canyon Reservoir)	X		X			
Chino Creek Reach 1	X		X			
Chino Creek Reach 2	X					
Cucamonga Creek, Valley Reach	X					
Grout Creek		X	X			
Knickerbocker Creek	X	X				
Lytle Creek	X					
Mill Creek (Prado Area)	X		X			X
Mill Creek Reach 1	X					
Mill Creek Reach 2	X					
Mountain Home Creek	X					
Mountain Home Creek, East Fork	X					
Prado Park Lake	X		X			
Rathbone (Rathbun Creek)			X		X	
Santa Ana River, Reach 3	X					
Santa Ana River, Reach 4	X					
Summit Creek			X			

NOTES:

1) Summary of the 2002 303(d) Listed Water Bodies and Associated Pollutants of Concern from RWQCB Region 8. Check for updated lists from the RWQCB.

2) Chlorides, pesticides, salinity, total dissolved solids (TDS), toxicity, and trash are listed impairments within the 303(d) table, however, they are not impairments in the above waterbodies.

Table B-2
C Values Based on Impervious/Pervious Area Ratios

% Impervious	% Pervious	C
0	100	0.15
5	95	0.19
10	90	0.23
15	85	0.26
20	80	0.30
25	75	0.34
30	70	0.38
35	65	0.41
40	60	0.45
45	55	0.49
50	50	0.53
55	45	0.56
60	40	0.60
65	35	0.64
70	30	0.68
75	25	0.71
80	20	0.75
85	15	0.79
90	10	0.83
95	5	0.86
100	0	0.90

NOTE:

Obtain individual runoff coefficient C-Factors from the local agency or from the local flood control district.

If C-Factors are not available locally, obtain factors from hydrology text books or estimate using this table.

Composite the individual C-Factors using area-weighted averages to calculate the Composite C Factor for the area draining to a treatment control BMP.

Do not use the C-Factors in this table for flood control design or related work.

Attachment C
Pollutants of Concern

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Pollutants of Concern

- *Bacteria and Viruses* – Bacteria and Viruses are ubiquitous microorganisms that thrive under certain environmental conditions. Their proliferation is typically cause by the transport of animal or human fecal wastes from the watershed. Water, containing excessive bacteria and viruses, can alter the aquatic habitat and create a harmful environment for humans and aquatic life. Also, the decomposition of excess organic waste causes increased growth of undesirable organisms in the water.

- *Metals* – The primary source of metal pollution in stormwater is typically commercially available metals and metal products. Metals of concern include cadmium, chromium, copper, lead, mercury, and zinc. Lead and chromium have been used as corrosion inhibitors in primer coatings and cooling tower systems. Metals are also raw material components in non-metal products such as fuels, adhesives, paints, and other coatings. At low concentrations naturally occurring in soil, metals may not be toxic. However, at higher concentrations, certain metals can be toxic to aquatic life. Humans can be impacted from contaminated groundwater resources, and bioaccumulation of metals in fish and shellfish. Environmental concerns, regarding the potential for release of metals to the environment, have already led to restricted metal usage in certain applications (OC 2003).

- *Nutrients* – Nutrients are inorganic substances, such as nitrogen and phosphorus. Excessive discharge of nutrients to water bodies and streams causes eutrophication, where aquatic plants and algae growth can lead to excessive decay of organic matter in the water body, loss of oxygen in the water, release of toxins in sediment, and the eventual death of aquatic organisms. Primary sources of nutrients in urban runoff are fertilizers and eroded soils.

- *Pesticides* -- Pesticides (including herbicides) are chemical compounds commonly used to control nuisance growth or prevalence of organisms. Relatively low levels of the active component of pesticides can result in conditions of aquatic toxicity. Excessive or improper application of a pesticide may result in runoff containing toxic levels of its active ingredient (OC 2003).

- *Organic Compounds* – Organic compounds are carbon-based. Commercially available or naturally occurring organic compounds are found in pesticides, solvents, and hydrocarbons. Organic compounds can, at certain concentrations, indirectly or directly constitute a hazard to life or health. When rinsing off objects, toxic levels of solvents and cleaning compounds can be discharged to storm drains. Dirt, grease, and grime retained in the cleaning fluid or rinse water may also adsorb levels of organic compounds that are harmful or hazardous to aquatic life (OC 2003).

- *Sediments* – Sediments are solid materials that are eroded from the land surface. Sediments can increase turbidity, clog fish gills, reduce spawning habitat, lower young aquatic organisms survival rates, smother bottom dwelling organisms, and suppress aquatic vegetation growth.

- *Trash and Debris* – Trash (such as paper, plastic, polystyrene packing foam, and aluminum materials) and biodegradable organic matter (such as leaves, grass cuttings, and food waste) are general waste products on the landscape. The presence of trash and debris may

have a significant impact on the recreational value of a water body and aquatic habitat. Trash impacts water quality by increasing biochemical oxygen demand.

- *Oxygen-Demanding Substances* – This category includes biodegradable organic material as well as chemicals that react with dissolved oxygen in water to form other compounds. Proteins, carbohydrates, and fats are examples of biodegradable organic compounds. Compounds such as ammonia and hydrogen sulfide are examples of oxygen-demanding compounds. The oxygen demand of a substance can lead to depletion of dissolved oxygen in a water body and possibly the development of septic conditions. A reduction of dissolved oxygen is detrimental to aquatic life and can generate hazardous compounds such as hydrogen sulfides.

- *Oil and Grease* – Oil and grease in water bodies decreases the aesthetic value of the water body, as well as the water quality. Primary sources of oil and grease are petroleum hydrocarbon products, motor products from leaking vehicles, esters, oils, fats, waxes, and high molecular-weight fatty acids.

Attachment D
Flow- and Volume-Based BMP Design Calculations

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INSTRUCTIONS FOR ESTIMATING VOLUME- AND FLOW-BASED BMP DESIGN RUNOFF QUANTITIES[4]

1) Identify the "BMP Drainage Area" that drains to the proposed BMP element. This includes all areas that will drain to the proposed BMP element, including pervious areas, impervious areas, and off-site areas, whether or not they are directly or indirectly connected to the BMP element. Calculate the BMP Drainage Area (A) in acres.

2) Outline the Drainage Area on the NOAA Atlas 14 Precipitation Depths (2-year 1hour Rainfall) map (Figure D-1).

3) Determine the area-averaged 2-year 1-hour rainfall value for the Drainage Area outlined above.

A. Flow-Based BMP Design

1) Calculate the composite runoff coefficient, CBMP, as defined in part A.2, above.

2) Determine which Region the BMP Drainage Area is located in (Valley, Mountain or Desert).

3) Determine BMP design rainfall intensity, IBMP, by multiplying the area-averaged 2-year 1-hour value from the NOAA Atlas 14 map by the appropriate regression coefficient from Table D-1 ("I"), and then multiplying by the safety factor specified in the criteria—usually a factor of 2.

4) Calculate the target BMP flow rate, Q, by using the following formula (see Table D-2 below for limitations on the use of this formula):

$$\mathbf{Q = CBMP \cdot IBMP \cdot A}$$

where: **Q** = flow in ft^3/s

IBMP = BMP design rainfall intensity, in inches/hour

A = Drainage Area in acres

CBMP = composite runoff coefficient

Table D-1: Regression Coefficients for Intensity (I) and 6-hour mean storm rainfall (P**6**).

Quantity	**Valley** 85% upper confidence limit	**Mountain** 85% upper confidence limit	**Desert** 85% upper confidence limit
I	**0.2787**	**0.3614**	**0.3250**
P6	**1.4807**	**1.9090**	**1.2371**

Table D-2: Use of the flow-based formula for BMP Design (CASQA 2003).

	Composite Runoff Coefficient, "C"			
BMP Drainage Area (Acres)	**0.00 to 0.25**	**0.26 to 0.50**	**0.51 to 0.75**	**0.76 to 1.00**
0 to 25	**Caution**	**Yes**	**Yes**	**Yes**
26 to 50	**High Caution**	**Caution**	**Yes**	**Yes**
51 to 75	**Not Recommended**	**High Caution**	**Caution**	**Yes**
76 to 100	**Not Recommended**	**High Caution**	**Caution**	**Yes**

If the flow-based BMP formula use case, as determined by Table D-2, shows "Caution," "High Caution," or "Not Recommended," considering the project's characteristics, then he project proponent must calculate the BMP design flow using the unit hydrograph method, as specified in the most current version of the San Bernardino County Hydrology Manual, using the design storm pattern with rainfall return frequency such that the peak one hour rainfall depth equals the 85th-percentile 1-hour rainfall multiplied by two.

B. Volume-Based BMP Design

1) Calculate the "Watershed Imperviousness Ratio", i, which is equal to the percent of impervious area in the BMP Drainage Area divided by 100.

2) Calculate the composite runoff coefficient CBMP for the Drainage Area above using the following equation:

$$\mathbf{CBMP = 0.858i^3 - 0.78i^2 + 0.774i + 0.04}$$

where: **CBMP** = composite runoff coefficient; and,

i = watershed imperviousness ratio.

3) Determine which Region the Drainage Area is located in (Valley, Mountain or Desert).

4) Determine the area-averaged "6-hour Mean Storm Rainfall", P6, for the Drainage Area. This is calculated by multiplying the area averaged 2-year 1-hour value by the appropriate regression coefficient from Table 1.

5) Determine the appropriate drawdown time. Use the regression constant a = 1.582 for 24 hours and a = 1.963 for 48 hours. *Note: Regression constants are provided for both 24 hour and 48 hour drawdown times; however, 48 hour drawdown times should be used in*

most areas of California. Drawdown times in excess of 48 hours should be used with caution as vector breeding can be a problem after water has stood in excess of 72 hours. (Use of the 24 hour drawdown time should be limited to drainage areas with coarse soils that readily settle and to watersheds where warming may be detrimental to downstream fisheries.)

6) Calculate the "Maximized Detention Volume", P0, using the following equation:

$$\mathbf{P0 = a \cdot CBMP \cdot P6}$$

where: **P0** = Maximized Detention Volume, in inches

a = 1.582 for 24 hour and a = 1.963 for 48 hour drawdown,

CBMP = composite runoff coefficient; and,

P6 = 6-hour Mean Storm Rainfall, in inches

7) Calculate the "Target Capture Volume", V0, using the following equation:

$$\mathbf{V0 = (P0 \cdot A) / 12}$$

where:

V0 = Target Capture Volume, in acre-feet

P0 = Maximized Detention Volume, in inches; and,

A = BMP Drainage Area, in acres

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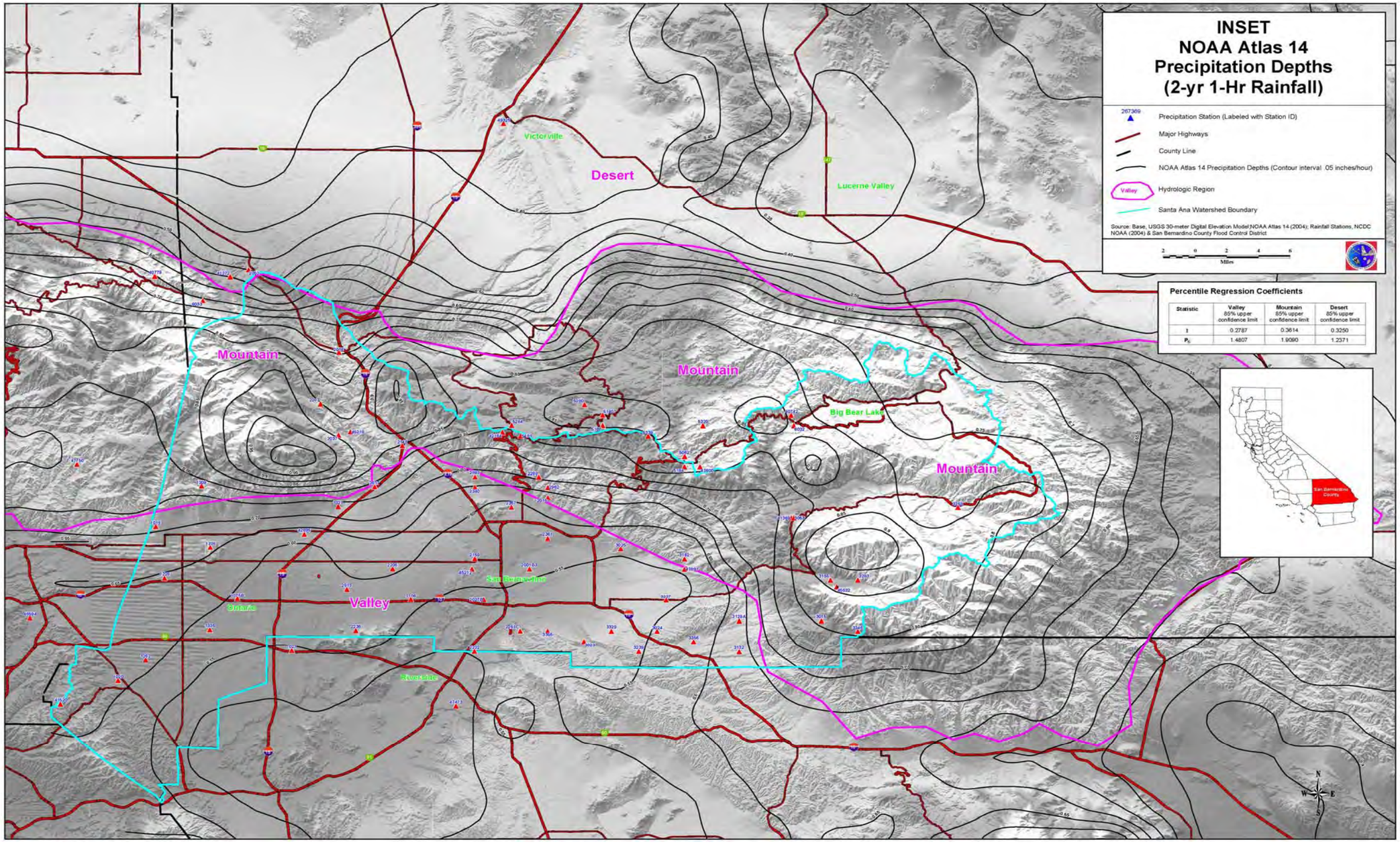
Figure D-1: NOAA Atlas 14 Inset Map.



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Appendix III-C-D

Pacific Advanced Civil Engineering Preliminary Master Plan of Drainage and Stormwater Management Lytle Creek Ranch Project

November 2007

Revised June 2008

Revised November 2008

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Preliminary Engineering Study

Preliminary Master Plan of Drainage and Stormwater Management Lytle Creek Ranch Project

November 2008
June 2008 - (Revised)
November 2007 – (Revised)

Prepared For:

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PACE 8425E

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1 Project Description

1.1 Project Location

The Lytle Creek Ranch project is located in unincorporated San Bernardino County south of Devore, north of the City of Fontana and City of Rialto, and adjacent to Lytle Creek at the Interstate 15 (I-15) Freeway crossing over Lytle Creek. The project site consists of four (4) neighborhood developments hereinafter referred to as Neighborhoods -1, -2, -3, and -4. Neighborhood-1 is located along either side of the I-15 extending from Lytle Creek to the Glen Helen. The site extends west and east into the canyon and foothills area on west of Glen Helen Parkway and east of Clearwater Parkway. In the existing condition, this area is undeveloped land with stands of scrub brush except for the existing improvements to Glen Helen and Clearwater parkways. Neighborhoods-2 and -3 are located east of the I-15 Freeway at Sierra Avenue. Neighborhood 2 is currently undeveloped and is bounded by El Rancho Verde golf course to the southeast. Neighborhood 3, under existing conditions, is mostly undeveloped except for a portion that is currently being used as an office complex for Hanson Aggregate, Inc. Neighborhood 4 is located west of I-15 Freeway at Sierra Avenue. In the existing condition this area is undeveloped with stands of scrub brush. A Vicinity Map and Landuse Plan are provided in Figure1 and Figure 2; respectively. Typical photographs of the site are provided in Figure-3.

This Master Drainage Plan study provides concept level analysis and data to support the proposed stormwater management facilities that would be constructed as a part of this project. In order to mitigate the effects of development on runoff water quality there are certain Best Management Practices (BMPs) that will be implemented in this project to meet and/or exceed the water quality requirements of the San Bernardino County General Permit issued by the Regional Water Quality Control Board (RWQCB) in compliance with the National Pollutant Discharge Elimination System (NPDES) as stated in the Clean Water Act. These NPDES requirements mandate the implementation of selected BMPs to capture, treat and/or eliminate pollutants of concern from non-storm and storm related runoff typically associated with new development.

1.2 Proposed Landuse

This study focuses on comparing the pre-project (existing) condition and post project (proposed) condition respectively for the regional and local watersheds of Lytle and Sycamore Creeks. In the existing condition, each of the proposed neighborhood areas is undeveloped fallow land. The overall neighborhood development plan will feature mixed landuses. The table below shows the proposed landuse category and approximate area per each neighborhood proposed in the Lytle Ranch development plan.

Table 1 - Land Use Summary

Neighborhood	Land Use	Acreage	No. of dwellings	Retail Sq. Footage
1	Open Space	176.0	-	-
	OS/Recreation	11.0	-	-
	Residential	172.0	942	-
	Mixed Use	12.0	336	-
	Roadways	46.2	-	-
2	Open Space	176.0	-	-
	OS/Recreation	226.0	-	-
	Residential	334.0	2,567	-
	Mixed Use	24.2	364	102,452
	Roadways	41.6	-	-

Neighborhood	Land Use	Acreage	No. of dwellings	Retail Sq. Footage
3	Open Space	396.0	-	-
	OS/Recreation	70.8	-	-
	OS/Park/School	17.0	-	
	Residential	334.0	2,704	-
	Mixed Use	87.8	625	566,279
	Roadways	39.2	-	-
	School	24.0	-	-
4	Open Space	160.0	-	-
	OS/Recreation	21.0	-	-
	Residential	54.0	869	-
	Mixed Use	17.0	-	180,689
	Roadways	7.5	-	-

1.3 Lytle Creek Watershed

The Lytle Creek watershed spans approximately 50 square miles of a south eastern portion of the San Gabriel Mountain range. The watershed is composed of highly fractured rock and steep slopes. The proposed segment of Lytle Creek to be developed is classified as a relic (non-active) alluvial fan (National Research Council, 1996). The fan is composed of gravelly and boulder granitic alluvium and other sediment including limestone, schist and volcanic fragments. Lytle Creek is characterized by multiple flow paths, poorly sorted sand, gravel and boulder deposits with occasional bands of recently formed soils. The fan slope is approximately 3%. The channel has been deeply incised since at least 1862, and comparison of flow paths on aerial photographs over the last 70 years suggests the flow path during major floods has not changed.

The confluence of Lytle Creek with Cajon Wash is approximately 5,000-ft downstream (east) of the Lytle-Sycamore Creek confluence. Neighborhoods 2, 3, and 4 of the project site are located along the banks of a wide, braided section of Lytle Creek located both upstream and downstream of the existing I-15 Bridge spanning approximately 27,500-lf of Lytle Creek from Glen Helen Parkway to the Lytle Creek/Cajon Wash confluence.

1.3.1 Existing Lytle Creek Improvements

The existing northerly bank of Lytle Creek is fully improved extending from Glen Helen Parkway to the Lytle Creek confluence with Sycamore Creek. An 8-foot thick grouted riprap revetment extends down 30-feet below the existing flowline and spans from Glen Helen to the CEMEX Quarry site located at the easterly boundary of Tract 15900; approximately 6,300-ft downstream of the northbound I-15 Bridge over Lytle Creek. This reach of Lytle Creek also has an existing 20-foot wide asphalt concrete access / maintenance road at the top of the bank. The CEMEX Quarry is protected by an existing levee that is constructed of soil cement capped with grouted riprap. The combined span of these two Lytle Creek bank improvements extends from 1.2 miles upstream of the I-15 crossing to 5.7 miles downstream of the I-15 crossing near the confluence with Cajon Creek Wash. The Glen Helen Parkway roadway crossing at Lytle Creek is improved to the ultimate condition. The roadway crossing is a dip crossing that would be inundated in a large storm event. The roadway profile was raised to provide a higher level of safety for the crossing of Lytle Creek and to allow for the construction of several culverts located at the main flow paths in Lytle Creek (see Figure-23).

1.3.2 Proposed Lytle Creek Improvements

Since the 1940s, a series of spur dykes and levees were built on the southerly bank of Lytle Creek. These spur dykes are known as Groin-1, -2, -3, and -4. They were constructed by the US Army Corps of

Engineers (USACE) to form a stable southerly boundary and limit of flooding along the southerly bank of Lytle Creek. The Lytle Ranch project, will construct a creek bank revetment/lining along the northerly most tip of each groin to form a uniform continuous southerly bank along Lytle Creek (See Figure-4) to protect the proposed Lytle Creek Ranch development, spanning approximately 7 miles. This proposed bank revetment will extend from approximately 0.9 miles upstream of Glen Helen Parkway to approximately 5.5 miles downstream of the northbound I-15 Bridge, at the easterly boundary of Neighborhoods 2 and 3. The structural section of the bank improvements will be composed of soil cement capped with grouted riprap and will include a 20-ft wide maintenance road on the top. Figure-4 contains a map showing the location of existing and proposed protection measures on the banks of Lytle Creek. The proposed improvements to Lytle Creek, as a part of the Lytle Creek Ranch project, will complete the confinement of the flowpath in Lytle Creek between the proposed and existing north and south banks of Lytle Creek from Glen Helen to Sycamore Creek.

1.4 Sycamore Creek Watershed

Sycamore Creek is a small tributary to Lytle Creek. The Sycamore Creek watershed is approximately 953 acres spanning several small canyons between foothills of the south eastern portion of the San Gabriel mountains. The canyon areas are undeveloped, hydraulically steep, and sandy with stands of sycamore trees, scrub brush, and grasses. The confluence of Sycamore Creek with Lytle Creek is located approximately 19,400-ft east (downstream) of the I-15 Bridge over Lytle Creek; measured along Lytle Creek. Neighborhood-1 is situated in the upstream reaches of Sycamore Creek adjacent to the north fork of Sycamore Creek.

1.4.1 Existing Sycamore Creek Improvements

The reach of Sycamore Creek within the span of the Lytle Ranch project was fully improved as a part of the Tract 15900 Lytle North development. The small tributaries of Sycamore Creek, north fork, north fork tributary, and south fork each have origins at the foothills and canyon on the west side of the I-15 Freeway. *RBF Consulting* prepared improvement plans to construct storm drain improvements within Glen Helen Parkway and culverts crossing Glen Helen Parkway for the tributaries to Sycamore Creek. The existing culverts beneath the I-15 Freeway conveying captured runoff from the west side of the freeway to the east were constructed along with the I-15. These culverts discharge to unimproved creeks just east of the freeway embankment. Two (2) arch culverts; one for Sycamore North Fork and one for Sycamore South Fork, were constructed along with the improvements to Clearwater Parkway. The channel section of Sycamore Creek just downstream of Clearwater Parkway and the junction of the north and south forks was regarded and stabilized as designed by *RBF Consulting*. The south bank of Sycamore Creek along Tract 15900 Lytle North was constructed along with the grading of Tract 15900 as designed by *Otte-Berkley Group*. The Sheriff station emergency access road bridge over Sycamore Creek was constructed along with the improvement of the Sheriff's access road as designed by *RBF Consulting*. Figure-16 is an overall exhibit depicting each of the existing Sycamore Creek improvements constructed as a part of the development of Tract 15900.

1.4.2 Proposed Sycamore Creek Improvements

There are no proposed improvements to Sycamore Creek as a part of the Lytle Ranch project.

2 Hydrology

The San Bernardino County rational method was used to perform the hydrology analysis of the local / watershed. The methodologies employed in the analysis are consistent with the 1986 San Bernardino County Hydrology Manual. The 100-year discharge peak flowrate was calculated at identified concentration points in the project watershed using the 2007 version of hydrology software developed by Advanced Engineering Software, Inc. (AES). The determined flowrate was used to preliminary size the proposed Lytle Creek Ranch drainage facilities and improvements. Pipe and channel sizes were estimated using normal depth calculations based upon Manning's Equation. The Rational Method assumes that there is uniform rainfall intensity across the entire watershed and is therefore intended for watersheds with a total drainage area less than 640-acres. For larger watersheds, the Rational Method tends to overestimate peak flow rates. However, for planning and conceptual design purposes the results are generally conservative and useful for preliminary sizing of future facilities. The hydrologic study of the project watershed included all offsite tributary areas. The storm and non-storm runoff from offsite areas tributary to the Lytle Creek Ranch project site will be conveyed through the site via proposed storm drains and/or channel improvements and discharged to Lytle Creek at or near the existing flowpath location(s).

Onsite / Local Watershed

2.1 Landuse

In the existing condition, each of planned Neighborhood sites is either undeveloped alluvial floodplain or undeveloped foothills. Each site currently features a moderate density of native scrub-type vegetation with a high density of rounded and smooth granitic rocks, cobbles, and small boulders. The existing site soils are very pervious consisting of graded sand ranging from coarse to very coarse. Appendix I includes the curve number for the cover and soil type that were used in the calculations for offsite runoff for Neighborhoods 1 and 4.

Neighborhood	Planning Areas
1	1 through 15
2	80 through 105
3	28 through 79
4	16 through 27

Table 1 contains a summary table of the proposed landuse areas for each neighborhood in the development. The proposed condition impervious cover percentage values used in each landuse are shown in Appendix II.

2.2 Hydrologic Soil Type

The watershed subareas were delineated on a topographic map along with aerial photographs to determine the major flowpaths, tributary area of the watershed(s), subarea soil types, drainage area and flowpath slopes, density and type of vegetation, landuse(s), and presence of existing improvements and/or structures within each subarea. The soil types for the project watershed were obtained from the most current Natural Resources Conservation Service (NRCS) dataset. Table 2 shows the soil types corresponding to each subarea.

Table 2 - NRCS Hydrologic Soil Groups by Neighborhood

Neighborhood	Hydro Group	Acres
N01	***A***	259.8
	B	143.8
	C	763.9
	D	12.1
N02	***A***	375.9
	B	235.1
N03	***A***	323.6
	B	244.7
N04	***A***	264.6
	B	212.9
	C	679.1
	D	12.5
	Total	**2348.4**

2.3 Rainfall Intensity

Since the project lies within the southwestern portion of the county, the slope of intensity duration curve used in this study was 0.6 (San Bernardino Hydrology Manual, 1986, page B-6). The 100-year rainfall intensity used in this study was 1.48 inches per hour (San Bernardino Hydrology Manual, 1986, Figure B-4). The 25-year rainfall intensity used in this study was 1 inch per hour (San Bernardino Hydrology Manual, 1986, Figure B-4). The isohyetal map is included in Appendix III. Antecedent Moisture Condition (AMC) used in the calculations was AMC-III for the 100-year and AMC-II for the 25-year, which correspond to a high runoff potential and moderate runoff potential, respectively.

The onsite watershed subareas for the existing and proposed conditions were delineated based on the existing topography, proposed grading, and entry points into the proposed and existing drainage system. Figures 7 - 14 contain the existing and proposed delineations for Neighborhoods 1 - 4.

In the proposed condition, the peak flowrates from the project watersheds are increased compared to the existing condition as measured at the point of discharge to Lytle Creek. However, these increases in peak flowrate are insignificant to the regional peak flowrates in Lytle Creek that would be expected in the same storm event due to the offset of peaks of the regional watershed hydrograph and the local watershed hydrograph as measured at the point where the local watersheds discharge to Lytle Creek. The average time of concentration (Tc) for the local watersheds discharging to Lytle Creek is approximately 30 minutes.

2.4 Regional Watershed

2.4.1 Lytle Creek Watershed

The calculated existing condition 100-year 24-hour clearwater peak flowrate in Lytle Creek at the I-15 bridges is approximately 42,600 cfs per the report titled, *Lytle Creek Revetment Design for Lytle Creek North Development – Hydraulic Report*, prepared by PACE in January 2004. A copy of this report in its entirety is included in Appendix-6.

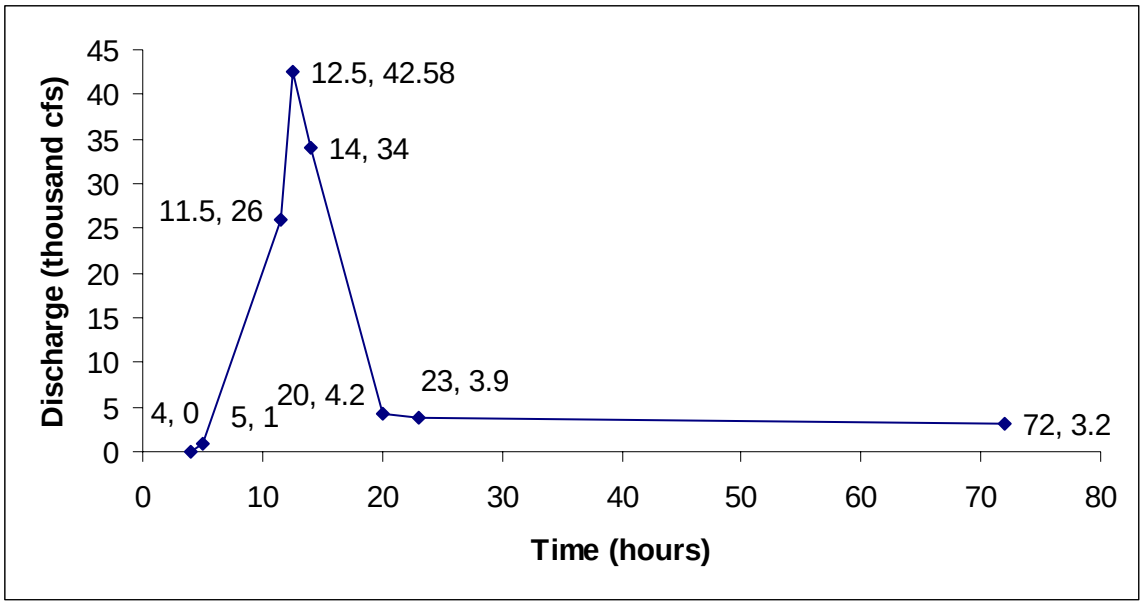
The calculated peak flowrate in Lytle Creek was based upon statistical analyses of several historical rainfall gauges that are operated by various governmental agencies within the Lytle Creek watershed.

This gauge network has over 63 years of record data and is within reasonable proximity to be considered representative of the project area regional watershed. These gauges include the (1) Lytle Creek Ranger Station, (2) Lytle Creek at the Fontana Intake Structure, (3) Lytle Creek at Foothill Blvd, all of which are daily or non-recording gauges.

The majority of the Lytle Creek regional watershed is located entirely within the boundaries of the San Bernardino National Forest. This regional drainage basin has a tributary watershed area of approximately 54.7 square miles to the project downstream boundary. Generally the majority of the watershed can be described as mountainous, with elevations ranging from 10,064-ft at the peak of Mount San Antonio to approximately elevation 2,000-ft at the I-15 Bridge. The mountains are relatively steep and rugged. In the upper elevations of the watershed, the vegetation consists of pine, fir, juniper, and oak scattered throughout a chaparral cover of manzanita, scrub oak, and sagebrush. In the lower elevations sycamore, willow, and cottonwood grow along the perennial mountain streams. The lower alluvial plain is characterized by alluvial scrub, chamise chaparral, riversidean sage scrub, riparian, and stands of juniper woodland.

2.4.2 Typical Lytle Creek Flood Hydrograph and Peak Durations

The typical variation of storm flow in the creek over time will develop a curve, known as a hydrograph, with rising and receding limbs from a maximum peak discharge. Typical hydrographs and base flood hydrograph shape were developed for the Lytle Creek watershed for each n-year flood to conform to the gauge based on peak discharges (see the hydrograph below).



The general shape of the hydrograph was developed through the application of synthetic precipitation-runoff unit hydrograph procedures and incorporated the characteristic parameters for the regional watershed. The synthetic hydrograph and actual stream hydrographs from the United States Geological Survey (USGS) Lytle Creek stream gauge were compared and there appeared to be relatively good correlation in the estimated watershed response. The shape of the hydrograph indicates the general response of the watershed is relatively flashy and the peak discharge will only occur for a short time. The duration of the peak discharges near the top of the hydrograph, indicates that from 35,000 cfs to the peak of 42,580 cfs and then receding to 35,000 cfs, would occur in less than one hour for a 24-hour storm event. The peak of the hydrograph would occur at the I-15 bridges approximately 12-hours after the peak precipitation period occurs. The time of concentration of the for the storm drain system conveying runoff from the project site to Lytle Creek is in the range of 5 to 10 minutes. Therefore, due to the time offset of the peak of the offsite hydrograph and the onsite hydrograph the increase in runoff from the onsite

watershed does not affect the peak of the hydrograph in Lytle Creek. The 100-year 24-hour peak flowrate in Lytle Creek measured at the I-15 Bridge, or any point along the project reach is the same pre- and post-project; 42,580 cfs.

2.4.2.1 Debris Production

In the existing condition, sediment and debris is transported from the onsite and offsite watershed to Lytle Creek. In this proposed condition, the volume of runoff transported from the onsite area to the Lytle Creek will be reduced. Buildings, homes, landscaping, roadway and parking lot paving and underground conveyance systems tend to reduce debris production. In comparison to the existing condition, debris that is produced in the onsite area and transported to Lytle Creek will be reduced in the proposed condition due to development. The existing condition debris volume generated in the offsite watershed and transported to Lytle Creek will be unchanged in the proposed condition. The onsite project area tributary to Lytle Creek is approximately 1.7 sq. miles. The overall Lytle Creek watershed area measured at the I-15 Bridge over Lytle Creek is 54.7 sq. miles. The onsite area represents 3.0% of the overall watershed.

In the existing condition, the onsite areas are protected by the existing USACE spur dykes 1-4. These spur dykes form an effective southerly boundary for flows in Lytle Creek. This prevents the accumulation of concentrated flow in the onsite areas in the existing condition. Flow between the spur dykes is largely via overland flow with some small concentrated intermixed / intertwined flow paths and rivulets. The absence of well defined flowpaths between the spurs in the onsite areas in the existing condition indicates that only small amounts of debris and sediment are transported from these areas to some point downstream in Lytle Creek. Therefore, the reduction in sediment transported to Lytle Creek from these areas in the proposed condition is thought to be insignificant.

2.4.3 Sycamore Creek Watershed

Sycamore Creek is a small tributary joining Lytle Creek approximately 19,300 feet southeast of the northbound I-15 Bridge over Lytle Creek measured along Lytle Creek. The Sycamore Creek watershed is approximately 953 acres at Clearwater Parkway spanning several small canyons between foothills of the south eastern portion of the San Gabriel mountains. The canyon areas are undeveloped, hydraulically steep, and sandy with stands of sycamore trees, scrub brush, and grasses. There are several existing flood control culverts and channels in the Sycamore Creek watershed, see Exhibit-16.

An existing and proposed condition rational method analysis of the Sycamore Creek watershed tributary to Clearwater Parkway has been provide, as well as, existing and proposed condition unit hydrograph analyses of the overall watershed tributary to Lytle Creek. These have been provided to allow for preliminary sizing of proposed facilities, The calculated existing condition 100-year rational method peak flowrate in Sycamore Creek is 2,056 cfs at the junction of the north and south forks of Sycamore Creek just downstream (east) of Clearwater Parkway with a time of concentration of 29 minutes as determined in the hydrograph analysis performed as a part of this study, see Appendix-5. The proposed condition 100-year peak flowrate in Sycamore Creek calculated at the same concentration point is 2,269 cfs. There is an increase of 9.3% in the peak flowrate in the proposed condition comparing clearwater flowrates. The existing improvements to Sycamore Creek (north and south fork culverts at Clearwater Parkway, the improved channel section along Tract 15900, and the existing Sheriff station emergency access road bridge over Sycamore Creek were designed using the existing condition peak flowrate from the Sycamore Creek watershed bulked by 50%. The peak flowrate at the confluence of the north and south forks or Sycamore Creek downstream of Clearwater Parkway was calculated by RBF Consulting at 2,656 cfs. The proposed development will reduce the debris producing watershed areas by approximately 233.4 acres; approximately 17.4% of the total Sycamore Creek watershed area, 1344 acres.

2.4.3.1 Debris Production

In the existing condition, sediment and debris is transported from the onsite and offsite watershed to Sycamore Creek. In this proposed condition, the volume of runoff transported from the onsite area to the Sycamore Creek will be reduced. Buildings, homes, landscaping, roadway and parking lot paving and underground conveyance systems tend to reduce debris production. In comparison to the existing

condition, debris that is produced in the onsite area and transported to Sycamore Creek will be reduced in the proposed condition due to development. The existing condition debris volume generated in the offsite watershed and transported to Sycamore Creek will be unchanged in the proposed condition. The onsite project area tributary to Sycamore Creek is approximately 1.26 sq. miles. The overall Sycamore Creek watershed area measured at the I-15 Bridge over Lytle Creek is 54.7 acres. The onsite area represents 2.2% of the overall watershed.

In the existing condition, just west of Glen Helen Parkway, west of the I-15 Freeway there is a transverse levee or berm that blocks runoff generated in the northwest portion of the Sycamore Creek watershed from crossing Glen Helen Parkway, see Figure 24. The berm deflects the storm runoff to the existing channel inlet.

3 Drainage Facilities

3.1 General Improvements

Each of the planned neighborhoods will include proposed onsite stormwater management system improvements. The improvements will consist of a closed conduit storm drain system capable of conveying debris from the offsite watershed, onsite closed conduit storm drain and/or open channel conveyance systems, and a water quality management system to treat non-storm and small storm runoff before discharge to the Sycamore and/or Lytle Creeks. Each of the proposed facilities was preliminarily sized using Manning's equation for normal depth flow.

3.2 Offsite Improvements

3.2.1 Offsite Storm Drain System

3.2.1.1 Design Requirements

A normal depth hydraulic analysis of the offsite storm drain system has been provided to preliminarily size the proposed offsite storm drain system. The calculated size for each reach of the proposed offsite storm drain system is shown on Figure –8. The offsite storm drain system was sized to convey or pass debris-laden flow from the offsite tributary watershed to Lytle Creek or Sycamore Creek respectively, for the 100-year storm event. A debris bulking factor of 50% was applied to the tributary clearwater peak flowrate to account for debris accumulation or suspended sediments in storm runoff.

3.2.1.2 Storm Drain System Configuration

There are no proposed debris trapping or desilting facilities in any of the proposed offsite storm drain systems. Neighborhoods 1 and 4 are located adjacent to steep hillsides which have the potential to generate significant debris in a large storm event. There is no proposed debris trapping facilities or debris basins in these watersheds. The inlets to these storm drains will be designed to convey debris-laden flow to the downstream storm drain system. All proposed storm drains conveying runoff from the offsite watershed will be designed to convey tributary suspended debris through the storm drain system to the downstream receiving channel section. Where offsite storm drains discharge to unimproved open space areas, energy dissipaters or armoring may be needed on a case-by-case basis depending on the flow velocity discharged from the storm drain. The locations of these energy dissipating implements will be determined in future phases of more refined design. In general, the proposed storm drains discharging to Lytle Creek will require little or no additional energy dissipation. The existing gravel, cobbles, rocks, and boulders that line Lytle Creek will provide adequate energy dissipation and protection against localized erosion for relatively small flowrates that will be discharged from these proposed storm drains. The storm drain systems discharging to Sycamore Creek may require additional energy dissipation at the outlet from said storm drain to Sycamore Creek. At all storm drain outlets to Sycamore Creek where the discharge velocity exceeds 6-fps a riprap energy dissipater will be constructed using ¼-ton rock gathered from the project site. The offsite storm drains system improvements will be constructed in the public right-of-way and/or within easements dedicated to the San Bernardino County Flood Control District (SBCFCD). The proposed facilities will be dedicated to the SBCFCD for ownership and maintenance. Figures-8,10,12 &14 provides a map of the proposed offsite storm drain system and facility sizes for Neighborhoods 1 through 4.

3.2.2 Offsite Open-Channel Storm Conveyance System

3.2.2.1 Design Requirements

The design of the proposed offsite storm channel system is governed by the basic requirements of the SBCFCD to provide a minimum of 1-ft of freeboard to the 100-year water surface elevation and a stable channel section. The barrier channels would require a hard channel lining to meet the requirements of a stable channel section. The channel sections will be designed in the future using the 100-year bulked

flowrate to provide adequate channel cross section for conveyance of the clearwater and debris laden flows.

3.2.2.2 Channel Configuration

The steep hillsides surrounding Neighborhood 1 have the potential to generate a significant volume of debris and fast moving storm runoff. The proposed development sites of Neighborhood 1 will be protected from these potential hazards with a cut-off channel at the boundary of the development adjacent to the hillsides. The proposed channels would capture runoff, clearwater or debris laden, and convey around the development sites to the downstream receiving channel. Figure-7 shows the location and preliminary sizing of the proposed open channel system.

Onsite Improvements

3.2.3 Onsite Storm Drain System

3.2.3.1 Design Requirements

The onsite storm drain system was preliminarily sized to convey clearwater runoff from the onsite tributary watershed for the 25-year storm event. No offsite debris producing watersheds are tributary to the onsite storm drain system. The proposed onsite streets will be surcharged in a 100-year storm event to a maximum water surface elevation equal to or less than the street right-of-way. The 25-year peak flowrate will be contained in the storm drain and the difference between the 100-year peak flowrate and the 25-year peak flowrate will be conveyed in the street right-of-way. This results in a combined conveyance system providing 100-year protection to the proposed development construction pads as required by the Federal Emergency Management Agency (FEMA) and the SBCFCD. The SBCFCD Design Standards state that, "closed conduit systems shall be designed with a surface backup system to handle a Q_{100} storm." The onsite storm drain system and street conveyance paths will be designed with a clear overflow path to discharge runoff to either Lytle or Sycamore Creeks; respectively. The onsite storm drain system will include curb opening catch basins at local sump locations and/or determined locations to maintain storm runoff within the street right-of-way. The catch basins that will be located in non-sump or flow-by locations will be designed to intercept the 10-year peak flowrate. Catch basins at sump locations will be designed to intercept the 25-year peak flowrate.

3.2.3.2 Storm Drain System Configuration

The onsite storm drain systems area each tributary to a water quality management feature or structural stormwater Best Management Practice (BMP) that will receive runoff from said system and provide treatment in compliance with the San Bernardino County NPDES Permit requirements prior to discharging to Sycamore and/or Lytle Creek. The storm drain systems that will be tributary to a proposed dry extended detention basin BMP or wet pond BMP will receive runoff via a storm drain diversion from the mainline. The diversion storm drain limits the maximum flowrate delivered to the BMP and maximizes the effectiveness of the BMP. The BMP diversion pipes will be designed in the final design phases to convey the calculated 2-year BMP runoff flow and/or dry weather nuisance flows to the BMP. Flows in excess of the design flowrate would remain within the mainline of the storm drain system and be conveyed to the discharge point at Lytle Creek or Sycamore Creek respectively. Figures 8, 10, 12 and 14 provide a map of the proposed offsite storm drain system and facility sizes for Neighborhoods 1 through 4.

3.2.4 Onsite Open-Channel Storm Conveyance System

3.2.4.1 Design Requirements

The design of the proposed onsite storm channel system is governed by the basic requirements of the SBCFCD to provide a minimum of 1-ft of freeboard to the 100-year water surface elevation, a stable channel section, and to maintain a maximum water surface elevation at or below the public street right-of-way elevation. The proposed open storm channel will have an earthen trapezoidal channel section. The channel will feature a combination of grade control structures and decorative armoring using site rock and landscaping to provide a stable channel section.

3.2.4.2 Channel System Configuration

The onsite open channel system located in Neighborhoods -2 and -3 were preliminarily sized to convey clearwater runoff from the onsite tributary watershed for the 100-year storm event. No offsite debris producing watersheds are tributary to the onsite storm channel system. The onsite storm channel system will receive storm runoff from curb opening catch basins at determined locations to maintain storm runoff within the street right-of-way and sumps and/or receive runoff from spill locations (sumps) in the street profile discharging to the stream/channel.

3.2.5 Water Quality Management System

3.2.5.1 Water Quality System Elements

The proposed water quality management system is composed of several elements or BMPs that will treat storm and non-storm runoff to reduce pollutants from the onsite watershed to acceptable levels per the San Bernardino County NPDES permit requirements prior discharging to Lytle and/or Sycamore Creeks. The proposed water quality management plan for Lytle Creek Ranch would utilize various BMPs to achieve the water quality goals. The proposed BMPs for the project include: dry extended detention basins, wet ponds/basins, wetland filters, a recirculating stream with pond bio-filtration system, and vegetated swales. Each of the BMP types were placed or selected to coincide logically with the landuse plan. Treatment capacity and pollutant removal efficiency along with expected pollutant loading from a particular typical landuse were the primary considerations in selecting and placing BMPs. The wet pond and dry extended detention BMPs were preliminarily sized according to the requirements of the San Bernardino County General NPDES Permit.

The wetland filters and recirculating stream with bio-filtration have much higher treatment capacity and removal efficiency than the standard NPDES General Permit BMPs provided in the CASQA Manual. These BMPs (wetland filters, recirculating stream) have been preliminarily sized based upon data garnered by PACE from long-term studies of the performance of these BMPs as constructed on past projects throughout California. Because it will receive polluted runoff discharged from the onsite storm drain system, the water quality management system will treat the first flush storm volume and/or dry weather non-storm runoff from the onsite watershed only. The proposed BMP basins will be connected to the storm drain system via a passive bypass or diversion storm drain system, rather than on a direct connection to the main storm drain system. The offline connection to the mainline storm drain will minimize the volume of basin surcharge in larger storm events. Each dry basin will include a infiltration sump area, low-flow outlet, and an overflow spillway to discharge excess captured runoff safely downstream to a receiving channel to be conveyed eventually to Lytle or Sycamore Creek. The basin low-flow outlets have been preliminarily sized as corrugates steel pipe (CSP) perforated vertical risers. Each water quality basin spillway will be constructed from a suitable armoring material such as site rock, grout, concrete, turf reinforcement matting, or similar, or combination thereof. The water quality basin spillways have been preliminarily sized using the broad crested weir equation, $Q= CLH^{1.5}$. The spillway and low-flow outlets are shown for each proposed basin in Exhibits 8, 10, 12, and 14 for Neighborhoods 1 through 4.

3.3 Neighborhood 1

3.3.1 Planning Areas 1 to 5

Planning Areas 1 to 5 are located on the west side of the I-15 at the Glen Helen off ramp. In the existing condition, both on and offsite runoff are intercepted in a natural channel. The vertical profile of the existing channel has a high point such that a portion of the channel drains south and discharges to an existing 12'x 8' (W x H) box culvert. The other portion of the channel drains north and discharges to an existing 60" RCP culvert beneath the I-15 Freeway. Both culverts convey storm runoff underneath the I-15 Freeway from the west side to the east side and discharge to an undeveloped open space area adjacent to the freeway, between Clearwater Parkway and the I-15. This area drains from north to south and discharges to the north fork of Sycamore Creek at the existing Clearwater Parkway / Sycamore Creek North Fork culvert. This area will remain as undeveloped open space in the proposed condition as well.

In the proposed condition, storm runoff from the offsite and onsite open space area will be intercepted in proposed trapezoidal open channels. The north channel has been preliminarily sized to have a 5' base width, 2' wall height and 2:1 side slopes. The south channel, a 10' base width, 3.5' wall height and 3:1 side slopes. The channel alignments are shown in Figure 8. Storm runoff conveyed in the channels will be discharged to the existing freeway culverts described above. The north channel will discharge to the existing 60" freeway culvert and the south channel will discharge to the existing 12'x8' freeway culvert. The freeway culvert alignments and discharge points will remain the same as the existing condition. Storm runoff generated in the proposed development area or onsite area will be captured via curb opening catch basins and discharged to the onsite subterranean storm drain system. The onsite storm drain system was preliminarily sized to convey the 25-year storm peak flowrate from the onsite watershed. The proposed streets within the development area will be designed and utilized to convey storm runoff within the roadway right-of-way exceeding the 25-year storm peak flowrate up to the 100-year flowrate creating a combined 100-year conveyance system (storm drain and street section surcharge). The resultant level of protection provided to the development pads will be 100-year plus a minimum of 1' of freeboard, in compliance with FEMA requirements as well as SBCFCD design requirements. The proposed onsite storm drain pipes will range in size from 18" to 78" in diameter. The proposed storm drains will be constructed in public right-of-way, within the street section of streets that will be dedicated to San Bernardino County in the future. Therefore, the storm drains will be designed and constructed to meet San Bernardino County minimum standards for performance, materials, and workmanship. Storm drain manholes will be provided at the maximum allowable spacing to provide access for maintenance and inspection of the underground facilities.

The onsite storm drain system will be connected to a water quality basin or a series of water quality basins to treat onsite generated non-storm related runoff and first flush storm runoff. All storm runoff generated onsite will be treated in at least one of the BMPs prior to being discharged to Lytle and/or Sycamore Creeks. The onsite storm drains will discharge runoff to the proposed water quality basins via a low flow bypass storm drain lateral for treatment. The low-flow bypass lateral will be designed in final design to intercept dry weather nuisance flows and the peak 2-year storm runoff flowrate and volume and convey the runoff to the basin. Flowrates in excess of the 2-year peak runoff rate will bypass the system and be discharged directly to Sycamore Creek. After containment and treatment, captured runoff will be discharged from the water quality basins to Lytle Creek in a period of time not to exceed 24 hours. Storm flow tributary to the basins and exceeding the 2-year storm event and/or the capacity of the water quality basin will be discharged to Sycamore Creek via an overflow spillway provided at each basin. Each basin will be constructed with a tiered invert to provide two (2) modes of treatment. The lower tier in the basin will be created by grading a small sump in the invert at the inlet to the basin. There will be no outlet from the basin for the lower tier sump. Runoff captured in the sump will be infiltrated into the ground, evapotranspirated into the atmosphere, and evaporated into the atmosphere from the basin. The lower tier sump will be designed in the final phase to provide a minimum volume equivalent to the expected daily nuisance flow volume. Once the sump volume is exceeded, runoff will flow into the main tier of the basin and remain in the basin for a period not to exceed 24 hours. The proposed Neighborhood 1 concept level storm drain and water quality system alignment and configuration are shown on Exhibit 8.

The WQMP document prepared for the Tract 15900 development included a dry extended detention water quality basin located adjacent to Clearwater Parkway in open space (OS) Planning Area-9 between the north and south forks of Sycamore Creek. This basin was designed as a part of the water quality system improvements associated with Tract 15900 – *Lytle North*. This basin was named "Basin-4" in the studies associated with that project. It was designed to capture and treat dry weather nuisance runoff and first flush storm runoff from the onsite area of Neighborhood 1, located on the west side of the I-15 Freeway. The treatment capacity of this existing basin can be utilized to treat runoff from the onsite area of Neighborhood 1 without the need to construct any additional water quality basins or BMPs to treat runoff in this area. The basin is located east of the I-15 Freeway and receives storm runoff conveyed from the west side of the freeway via the existing freeway 60" RCP discussed above and an existing 48" RCP freeway culvert, see Figure 8. These culverts were sized to convey runoff from the entire existing undeveloped area tributary to Neighborhood 1. This tributary area includes the offsite watershed area. This basin was not constructed as a part of the Tract 15900 improvements. If it were constructed in the future, as currently designed it would have sufficient capacity to treat runoff from the development area of

Neighborhood-1. There is also an existing dry extended water quality basin designed by *RBF Consulting* that was constructed in open space (OS) Planning Area-12 on the west side of the I-15. This basin has sufficient capacity to treat runoff from Planning Areas 11 thru 15. In the event that, Basin-4 is not constructed, the proposed BMPs will treat runoff from the remainder of Neighborhood-1, Planning Areas 1 thru 8. The construction of either Basin-4 or the BMPs proposed in this study in addition to the existing basin in OS-12 would result in a comprehensive treatment plan for Neighborhood-1, Planning Areas 1 thru 15.

3.3.2 Planning Area 8

In the existing condition, the entire watershed of Neighborhood 1 Planning Area 8 drains from east to west to the open space area enclosed by the I-15 Freeway on the west, Glen Helen Parkway on the north, and Clearwater Parkway on the east. Storm runoff is conveyed through this area from north to south to the existing Sycamore Creek north fork culvert at Clearwater Parkway, see Figure 8. The existing culvert is a reinforced concrete Conspan soft bottom arch structure. The culvert is 12' wide and 10' tall and drains directly to Sycamore Creek. The open space areas, the Clearwater Parkway culverts, and Sycamore Creek will remain unchanged from their existing condition.

In the proposed condition, there will be a dual storm drain and channel conveyance system to capture and convey runoff through the proposed development area to the open space area between the I-15 Freeway and Clearwater Parkway. The offsite open channel conveyance system will be designed to capture runoff from the 100-year storm event including a 50% bulking factor to allow for debris bulking in the flow and convey it through the development area in an above ground open channel and discharge to a proposed culvert at Clearwater Parkway. The channel cross sections have been preliminarily sized for the 100-year peak flowrate as a part of this study. The open channel section will end at the east side of Clearwater Parkway and will discharge to a close conduit culvert that will discharge to the open space area described above at or near the existing condition discharge point. The flow patterns in the open space area will remain unchanged from the existing condition.

Runoff generated from onsite open space areas will be intercepted into proposed closed conduit storm drain systems. The closed conduit storm drain will be designed for the 25-year storm and surcharge the street cross section up to the street right-of-way to provide a combined 100-year storm drain and street cross section conveyance system as described in previous sections. The proposed onsite storm drain has been preliminary sized for the 25-year storm clearwater runoff as a part of this study.

Non-storm and storm runoff captured in the onsite storm drain system will be conveyed and discharged to a water quality basin(s) for treatment and pollutant removal. The onsite storm drains will discharge runoff to the proposed water quality basins via a low flow bypass storm drain lateral for treatment. The low-flow bypass lateral will be designed in final design to intercept dry weather nuisance flows and the peak 2-year storm runoff flowrate and volume and convey the runoff to the basin. Flowrates in excess of the 2-year peak runoff rate will bypass the system and be discharged directly to Sycamore Creek. After containment and treatment, captured runoff will be discharged from the water quality basins to Sycamore Creek in a period of time not to exceed 24 hours. Storm flow tributary to the basins and exceeding the 2-year storm event and/or the capacity of the water quality basin will be discharged to Sycamore Creek via an overflow spillway provided at each basin. Each basin will be constructed with a tiered invert to provide two (2) modes of treatment. The lower tier in the basin will be created by grading a small sump in the invert at the inlet to the basin. There will be no outlet from the basin for the lower tier sump. Runoff captured in the sump will be infiltrated into the ground, evapotranspirated into the atmosphere, and evaporated into the atmosphere from the basin. The lower tier sump will be designed in the final phase to provide a minimum volume equivalent to the expected daily nuisance flow volume. Once the sump volume is exceeded runoff will flow into the main tier of the basin and remain in the basin for a period of time not to exceed 24 hours. Once runoff is discharged from the water quality basin it will be joined together with the proposed offsite system storm drain culvert via a storm drain lateral at Clearwater Parkway and conveyed to the open space area between the I-15 Freeway and Clearwater Parkway. The onsite storm drain pipes will range in size from 18" to 36". The existing Clearwater Parkway / Sycamore Creek north fork culvert was designed to intercept and convey the developed condition runoff from Neighborhood 1 as indicated in

the report by *RBF Consulting* titled, "*Basis of Design Report – Lytle Creek Area Clearwater Parkway Culverts,*" dated November 2004. Table 3 provides a summary of storm drain preliminary design for Neighborhood 1.

3.3.3 Planning Areas 11, 13 and 15

In the existing condition, concentrated flow from the tributary watershed is intercepted and conveyed to the west of Glen Helen Parkway via existing channels and culverts (Figure 24). The culverts discharge storm runoff into an open space area on the east side adjacent to the I-15 Freeway. Both onsite and offsite runoff will then be intercepted into existing culverts under the I-15 Freeway, then outlet into an existing dry extended detention basin open space area on the east side of the I-15 Freeway. Storm runoff discharged from the basin will be conveyed to the east side of the I-15 Freeway via an existing 48" RCP culvert (Exhibit 8). This culvert discharges to an existing swale in open space area that currently drains to the existing Tract 15900 water quality basin #4. Treated runoff is then discharged from this basin to the north fork of Sycamore Creek just upstream of Clearwater Parkway.

In the proposed condition, the proposed offsite flow path will remain the same as in the existing conditions. The open space adjacent to the freeway will remain undeveloped with an existing dry extended detention basin. The onsite flow will be intercepted into a storm drain system and then routed through the water quality basin in OS-12. The flow will then be intercepted into existing culverts underneath the freeway, identical the existing demonstrates the existing culverts will be able to handle the proposed conditions runoff. Table 3.1 summarizes conditions. Our analysis the quantity of runoff from the proposed conditions in comparison to the existing conditions.

3.4 Neighborhood 2

In the existing condition, storm runoff from this area is conveyed mostly via sheet flow through the site, with an exception of a few small natural drainage ditches and swales. All storm runoff from this area is tributary to Lytle Creek. In general, this site drains from south to north and from west to east.

In the proposed condition, the storm conveyance system will consist of underground storm drains, golf course channels, and detention/conveyance ponds. The layout of the storm drain system is intended to maximize the use of surface flow channels and swales through the golf course and minimize the use of underground storm drains. This configuration is both cost effective and beneficial to water quality and use of storm water. The storm drain reaches were minimized to the extent practicable and were preliminarily designed to discharge runoff to either a golf course basin or channel. The fairways, tees, and greens of the golf course will discharge storm runoff as sheet flow to either a golf course channel/swale or a lake/basin. The lakes will serve multiple purposes. They will provide aesthetic benefits of the golf course, function as water hazards to the course, and will be used as water quality basins for nuisance, low flow, and irrigation runoff from the course and tributary areas. The basins will also function as reservoirs for irrigation water for the golf course and potentially the local greenbelt areas. Some of the lakes are interconnected by storm drain or channels and will ultimately discharge to Lytle Creek. An overflow spillway and path has been preliminarily sized for each water quality basin. In the event of an overflow, ultimately, the overflow path will discharge to Lytle Creek. There will be one dry extended detention BMP water quality basin that will be located in the northeast portion of Neighborhood 2 adjacent to Lytle Creek. This basin will receive storm and nuisance runoff from the tributary developed area.

The proposed storm drain sizes in this area range from 18" to 72." Each of the storm drains will be located within the public right-of-way beneath the roadway surface and have been preliminarily sized for the 25-year storm event. The storm drain system along with the streets will provide 100-year storm protection and will function as a dual system as described in the preceding paragraphs. The locations and sizes of the storm drain and lakes are shown in Figure 10. Table 3-2 summarizes the quantity of runoff from the proposed conditions in comparison to the existing conditions.

There is a proposed regional storm drain connecting Neighborhoods 2 and 3. This storm drain will convey runoff from the southeasterly portion of Neighborhood 3 in a proposed storm drain that will be

located in the public right-of-way beneath the roadway of Riverside Drive. The storm drain will connect to Neighborhood 2 and the southwesterly most corner, adjacent to Hansen Aggregates Quarry, traverse through Neighborhood 2, and ultimately discharge to Lytle Creek (Figure 10). This storm drain has been preliminarily sized to convey the 100-year clearwater peak flowrate.

3.5 Neighborhood 3

In the existing condition, storm runoff from this area is conveyed mostly via sheet flow through the site, with an exception of a few small natural drainage ditches and swales. All storm runoff from this area is tributary to Lytle Creek. In general, this site drains from south to north and from west to east.

In the proposed condition, a drainage corridor/channel will traverse the area conveying non-storm and storm runoff from west to east across the site and ultimately discharge to Lytle Creek (Exhibit 12). This drainage corridor will feature a series of interconnected small ponds, vegetated corridors, walking trails that connect a series of parks and open space areas. The drainage corridor will provide the main conveyance for nuisance runoff and storm runoff up to the 100-year event. The channel system has been preliminarily sized for the tributary 100-year storm peak flowrate. The ponds and stream system will feature a recirculating stream that is both aesthetically pleasing and provides treatment of the nuisance flows and small storms. Each pond in the system functions as a wet BMP basin and will include vegetated wetland filters and/or biofilters to provide superior water quality treatment. The low flow section of the channel will be lined with grouted site rocks/cobbles and underlain with a plastic liner system to achieve a natural looking stream consistent in appearance with the site. The plastic liner system is intended to prevent excessive water loss from the stream system. When nuisance and storm runoff is insufficient to maintain flows in the stream system the ponds and stream will be supplemented with irrigation water. The stream and pond system will also function as a reservoir system for irrigation water. Details of the water quality basins and drainage corridors are shown in Figure 12.

Nuisance flows and storm runoff will be intercepted into curb opening catch basins and conveyed to the channel / drainage corridor through an underground storm drain system. This storm drain system has been preliminarily sized for the 25-year storm event and will work in combination with the street surface to provide 100-year capacity and protection to the development pads consistent with FEMA and SBCFCD flood protection requirements. The street section will either discharge 100-year storm runoff to the channel corridor or Lytle Creek, which will outlet into water quality basins along the drainage corridor. Most of the runoff generated in Neighborhood 3 will be discharged to Lytle Creek adjacent the Neighborhood 3 at the terminus of the drainage corridor (Figure 12). The remaining 165 acres of Neighborhood 3 will be captured in a proposed storm drain and conveyed easterly beneath Riverside Drive roadway to Neighborhood 2 as discussed in the preceding paragraphs.

The proposed storm drain sizes range from 18” to 54”. The proposed locations and sizes for of the storm drain pipes are shown in Figure 12. Table 3-3 summarizes the quantity of runoff from the proposed conditions in comparison to the existing conditions.

3.6 Neighborhood 4

In the existing condition, there is a 1,103-acre watershed tributary to the southerly boundary of Neighborhood 4. This area is largely undeveloped natural foothills with some low density residential adjacent to Lytle Creek Road. These areas discharge storm and nuisance runoff that is generated offsite, across Neighborhood 4, and then to Lytle Creek. In general, storm runoff is conveyed across the site from south to north as sheet flow to Lytle Creek. The offsite undeveloped hillsides are capable of producing a considerable amount of debris due to the steepness of the terrain, existing soil types, type of vegetation, and the susceptibility to wildfire burns.

In the proposed condition, the offsite watershed will not be changed by this project. Runoff will be intercepted on the upstream side (southerly) of Lytle Creek Road and conveyed via a proposed closed conduit storm drain within the public right-of-way beneath the road surface of Lytle Creek Road. The proposed Lytle Creek Road Offsite Storm drain has been preliminarily sized to intercept and convey the 100-year bulked peak flowrate. The clearwater peak flowrate is bulked by 50% as required by SBCFCD

to account for the presence of debris in the runoff from the offsite watershed. The alignment of the offsite storm drain systems will by cut across Neighborhood 4 either within the right-of-way of proposed public roadways or within easements to be dedicated for public use.

Non-storm and storm related runoff from the onsite watershed will be captured in curb opening catch basins and conveyed to the onsite storm drain system. The onsite storm drain system has been preliminarily sized for the 25-year storm peak flowrate and will utilize a combined conveyance system to surcharge the street section below the street right-of-way in a larger storm event up to and including the 100-year event. The onsite storm drains will discharge runoff to the proposed water quality basins via a low flow bypass storm drain lateral for treatment. The low-flow bypass lateral will be designed in final design to intercept dry weather nuisance flows and the peak 2-year storm runoff flowrate and volume and convey the runoff to the basin. Flowrates in excess of the 2-year peak runoff rate will bypass the system and be discharged directly to Lytle Creek. After containment and treatment, captured runoff will be discharged from the water quality basins to Lytle Creek in a period of time not to exceed 24 hours. Storm flow tributary to the basins and exceeding the 2-year storm event and/or the capacity of the water quality basin will be discharged to Lytle Creek via an overflow spillway provided at each basin. Each basin will be constructed with a tiered invert to provide two (2) modes of treatment. The lower tier in the basin will be created by grading a small sump in the invert at the inlet to the basin. There will be no outlet from the basin for the lower tier sump. Runoff captured in the sump will be infiltrated into the ground, evapotranspirated into the atmosphere, and evaporated into the atmosphere from the basin. The lower tier sump will be designed in the final phase to provide a minimum volume equivalent to the expected daily nuisance flow volume. Once the sump volume is exceeded, runoff will flow into the main tier of the basin and remain in the basin for a period of time not to exceed 24 hours. The proposed storm drain sizes range from 18” to 102”. The locations and sizes for of the storm drain pipes are shown in Figure 14.

Tables 3.1 - 3.4 - Summary Tables for Neighborhoods 1-4

3.1	*Existing Condition (AMC III)*							*Proposed Condition (AMC III)*							*RBFValues*		
Sub-basin	Area (ac)	Tc (min)	Q Rational Method	Q Single Area UH Method	% Development	Area Wt. Bulking Factor	Q Bulk (Single Area UH Method)	Area (ac)	Tc (min)	Q Rational Method	Q Single Area UH Method	% Development	Area Wt. Bulking Factor	Q Bulk (Single Area UH Method)	Corresponding Node ID	Area (ac)	Q Rational Method
1295	493.6	32	792	701	1.4	1.5	1052	449.8	32	744	656	5.1	1.4	933	109	532	532
2245	385.7	27	598	593	1.6	1.5	890	385.7	26	643	624	12.1	1.3	823	210	267.0	575
2255	393.4	29	598	584	1.7	1.5	875	393.4	28	643	618	12.3	1.3	813	211	293.9	597
3070	68.6	22	134	112	2.6	1.5	169	110.9	13	258	228	43.1	0.9	194	117	60	133
4050	51.7	22	114	90	20.7	1.2	107	51.6	21	115	91	23.4	1.1	105	128	47.0	158
5020	932.1	29	1459	1318	2.8	1.5	1976	947.7	22	1658	1507	19.7	1.2	1816	111	991.0	1771
5035	1339.2	29	2056	1857	2.5	1.5	2785	1347.1	24	2269	2083	17.5	1.2	2578	500	1285.0	2308

Neighborhood 2

3.2	Existing Condition			Proposed Condition					
Node ID	Area (ac)	Q Rational Method	Q Bulk	Node ID	Area (ac)	% Development	Area Wt. Bulking Factor	Q Rational Method	Q Bulk
2445	928.8	692	1384	650	590.3	100.0	0.00	1195	1195
2120	232.1	153	306	525	188.4	100.0	0.00	354	354
2565*	1233.3	907	1814	525*	684	100.0	0.00	1542	1542

In order to compare the impact of existing Vs proposed, watershed models are confluence at single node even though they are discharged in to Lytle Creek at different locations.

Neighborhood 3

3.3	Existing Condition			Proposed Condition					
Node ID	Area (ac)	Q Rational Method	Q Bulk	Node ID	Area (ac)	% Development	Area Wt. Bulking Factor	Q Rational Method	Q Bulk
580	262.3	156	312	410	384.7	100.0	0.00	798	798
1065	658.1	516	1032	635	167.2	100.0	0.00	414	414
1065*	658.1	516	1032	635*	551.9	100.0	0.00	1196	1196

In order to compare the impact of existing Vs proposed, watershed models are confluence at single node even though they are discharged in to Lytle Creek at different locations.

Neighborhood 4

3.4	Existing Condition			Proposed Condition					
Node ID	Area (ac)	Q Rational Method	Q Bulk	Node ID	Area (ac)	% Development	Area Wt. Bulking Factor	Q Rational Method	Q Bulk
4045	462.8	662	993	4045	462.8	0.0	1.50	662	993
4090	55.6	82	123	4090	55.6	0.0	1.50	82	123
4160	397.6	604	906	4160	397.6	0.0	1.50	604	906
4060	11.2	20	30	4060	11.2	2.3	1.47	20	29
5050	927	1336	2004	7550	954.7	0.0	1.50	1387	2081
5110	1080.3	1550	2325	7535	1154	6.0	1.41	1707	2407
4215	72.2	115	173	4215	72.2	0.0	1.50	115	173
4260	92.1	148	222	4260	92.1	0.0	1.50	148	222
5130*	1170.4	1554	2331	7595*	1197.4	9.4	1.36	1782	2422

In order to compare the impact of existing Vs proposed, watershed models are confluence at single node even though they are discharged in to Lytle Creek at different locations.

4 Offsite Flood Control Improvements

There are existing and proposed offsite flood control improvements that will provide a minimum of 100-year storm frequency flood hazard protection to the proposed Lytle Creek Ranch project site. The north bank of Lytle Creek and Sycamore Creek were improved as part of the development of Tract 15900, Lytle North. The proposed flood control improvements that will be designed and constructed as a part of this project complete the improvement of both banks of Lytle Creek from Glen Helen Parkway to the CEMEX Quarry haul road crossing Lytle Creek, approximately 2.6 miles east of the I-15 Freeway.

4.1 Existing Flood Control Improvements

The existing improvements to the south bank of Lytle Creek consist of four (4) spur dykes built by the USACE in the 1940s, and levees constructed to protect the quarry site(s) within Lytle Creek to confine flows to a narrow corridor along the fan. These dykes are within the current planned development zones of Neighborhoods 3 and 4 and will be removed and/or built over as a part of the proposed site grading for these development areas.

Glen Helen Parkway was improved as a part of the development and improvements associated with Tract 15900. The roadway profile of Glen Helen Parkway was modified such that the 100-year water surface profile in Lytle Creek will pass over the roadway but remain within the confines or banks of the creek. In the past, the reach of Glen Helen Parkway crossing Lytle Creek was not adequately protected to withstand flows within Lytle Creek and would occasionally be washed out and/or severely damaged. The embankments of Glen Helen Parkway were armored with an 8-foot thick layer of 2-ton riprap and toed down approximately 30-feet to protect the roadway in an overtopping event. There is also a 10-foot deep cutoff wall constructed at the top of the revetment on the downstream face of the embankment to prevent undermining of the revetment in a roadway overtopping flow event. Larger return interval and more frequently occurring storms will be conveyed beneath the roadway of Glen Helen Parkway via the existing arch culverts that were constructed as a part of Tract 15900 improvements.

The northerly bank of Lytle Creek is fully improved extending from Glen Helen Parkway to the confluence with Sycamore Creek. There is an 8-foot thick grouted riprap revetment that extends down 30-feet below the existing flow line, which spans from Glen Helen to the CEMEX Quarry site located at the easterly boundary of Tract 15900. This reach of Lytle Creek also has an existing 20-foot wide asphalt concrete access / maintenance road at the top of the bank. The CEMEX Quarry site is protected by an existing levee constructed of soil cement capped with grouted riprap. The combined span of these two Lytle Creek bank improvements extends from 1.2 miles upstream of the I-15 crossing to 2.6 miles downstream of the I-15 crossing; just upstream of the confluence with Sycamore Creek Wash (see Figure 4).

4.2 Proposed Flood Control Improvements

4.2.1 Lytle Creek – South Bank Improvements

A soil cement revetment is proposed for the southerly bank of Lytle Creek to protect the proposed Lytle Creek Ranch development, approximately 7 miles in length. The proposed south bank improvements will extend from approximately 0.9 miles upstream of Glen Helen Parkway to approximately 5.5 miles downstream of the northbound I-15 Bridge, at the easterly boundary of Neighborhoods 2 and 3. The proposed curvilinear alignment of the facility causes the facility length to exceed the span. The proposed south bank lining system cross section will consist of an 8-ft thick soil cement revetment with a 20-foot wide maintenance road on the top. Figure-18 provides a typical section of the proposed bank improvements. These improvements will be dedicated to SBCFCD for ownership and maintenance, and therefore will be designed and built to meet SBCFCD minimum requirements for performance, material, and workmanship. Figure-4 contains a plan locating existing and proposed protection measures on the banks of Lytle and Sycamore Creeks. The proposed improvements to Lytle Creek as a part of the Lytle Ranch project will complete the confinement of the flowpath in Lytle Creek. These improvements along with the existing Tract 15900 north bank improvements, and the existing north bank CEMEX levee improvements will define the limits of the floodplain between the north and south bank improvements.

4.2.2 Lytle Creek – FEMA Floodplain Mapping

Currently portions of the proposed onsite development area of Neighborhoods 3 and 4 are within a mapped FEMA 100-year floodplain, see National Flood Insurance Plan (NFIP) Federal Insurance Rate Map (FIRM) panels 06071C7910F and 06071C7912G. SBCFCD requires that a FEMA Conditional Letter of Map Revision (CLOMR) be obtained before issuance of a grading permit for the proposed onsite improvements. SBCFCD also requires that a Letter of Map Revision (LOMR) be obtained before a Certificate of Occupancy will be issued for constructed structures. These protocol requirements insure that the proposed development area of Lytle Creek Ranch will be adequately removed from the 100-year FEMA floodplain by proposed grading and/or flood control improvements before the project is permitted to grade and construct proposed improvements.

A FEMA CLOMR application was submitted to modify the mapped floodplain limits for the proposed south bank improvements and development that will be designed and constructed as a part of the Lytle Creek Ranch project. The case number for this application is 0609B387R.

4.2.3 Hydraulic Analysis

A detailed hydraulic analysis of Lytle Creek was performed in the design of the existing north bank improvements in a report titled, "*Revetment Design for Lytle Creek North Development- Hydraulic Report," dated June 2004.* An additional detailed hydraulic analysis was performed in the design of the proposed south bank improvements in a report titled, "*Preliminary Engineering Investigation – Lytle Creek Hydraulic Investigation*" dated, November 2007. Both of these reports in their entirety are provided in the appendix of this report. This report provides generalized summary information garnered from these studies.

The south bank lining system was preliminarily designed to withstand the hydraulic forces generated by the 100-year bulked flow flowrate in Lytle Creek, 64,450cfs. The calculated ultimate condition flow velocities in Lytle Creek range between 10 fps and 20 fps. The project reach has average flowline grades of 0.03 ft/ft. The flow regimes vary between subcritical and supercritical, with supercritical flow dominating most segments of the channel. In the design hydraulic analysis the entire bulked flowrate was assumed to be conveyed to the south of the San Bernardino Kangaroo Rat (SBKR) habitat mitigation island located downstream of I-15 crossing.

The entrenched nature of the Lytle Creek alluvial fan allows the application of riverine hydraulic modeling techniques for the floodplain evaluation since the channel boundaries are clearly defined. Common procedures can be applied to account for split flows or obstructions within the active channel associated with flow path variability in a braided channel system.

The hydraulic modeling procedures applied to the existing Lytle Creek floodplain conditions and the results are provided in this section. The technical evaluation developed a detailed analysis of the natural floodplain from the Lytle Creek canyon mouth, approximately 1.3 miles upstream of the I-15 Bridge crossing to 5.4 miles downstream of I-15 crossing near the confluence with Cajon Creek Wash, or a total reach length of approximately 35,260 feet. The studied Lytle Creek is part of the cone-shaped Lytle Creek Wash alluvial fan. However, the geological mechanism to generate the entire alluvial fan has ceased to continue since mountain stream runoff is mostly confined to Lytle Creek. The creek terrace is geologically stable and has sufficient conveyance capacity to convey large magnitude floodwaters. Therefore, a well-developed open channel hydraulic model such as HEC-RAS applies for flood control assessment for Lytle Creek. The current study remains at steady flow open channel level with the design peak runoff condition implemented into accurate channel geometrical conditions.

4.2.4 Hydraulic Model Assumptions

The U.S. Army Corps of Engineers (ACOE) HEC-RAS (River Analysis System) water surface profile computer model was used to analyze the existing floodplain within this portion of Lytle Creek and assess the hydraulic properties within the active channel system.

The geometry of the existing channel is unique because of the erosion and depositional features that have resulted in braiding, multiple flow paths, and various obstructions that require specialized modeling assumptions. This portion of the alluvial fan can generally be considered to be within a **supercritical** flow regime that is characterized by high velocity flows because of the steep nature of the active streambed slope. The detailed floodplain hydraulics generally reveals that channel regime fluctuates between the critical and supercritical regime which is consistent with alluvial fan operation. The HEC-RAS hydraulic modeling reflects assumptions regarding the flow path direction, and so multiple paths were analyzed, including the effects of flow blockage from manmade embankment obstructions. Numerous conditions were evaluated with the hydraulic model to study the effects of (1) cross section orientation, (2) variation of roughness coefficient, (3) flow distribution or island effects, and (4) flow blockage.

The following several assumptions and guidelines were utilized in the development of the floodplain hydraulic model in order to address the unique conditions associated with this portion of Lytle Creek.

4.2.5 Channel Roughness

Proper selection of the Manning's roughness coefficient, n, is one of the more critical and subjective elements describing the hydraulics. The selection of the appropriate Manning's roughness coefficient was performed based on (1) field observation and inspection of the existing floodplain conditions, (2) color aerial photographs, (3) field ground photographs of representative locations along the natural creek corridor, (4) comparison to published guidelines for roughness selection based on similar ground photographs corresponding to representative cross sections, and (5) calculation of the Manning's coefficient within the floodplain based on the application of Cowan's additive procedure (Chow, 1959). Cowan's procedure uses the following equation to predict the Manning's value:

$$n = (n_0+n_1+n_2+n_3+n_4)m_5$$

where n is the estimated Manning's roughness coefficient, n_0 represents the bed material involved, n_1 the degree of channel irregularity, n_2 the variations of channel cross-sections, n_3 the relative effect of channel obstructions, n_4 vegetation density, and m_5 as the degree of channel meandering. Table 4 lists the ranges of values used to determine the estimated high and low Manning's number for the creek. The table shows that the estimated roughness coefficient ranges from 0.025 to 0.055. These values compare well with those presented in Chow (1959, Table 5.6) for natural streams. Such Manning's values in Chow's table reflect clean streams that are both straight and winding with some weeds and stones. Channel Roughness in the hydraulic computations was varied depending on the material and location.

Table 4 - Range of Estimated Manning's Number based on Cowan's Procedure

Variable – Contribution Type	Low		High	
	Value	**Condition**	**Value**	**Condition**
n_0 – Bed Material	0.020	Earth	0.024	Fine Gravel
n_1 - Channel Irregularity	0.000	Smooth	0.010	Moderate
n_2 - Section Variation	0.000	Gradual	0.005	Alternating Occasionally
n_3 - Channel Obstruction	0.000	Negligible	0.000	Negligible
n_4 - Vegetation Density	0.005	Low	0.010	Low
m_5 - Channel Meandering	1.000	Minor	1.150	Appreciable
n - Manning's #	**0.025**		**0.055**	

Figure 1 - Lytle Creek - Creek Bed for Roughness Determination

In evaluating Lytle Creek several n-values were utilized for varied design conditions as follows. For design of the toe-down or cut-off depth of the proposed bank revetment an n-value of 0.025 was used. The calculated maximum water surface elevation for design of the top of bank for the proposed revetment was determined using an n-value of 0.055 was used. Evaluation of the sediment transport characteristics of Lytle Creek was performed using an n-value of 0.045.

4.2.6 Interval Spacing

The cross-section spacing was generally two to three hundred feet in separation. Cross-section spacing was also determined based upon ensuring that the average channel characteristics were correctly modeled, including all changes in the average geometry or roughness.

4.2.7 Boundary Conditions

The HEC-RAS boundary conditions starting water surface elevations were based upon normal depth using a slope of 0.0220.

4.2.8 Discharge

The 100-yr peak discharge in Lytle Creek used for this project is 64,540 cfs. This flowrate is based upon previous studies conducted by Simons, Li & Associates (SLA) dated 1997 "100-year Flood Using Frequency Analysis of Gaged Records (1997)" and PACE dated 2004 "Bulked Baseflood by San Bernardino County Hydrology Procedure (2004)". These studies summarized the various flowrates calculated for Lytle Creek. The 100-yr clearwater flowrate for Lytle Creek at the I-15 Bridges calculated using the San Bernardino County Procedure (1992) was determined to be 32,270 cfs by *Simons, Li & Associates*. A bulking factor of two (2) was applied to the clearwater flowrate to develop the 100-yr bulked flowrate of 64,540 cfs for Lytle Creek

4.2.9 Split Flow or Islands

A major constraint in the hydraulic analysis for this segment of Lytle Creek is the large island that will result in divided flow around each side of the island. It is necessary to prepare independent hydraulic models for each side of the island in order to perform accurate evaluation of the water surface profile since they function as independent streams but within common junction points or boundaries upstream and downstream. Even though Lytle Creek is considered a stable non-active alluvial fan, the potential for localized streambed avulsions and stream path migration within the boundaries of the creek still exists. The potential for streambed erosion coupled with the presence of the SBKR habitat island located within Lytle Creek downstream of the I-15 provides the potential for the Lytle Creek stream path to either split around both sides of the island or be deflected to one side or the other. Therefore, detailed analysis was performed in the previous studies to determine the result of each of the three possible flow paths. The most conservative results (the highest water surface elevation and the largest calculated flow velocity) were used for design of the existing north and proposed south bank improvements.

4.2.10 Active Channel Obstructions

Channel obstructions such as the artificial earthen berms that have been constructed as part of the active in-channel water recharge program have a definitive impact on the channel hydraulic and flow distribution since these are located in the active stream channel. The method that was used to account for these features was to utilize "ineffective flow area" for that portion of the channel cross section that was impacted by the berms. The "ineffective flow area" disregards that portion of the channel section as available flow area and is similar to block flow area without the divided flow calculation problems.

4.2.11 Results of Calculated Floodplain Hydraulic Characteristics

Representative hydraulic parameters for the entire 6.7-mile reach of Lytle Creek floodplain are summarized in the following table for the left and right (oriented in the downstream direction) floodplain areas. The left floodplain model evaluated the floodplain around the left side of the large island but and the right floodplain model evaluated the right side of the island. Important hydraulic parameters that assist in evaluation of trends and stability within the active floodplain include variations and magnitude for (1) velocity, (2) top width, (3) flow area, (4) depth, (5) shear stress, and (6) stream power. Shear stress is the measure of the erosive capacity of a creek in terms of the force applied to soil particles in the direction of flow. It indicates the ability of the flow to initiate movement or transport of sediments from the banks and/or bottom of the creek. Stream power is a measure of the energy available in the stream flow to transport sediment. It is an expression of the rate of energy expenditure or flow strength at a given point in a river system that is used to determine the erosive capacity of flow in a creek/river. These two parameters are used typically to evaluate the potential erosiveness of flow in a "natural" creek system. Table 5 shown below provides a summary comparison of the existing condition and proposed condition hydraulic analysis of Lytle Creek. See Figure 15 for Lytle Creek ultimate floodplain boundary. Summaries

of the channel existing and proposed conditions can be found in Appendix VIII Table 5.1, 5.2, 5.3 and 5.4 respectively.

A comparison of the model results for shear stress and stream power in the existing condition versus the proposed condition indicates that there would be four (4) stream locations that would exhibit impact or increases in these parameters in the proposed condition. A plot of the stream power and shear stress in the proposed condition overlaid on an existing condition plot of the same parameters reveals the locations of expected impacts. See the *Stream Power Diagram* and *Shear Stress Diagram* provided in Appendix-VIII. The channel stations of the impacted areas would be approximately stations 160+00, 180+00, 250+00, and 310+00. These impacts will be studied further in final design to determine the relative significance. Significant impacts will be mitigated in final design by armoring of the stream bed and banks and/or constructing the toe of the proposed bank revetment deeper than the maximum calculated scour depth at the corresponding channel section(s).

Table 5 - Existing Condition and Proposed Condition Hydraulic Analysis of Lytle Creek

Existing Condition				Proposed Condition			Difference			Landmarks
River Sta	W.S. Elev (ft)	Velocity (ft/s)	Top Width (ft)	W.S. Elev (ft)	Velocity (ft/s)	Top Width (ft)	W.S. Elev (ft)	Velocity (ft/s)	Top Width (ft)	
37076	2,202.30	20.8	697.2	2,202.30	20.8	697.2	0	0	0	U/S Extent of Study
36825	2,195.40	19.5	834.2	2,195.40	19.5	834.3	0	0	0	End Proposed South Bank Revetment
36572	2,186.80	20.3	835.7	2,187.10	20.6	744	0.3	0.3	-91.6	
36318	2,178.10	22.1	627.6	2,178.90	21.7	627.3	0.8	-0.3	-0.3	
36064	2,170.60	22.4	676.8	2,172.60	19.2	896.5	2	-3.2	219.7	
35850	2,164.60	19.6	876.2	2,165.70	20.1	759.4	1.2	0.5	-116.8	
35649	2,159.90	16.6	1,121.10	2,160.00	19.1	932.5	0	2.6	-188.6	
35349	2,150.50	17.1	1,338.90	2,151.00	17.7	1,121.00	0.5	0.5	-218	
35048	2,142.00	15.3	1,371.40	2,142.30	17.7	1,022.10	0.3	2.4	-349.3	
34658	2,131.10	16.4	1,198.40	2,131.40	18.6	903.4	0.3	2.2	-295.1	
34357	2,122.40	16.4	1,320.10	2,123.30	17.9	999.7	0.9	1.5	-320.5	
34162	2,116.90	15.5	1,434.90	2,117.80	18.1	1,022.90	0.9	2.6	-412.1	
33912	2,109.00	16.1	1,426.00	2,110.00	18.3	1,105.00	1	2.2	-321	
33661	2,101.60	16.9	1,042.10	2,102.70	17.9	1,001.50	1.1	1	-40.6	
33353	2,093.20	16.6	1,334.70	2,093.50	18.3	963.1	0.3	1.8	-371.6	
33102	2,086.50	16.2	1,286.40	2,085.80	18.4	1,032.60	-0.7	2.1	-253.8	
32824	2,079.10	16.8	1,180.10	2,078.20	17.4	1,007.50	-0.9	0.7	-172.6	
32502	2,070.20	18.3	1,113.50	2,069.50	18.3	1,062.50	-0.7	0	-51	
32257	2,064.00	18.9	1,006.60	2,062.90	19.2	978.5	-1.2	0.3	-28.1	
32055	2,062.50	19	1,790.80	2,062.50	5.9	1,618.40	0	-13.1	-172.4	
31951	2,057.30	10.6	1,203.60	2,057.30	10.4	1,203.30	0	-0.2	-0.3	Glen Helen Parkway
31653	2,045.20	31.9	947.3	2,043.30	31.9	779	-1.9	0	-168.3	
31319	2,033.00	24	897.6	2,033.70	27.3	1,007.50	0.8	3.3	109.9	
30906	2,023.30	17.3	1,203.30	2,023.80	24.5	728.2	0.5	7.2	-475.1	
30537	2,016.80	18.2	1,918.40	2,010.90	23.1	841.8	-5.9	4.9	-1,076.60	Southbound I-15 Bridge
30452	2,009.10	16.5	1,507.40	2,008.60	16.1	1,189.90	-0.5	-0.4	-317.5	
30412	2,009.70	17.2	1,697.50	2,008.10	16	1,284.80	-1.5	-1.2	-412.6	Northbound I-15 Bridge
30322	2,006.00	14.9	1,454.90	2,005.40	14.1	1,267.00	-0.6	-0.8	-187.9	
30196	2,001.50	16.2	1,149.00	2,001.70	15.9	1,150.00	0.2	-0.3	1	
30018	1,996.30	17.5	971.7	1,996.40	18	885.2	0.1	0.5	-86.5	
29850	1,992.00	17.6	939.3	1,991.90	18.6	881.2	-0.1	1	-58.1	
29719	1,988.70	17.1	1,107.80	1,988.80	17.3	1,093.30	0	0.3	-14.5	

29586	1,985.10	16.7	1,147.70	1,985.10	16.9	1,143.20	0	0.2	-4.5
29443	1,982.60	16	983.9	1,982.30	16.2	981.1	-0.3	0.2	-2.7
29294	1,978.00	18.4	820.9	1,978.00	18.1	820.5	0	-0.3	-0.4
29171	1,974.20	19.2	873.1	1,974.20	19.1	873	0	-0.1	-0.1
29038	1,970.50	18.4	1,000.50	1,970.50	18.3	1,000.50	0	0	0
28926	1,967.40	17.8	996.7	1,967.40	17.8	996.7	0	0	0
28783	1,963.60	16.9	1,199.40	1,963.60	17	1,189.40	0	0.1	-10
28644	1,959.60	16	1,437.10	1,959.60	16.3	1,356.50	0	0.3	-80.6
28503	1,956.10	15	1,362.00	1,956.10	15.3	1,362.10	0	0.3	0.1
28352	1,952.30	16.7	1,053.70	1,951.50	16.8	1,082.10	-0.7	0	28.4
28263	1,949.20	19	904.2	1,948.90	17.5	908.6	-0.3	-1.4	4.5
28172	1,947.30	19.5	766.3	1,946.60	18	766.4	-0.7	-1.5	0.2
28046	1,942.00	22.7	1,083.00	1,942.00	19.5	1,083.00	0	-3.2	0
27910	1,939.20	18.7	1,144.80	1,939.10	16.1	1,141.40	-0.1	-2.6	-3.4
27755	1,934.60	19.4	1,092.80	1,934.60	17.2	1,035.50	0	-2.2	-57.4
27586	1,930.10	19	1,070.70	1,929.90	17.4	1,061.00	-0.2	-1.6	-9.8
27440	1,926.20	18.7	1,138.10	1,926.00	16.9	1,189.50	-0.2	-1.9	51.5
27315	1,922.90	18.6	1,140.80	1,922.40	16.7	1,286.20	-0.5	-1.9	145.4
27193	1,919.60	18.8	1,265.60	1,919.10	15.9	1,293.30	-0.5	-3	27.7
27067	1,916.40	18.4	1,319.70	1,915.70	15.7	1,375.10	-0.6	-2.7	55.4
26965	1,913.40	18	1,533.30	1,912.80	15.5	1,478.90	-0.6	-2.5	-54.4
26814	1,909.50	17.1	1,616.20	1,908.60	15.1	1,537.20	-0.9	-2	-79
26683	1,905.90	17.3	1,581.80	1,904.60	15.5	1,544.60	-1.3	-1.8	-37.2
26571	1,902.80	17.6	1,108.60	1,901.40	15	1,647.40	-1.4	-2.6	538.8
26405	1,897.90	18.9	1,059.70	1,899.00	15.3	1,028.40	1.1	-3.6	-31.3
26256	1,893.30	19.6	1,016.90	1,893.40	19.3	936.9	0.1	-0.3	-80
26099	1,888.50	21.1	967.1	1,888.60	21	876.9	0.1	-0.1	-90.2
25952	1,884.50	19.7	1,242.60	1,884.90	19.7	921.9	0.3	0	-320.8
25772	1,878.70	18	1,071.10	1,878.70	19.7	839.5	0	1.8	-231.6
25642	1,874.40	20.2	986.8	1,874.20	20.3	789.2	-0.1	0	-197.6
25522	1,870.30	21.8	1,036.10	1,870.10	21.8	798	-0.1	0	-238.1
25319	1,865.20	18.7	865.9	1,865.20	20.3	865.9	0	1.5	0
25102	1,860.40	18.7	892.3	1,860.40	20.3	892.3	0	1.6	0
24913	1,855.30	19.5	977	1,855.30	20.9	977	0	1.4	0
24765	1,850.40	19.9	792.4	1,850.40	20.6	792.3	0	0.7	-0.1
24632	1,845.90	22.5	717.9	1,845.90	23	727.5	0	0.5	9.5
24427	1,839.50	21.5	1,023.30	1,839.50	21.4	746.5	0	-0.1	-276.8
24220	1,834.60	21.9	1,159.70	1,834.90	22	683.6	0.3	0.1	-476
24048	1,829.60	23.1	1,156.70	1,829.90	23.4	852.3	0.3	0.3	-304.4
23892	1,823.30	22.8	1,108.10	1,824.40	22.7	802.9	1.1	-0.1	-305.2
23754	1,816.70	26.1	848.1	1,819.30	26	782.1	2.6	-0.2	-65.9
23559	1,810.70	20.8	1,042.40	1,813.90	20.8	840.8	3.2	0	-201.6
23355	1,804.90	20.8	1,102.00	1,807.70	20.8	702	2.8	0	-400
23191	1,799.70	21.5	927.3	1,803.50	21.5	802.1	3.8	0	-125.2
23044	1,795.60	21.4	843.7	1,799.00	21.4	739.9	3.3	0	-103.8
22888	1,792.30	22.5	913.5	1,795.00	22.5	712	2.6	0	-201.5
22705	1,786.60	22.3	945.3	1,788.20	22.3	823.5	1.7	0	-121.7
22527	1,782.30	24.1	1,154.20	1,783.50	24.1	866.4	1.3	0	-287.8
22354	1,777.10	25.3	1,369.40	1,778.20	25.3	1,050.60	1.1	0	-318.9
22130	1,771.40	23.8	1,425.10	1,772.00	23.8	1,009.80	0.6	0	-415.4
21921	1,765.40	22.3	1,107.20	1,765.20	22	991.8	-0.2	-0.3	-115.5

21731	1,759.80	25	939.5	1,759.80	24.7	1,014.20	0	-0.3	74.7	
21572	1,755.30	26.7	1,229.20	1,755.40	26.5	928.8	0.1	-0.3	-300.4	
21423	1,750.60	33.3	1,775.10	1,751.60	33.3	859.4	1.1	0	-915.7	
21297	1,747.00	33.1	1,700.50	1,747.70	33.1	846	0.7	0	-854.5	
21146	1,741.90	33.1	1,426.60	1,741.40	33.1	1,034.90	-0.5	0	-391.7	
21034	1,737.90	32.3	1,366.70	1,738.00	32.3	937.1	0.1	0	-429.6	
20892	1,733.70	32.4	816.6	1,733.00	32.4	785.1	-0.7	0	-31.5	
20751	1,728.80	31.7	747.1	1,728.90	31.7	748.3	0.2	0	1.2	
20593	1,722.30	30.2	571.5	1,722.30	30.2	571.9	0	0	0.3	
20475	1,717.90	30.7	677.1	1,713.50	31.2	393.9	-4.4	0.5	-283.2	
20320	1,709.10	26.5	493.1	1,710.80	28	651.5	1.6	1.5	158.4	
20154	1,707.20	21.8	560.4	1,707.50	22.3	580.5	0.3	0.5	20.1	
20000	1,704.00	19.9	621.5	1,704.10	19.9	623.4	0.1	0.1	1.9	
19880	1,701.60	19.7	554.3	1,701.70	19.6	554.8	0	0	0.4	
19726	1,697.40	21	613.2	1,697.40	21	613.3	0	0	0.1	
19573	1,691.90	22.6	611.1	1,691.90	22.6	611.2	0	0	0	
19421	1,686.60	23.2	542.8	1,686.60	23.2	542.9	0	0	0	
19268	1,678.60	28.5	202.4	1,678.60	28.5	202.5	0	0	0	
19116	1,655.70	43.1	254.6	1,655.70	43.1	254.6	0	0	0	
18963	1,648.90	34	522.5	1,648.90	34	522.5	0	0	0	
18810	1,641.90	29.3	422.8	1,641.90	29.3	422.8	0	0	0	
18657	1,635.30	28.9	406.6	1,635.30	28.9	406.6	0	0	0	
18504	1,630.70	27.3	374.7	1,630.70	27.3	374.7	0	0	0	
18351	1,626.90	26.4	353.7	1,626.90	26.4	353.7	0	0	0	
18198	1,626.00	22.7	319.1	1,626.00	22.7	319.1	0	0	0	
18045	1,621.90	24.6	338.1	1,621.90	24.6	338.1	0	0	0	
17893	1,620.00	23.4	303.2	1,620.00	23.4	303.2	0	0	0	
17739	1,625.70	10.7	290.4	1,625.70	10.7	290.4	0	0	0	
17585	1,625.60	10.6	284.7	1,625.60	10.6	284.7	0	0	0	
17433	1,625.70	9.2	320.3	1,625.70	9.2	320.3	0	0	0	
17295	1,625.70	9	312.2	1,625.70	9	312.2	0	0	0	
17185	1,622.60	16	336.6	1,622.60	16	336.6	0	0	0	
16968	1,616.00	22.9	487.8	1,616.30	23.1	506	0.3	0.2	18.2	
16794	1,618.60	13.1	1,396.60	1,619.10	14.6	692.7	0.5	1.5	-703.9	
16644	1,611.30	23.6	363.6	1,614.50	21.3	725.6	3.2	-2.3	362	
16463	1,606.60	21.5	1,097.90	1,606.80	23.3	1,093.90	0.2	1.8	-4.1	
16274	1,603.40	14.5	1,350.50	1,603.40	14.9	1,350.60	0	0.4	0.1	
16149	1,600.00	16.1	1,570.10	1,600.00	16	1,570.10	0	-0.1	0	
16005	1,596.70	16.2	1,643.40	1,596.50	15.6	1,435.40	-0.3	-0.6	-207.9	
15869	1,594.70	14.2	1,504.50	1,594.60	13.1	1,537.70	-0.1	-1.1	33.3	
15728	1,590.90	15.4	1,928.10	1,591.10	15.3	1,504.60	0.1	-0.1	-423.5	
15540	1,585.40	15.9	1,274.70	1,585.50	17.2	1,187.40	0	1.3	-87.3	
15355	1,581.80	14	1,649.40	1,582.10	13.9	1,697.20	0.3	-0.1	47.8	
15215	1,578.30	14.7	1,407.60	1,578.40	15.2	1,584.30	0.1	0.5	176.6	
15035	1,574.80	14	2,394.50	1,575.10	13.2	1,837.10	0.3	-0.8	-557.4	
14847	1,570.80	13.7	1,773.70	1,571.20	13.2	2,002.60	0.4	-0.5	228.9	
14621	1,565.50	14.3	1,695.10	1,566.30	13.3	1,733.80	0.7	-1	38.7	
14443	1,561.20	13.8	1,754.10	1,561.80	14	1,636.40	0.6	0.2	-117.7	
14267	1,556.90	14.1	1,833.30	1,557.40	14.5	1,535.90	0.5	0.4	-297.4	
14096	1,552.90	14.7	1,497.90	1,553.60	14.8	1,197.60	0.8	0.1	-300.2	Sycamore Creek Junction
13938	1,548.40	15.6	1,408.20	1,549.20	16.5	1,170.90	0.8	0.9	-237.3	

13776	1,544.10	16.2	1,091.80	1,545.00	16.6	1,095.60	0.9	0.4	3.9	
13625	1,540.50	16.5	1,018.10	1,541.40	16.2	1,226.90	0.9	-0.3	208.8	
13476	1,537.00	16.7	958	1,538.10	15.5	1,234.10	1	-1.2	276.1	
13326	1,533.90	15.3	1,408.80	1,534.50	15.6	1,285.90	0.5	0.3	-122.9	
13176	1,530.40	14.9	1,333.30	1,530.80	15.6	1,203.30	0.4	0.7	-130	
13025	1,526.80	15.2	1,254.00	1,527.30	15.8	1,181.40	0.5	0.6	-72.7	
12876	1,523.40	15	1,352.00	1,523.80	15.9	1,173.30	0.3	0.9	-178.7	
12726	1,520.00	15.2	1,202.00	1,520.20	16	1,151.60	0.2	0.9	-50.5	
12576	1,516.00	16.1	1,247.70	1,516.20	16.6	1,194.70	0.2	0.5	-53	
12421	1,512.00	16.1	1,147.40	1,512.00	16.7	1,072.00	0	0.6	-75.4	
12274	1,508.00	17.2	937.4	1,507.90	17.7	920.2	0	0.5	-17.2	
12123	1,504.50	17.7	769.7	1,504.50	18	768.2	0	0.4	-1.5	
11913	1,499.60	18.2	851.4	1,499.60	18.2	851.3	0	0	-0.1	
11677	1,494.30	17.9	817.5	1,494.30	17.9	817.5	0	0	0	
11382	1,488.30	18.1	810.1	1,488.30	18.1	810.1	0	0	0	Cajon Wash Junction
11172	1,482.60	19.5	951.5	1,482.60	19.5	951.5	0	0	0	
10981	1,477.60	18.3	1,067.20	1,477.60	18.3	1,067.20	0	0	0	
10791	1,473.10	18.3	860.3	1,473.10	18.3	860.3	0	0	0	
10614	1,469.90	18.5	643.9	1,469.90	18.5	643.9	0	0	0	
10436	1,465.80	20.5	548.8	1,465.80	20.5	548.8	0	0	0	
10247	1,460.30	22.9	551.9	1,460.30	22.9	551.9	0	0	0	
10052	1,455.90	21.9	663.5	1,455.90	21.9	663.5	0	0	0	
9938	1,453.00	21.7	664.3	1,453.00	21.7	664.3	0	0	0	
9785	1,449.10	21.2	735.8	1,449.10	21.2	735.8	0	0	0	
9663	1,445.50	21.7	642.8	1,445.50	21.7	642.8	0	0	0	
9529	1,442.80	20.8	658.7	1,442.80	20.8	658.7	0	0	0	
9416	1,440.00	21.2	623.6	1,440.00	21.2	623.6	0	0	0	
9283	1,436.30	22.2	565.4	1,436.30	22.2	565.4	0	0	0	
9093	1,431.80	22	640.5	1,432.10	22.1	595.9	0.4	0.1	-44.6	
8907	1,426.20	22.7	614.3	1,426.20	23.4	614	-0.1	0.7	-0.2	
8700	1,421.00	21.4	758.7	1,421.00	21.3	759.2	0	-0.1	0.5	
8536	1,416.80	20.6	732.3	1,416.80	20.6	732.3	0	0	0	
8398	1,413.60	20.4	746.6	1,413.50	20.4	746.3	0	0	-0.2	
8214	1,409.20	20.6	681.5	1,409.20	20.5	681	0	-0.1	-0.5	
8058	1,406.70	19.2	697.3	1,406.70	19.1	697.1	0	-0.1	-0.1	
7908	1,403.20	20.1	652.3	1,403.20	20	652.3	0	-0.1	0	
7764	1,401.20	19.2	579.3	1,401.20	19.2	579.4	0	0	0	
7631	1,398.70	19.9	567.9	1,398.70	19.9	567.9	0	0	0	
7500	1,395.90	21.4	550.5	1,395.90	21.4	550.5	0	0	0	
7400	1,393.10	22.1	630	1,393.10	22.1	630	0	0	0	
7300	1,390.60	21.7	704.2	1,390.60	21.7	704.2	0	0	0	
7200	1,388.00	21	806	1,388.00	21	806	0	0	0	
7100	1,383.70	21.9	988.6	1,383.70	21.9	990.1	0	0	1.5	
7000	1,382.40	17.2	1,153.20	1,382.40	17.2	1,153.20	0	0	0	
6900	1,380.50	16.2	1,188.20	1,380.50	16.2	1,188.20	0	0	0	
6800	1,378.00	16.6	1,247.10	1,378.00	16.7	1,247.20	0	0.1	0.2	
6700	1,375.90	16	1,247.70	1,376.00	16	1,248.00	0.1	0	0.3	
6600	1,373.70	16	1,237.30	1,373.70	16	1,237.50	0	0	0.2	
6500	1,371.40	16.2	1,311.10	1,371.40	16.2	1,311.10	0	0	0	
6400	1,369.10	16	1,293.70	1,369.10	16	1,293.70	0	0	0	
6299	1,367.00	15.9	1,227.20	1,367.00	15.9	1,227.20	0	0	0	

6199	1,364.80	16.1	1,131.70	1,364.80	16.1	1,131.70	0	0	0	
6098	1,362.80	16.3	1,068.70	1,362.80	16.3	1,068.70	0	0	0	
5998	1,360.50	16.9	1,009.80	1,360.50	16.9	1,009.80	0	0	0	
5897	1,358.70	16.7	958.8	1,358.70	16.7	959	0	0	0.3	
5711	1,356.70	14.6	890.7	1,356.70	14.7	891.2	0	0.1	0.5	
5609	1,354.80	16.2	795.5	1,354.80	16.2	795.6	0	0.1	0.1	
5404	1,351.10	17.6	809.1	1,351.10	17.6	809.1	0	0	0	
5190	1,347.50	17.6	869.2	1,347.50	17.6	869.2	0	0	0	
4960	1,344.30	15.4	1,133.70	1,344.40	15.5	1,137.40	0.1	0.1	3.7	
4806	1,341.70	15.3	1,267.10	1,341.70	15.4	1,267.60	0	0.1	0.5	
4619	1,338.30	15	1,412.80	1,338.40	15.1	1,413.00	0	0.1	0.2	
4461	1,335.50	14.4	1,453.90	1,335.50	14.6	1,454.00	0	0.2	0.1	
4285	1,332.30	14.3	1,445.00	1,332.30	14.4	1,443.10	0	0.2	-1.9	
4125	1,329.40	14.5	1,315.10	1,329.40	14.5	1,315.40	0	0	0.2	
3970	1,327.10	14.2	1,308.00	1,327.10	14.2	1,308.00	0	0	0	
3828	1,325.50	13.8	1,251.50	1,325.50	13.8	1,251.50	0	0	0	
3647	1,322.70	14	1,135.90	1,322.70	14	1,135.90	0	0	0	Begin South Bank Revetment
3494	1,320.40	14.8	991.3	1,320.40	14.8	991.3	0	0	0	
3340	1,317.80	16.2	821.3	1,317.80	16.2	821.3	0	0	0	
3187	1,315.10	17.2	766.8	1,315.10	17.2	766.8	0	0	0	
3034	1,313.00	17.3	678.4	1,313.00	17.3	678.4	0	0	0	
2880	1,311.40	16.7	730	1,311.40	16.7	730	0	0	0	
2727	1,309.60	16.6	757.9	1,309.60	16.6	757.9	0	0	0	
2574	1,307.60	16.6	801.4	1,307.60	16.6	801.4	0	0	0	
2413	1,306.10	15.6	784.6	1,306.10	15.6	784.6	0	0	0	
2259	1,306.20	13.5	873	1,306.20	12.3	873	0	-1.2	0	
2105	1,303.70	15.4	883.4	1,303.70	15.1	883.4	0	-0.4	0	
1930	1,302.30	13.9	932.5	1,302.30	13.9	932.1	0	0	-0.4	D/S Extent of Study

4.2.12 Geomorphic Streambank Erosion Analysis

4.2.12.1 Project Historical Aerial Photograph Data Acquisition/Interpretation

Research was performed to obtain historical aerial photographs of Lytle Creek that covered an adequate period of record in order to evaluate (1) specific trends in the fluvial processes, (2) the effect of major storm events, and (3) the response of the creek system to different external changes such as hydraulic structures.

Two different resources of historical aerial photography archives used to obtain data specifically for the project included Whittier College and San Bernardino County Flood Control District. The "Valley Wide" area that includes Lytle Creek has aerial photos from 1938 to 2005 at scales ranging from 1"=1000' to 1"=2000'. The methodology for developing the sequence of aerial photographs obtained from the sources was based on providing aerial coverage for (1) significant storm events, (2) years with high rainfall, and (3) time intervals between photographed years not exceeding approximately 10-years. High-resolution scans were produced for all the aerial photographs. The photographs were then geo-referenced utilizing GIS tools with the available USGS mapping for the area and common geographic features. The geo-referencing of the aerial photographs ensured that all the photographs were on the same horizontal datum for comparison purposes. The following table summarizes all the historical aerial photographs obtained as part of the research for this analysis and indicates relevant hydrologic data associated with that year or time interval between aerial photos of this sequence. The relevant hydrologic

data includes the annual rainfall for that year and any significant storm that occurred since the last historic photo in the sequence was obtained.

Table 6 - Historic Aerial Photograph Research Data

Date	Source	Annual Rainfall (inches)	Significant Storm in Photo Time Interval	Time Increment Between Photos (years)
1930	Fairchild	21.33	02/16/27 (2,700 cfs)	----------
Oct 22, 1932	Fairchild	12.2	----------	2
August 3, 1933	Fairchild	12.7	----------	1
August 29, 1934	Fairchild	18.6	----------	1
September 8, 1935	Fairchild	14	----------	1
March 12, 1943	Fairchild	21.4	03/02/38 (25,200 cfs) 01/23/43 (4,800 cfs)	8
August 15, 1952	Fairchild	25.6	----------	9
May 6, 1953	Fairchild	16.5	----------	1
November 10,1955	Fairchild	14	----------	2
1958	San Bernardino County	6.27	----------	3
January 30, 1969	Fairchild	9.34	01/25/69 (35,900 cfs)	11
February 7, 1970	San Bernardino County	10.6	2/25/69 (6,000 cfs)	1
October 17, 1972	Fairchild	18.9	----------	2
January 21, 1978	San Bernardino County	17	----------	6
February 25, 1986	Fairchild	19.8	03/02/83 (4,000 cfs)	8
July 1991	San Bernardino County	13.3	----------	5
April 20, 1996	Fairchild	12.4	----------	5
June 15, 2001	San Bernardino County	13.6	----------	5
January 19, 2005	San Bernardino County	27	----------	4

4.2.12.2 Identified Historic Geomorphic Trends

Specific features, including changes in planform and active erosion can be identified from the different aerial photographs that influence the stability of Lytle Creek. The specific trends that were evaluated included (1) historic thalweg location and variation over time to establish the dominant trends in the stream system, and (2) influence of manmade actives in the watershed on erosion events.

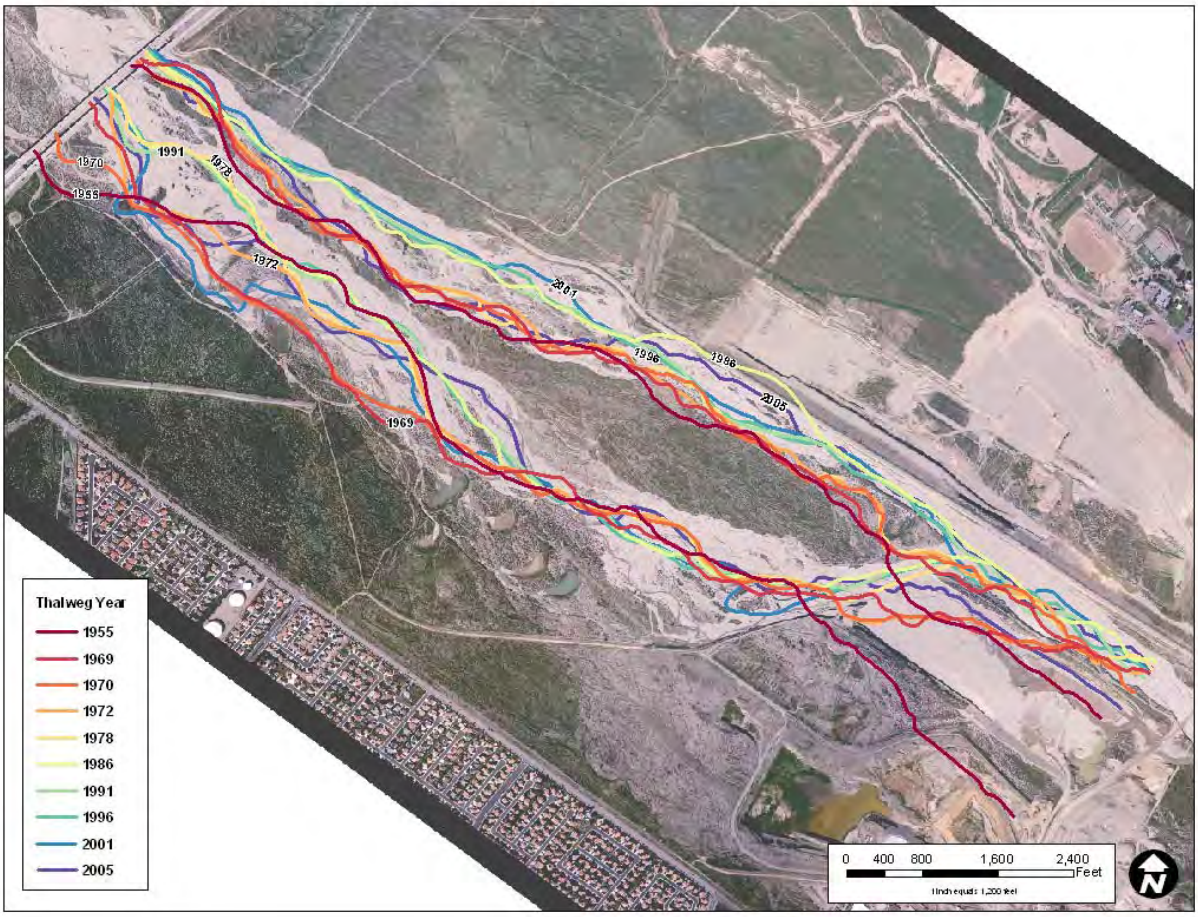


Figure 2 - Summary of historical variation of active thalweg location from historic aerial photographs.

4.2.12.3 Floodplain Hydraulic and Erosion Influences

Review of the historical aerial photograph sequence for the 75 years of record provides physical evidence of the floodplain response to different influences including manmade structures and significant storm events. The following conclusions can be drawn from the chronology of active channel changes from aerial photographs:

- Human Impacts: Direct human impacts over the period of aerial photographic record include the construction of the I-15 Bridge, at grade roadway crossing for Glen Helen Parkway, sand and gravel excavations, USACE groin systems, channel revetments, irrigation infiltration ponds, irrigation distribution canals and diversion structures. The varying degree of human adjustment within the floodplain has been reflected by a corresponding response in the river system.
    - Numerous in-stream water diversion systems have been historically installed within the active stream and adjacent relic floodplain areas.
    - Gravel mining activities have modified the floodplain through the installation of levee systems that have redirected and modified the flow patterns and hydraulic characteristics.
    - Army Corps of Engineers groin field stabilized the migration of the flow patterns across the alluvial fan.
- Channel Change: The historical record of aerial photographs illustrates that the overall channel movement has generally been contained within the historical incision of the alluvial fan. In addition, the general vertical profile and elevation of the channel thalweg has not changed

significantly except for the changes associated with the gravel pit levee failure. The historic invert stabilization and water diversion structures constructed in the 1930-1940s have remained at the same elevation as the surrounding creek flowline elevations.

- Hydrologic Events: The photographs indicate that the earlier larger rainfall events during the 1930's and 1940's had the most dramatic effect on the shaping of the island which remained relatively constant since those events.
- Watershed Effects: This location within the Lytle Creek watershed is immediately downstream of the canyon mouth or historic apex of the alluvial fan that results in unique hydraulic characteristics and sediment delivery to this location of the floodplain.

4.2.13 Proposed Flood Control Improvements

4.2.14 Design Condition

Design of a revetment to be stable against debris flow and flooding from Lytle Creek involves development of minimum requirements for the revetment height and toe-down to account for the maximum depths of flood flows and lowering of the streambed due to erosion and scour effects. The design parameters formulated for the proposed flood control revetment relied partially upon the information generated from the previous extensive hydraulic and sediment transport analysis. The specific guidelines used in engineering calculations to establish the minimum design requirements were based upon commonly used criteria by a number of local and federal agencies including San Bernardino County Flood Control District, Los Angeles County Flood Control District, Federal Highway Administration, and FEMA.

4.2.15 Soil Cement Revetment

Soil Cement is a mixture of pulverized soil material and measured amounts of Portland Cement and water which are compacted to high density. As the cement hydrates, the mixture becomes a hard, durable material with low permeability and since soil cement is a structural material, it possesses engineering properties of strength dependent upon type of soil, curing conditions, and age. The cement contents for typical soil-cement mixtures are generally in the range of 7% to 12% by weight of dry soil. Soil cement contains enough moisture for maximum compaction.

4.2.16 FEMA Requirements

For channel/creek/river bank lining systems or bank protection FEMA does not have design requirements. For such facilities design requirements are administered locally. FEMA does have floodplain management regulations that are administered in the form of insurance requirements, zoning ordinances, and planning policies.
The proposed bank protection system will provide the minimum 3 feet of freeboard over the base flood elevation. The actual bank protection design will include 3 feet of freeboard over the ultimate bulked flow discharge of 64,540 cfs, which is 34% greater than the FEMA 100-yr flowrate (42,580 cfs).

4.2.17 Proposed Section

The revetment functions as a streamside embankment whose primary purpose is to furnish flood protection from flood high water and which is therefore subject to potential debris flux loading from upstream of the natural channel during the design storm event.

Typical revetment structure type may be classified by its surface armor construction material utilization. Among commonly seen revetment armor materials are earth lining, timber alignment, concrete channel bank, riprap stone, rubble mound, stone gabion, special designed reinforced concrete armor unit and grouted riprap stone.

For Lytle Creek Ranch Development, soil cement revetment or alternative grouted rock riprap revetment is recommended. The revetment cross-section has the soil cement or alternative grouted rock riprap at

1.5 to 1 (horizontal to vertical) side slopes. A 20 feet wide paved road will follow along the top of the revetment and will slope away from the channel to a v-ditch. The road can be used by service or local vehicles and has ramp assess to the creek channel floor. The revetment alignment extends about 1.2 miles upstream of I-15 Freeway to 5.7 miles downstream of the I-15 Freeway for a total length of 35,260 feet. The revetment will include a freeboard over the 100-year water surface elevation and a toe-down depth to satisfy the ultimate condition.

4.2.18 Vertical Alignment

The streambank revetment profile is composed of a top-of-bank profile and a toe-down profile. The minimum top of bank elevation is defined by the hydraulic requirements of the water surface profile for the creek and freeboard criteria. The toe-down of the revetment is designed to ensure that it cannot be undermined from local scour and degradation. The toe-down must satisfy both the existing streambed profile and future long-term degradation of the streambed based upon sediment transport studies evaluating the long-term equilibrium channel slope and revetment cutoff depth criteria of the Los Angeles County Flood Control District.

4.2.19 Minimum Toe-down Requirement

The design of the revetment must provide adequate toe-down protection below the channel invert to account for the potential dynamic changes in the bed elevations due to erosion and scour effects. The design parameters formulated for the proposed flood control bank protection toe-depth were based upon a comparison of information generated from the previous hydraulic and sediment transport analyses. The toe-down depth requirements were evaluated by comparing the requirements outlined in the Los Angeles County Hydraulic Design Criteria Manual, Page F-31 summarized in Table 7 shown below versus the total calculated bed elevation adjustment for a sandy bed stream. The results of the *Sediment Continuity* analysis are discussed in section 4.3.10.

Table 7 - Cut-off Depths Based Upon Los Angeles County Hydraulic Design Criteria Manual, Pg F-31

Velocities	Straight Reaches	Curved Reach
0 - 6 f.p.s.	6 feet	9 feet
6 - 10 f.p.s.	8 feet	12 feet
10 - 15 f.p.s.	10 feet	15 feet
15 - 18 f.p.s.	12.5 feet	18 feet
18 - 20 f.p.s.	14 feet	21 feet

The (Z_{tot}) elevation adjustment at any given location in a sand bed stream may include the components of long-term degradation, general scour, local scour, bedform development, bend scour, and low flow incisement as expressed by the following equation:

$$Z_{tot} = Z_{\deg} + Z_{gs} + Z_{ls} + \frac{1}{2} Z_a + Z_{bs} + Z_i$$

where:

Z_{tot} = total potential vertical adjustment,

$Z_{\deg}$ = long-term degradation,

Z_{gs} = general scour,

Z_{ls} = local scour,

Z_a = bedform height,

Z_{bs} = bend scour, and

Z_i = low flow incisement

4.3 Summary of Minimum Toe-down Requirement

The above scour components were evaluated based upon the hydraulic and sediment transport characteristics produced under the maximum design conditions. The sum of all the above estimates constitutes a maximum allowance for the stream bed elevation adjustments. The long term degredation component were obtained from the *Sediment Continuity* analysis calculation results provided in section 4.3.10.

A separate hydraulic analysis using HEC-RAS was generated to determine the hydraulic parameters utilized to evaluate the potential scour requirements. A condition with minimum vegetation was created by adjusting the Manning's roughness coefficients to n=0.025 to determine the maximum velocities. This condition corresponds either to the initial seasons immediately preceding the construction to establish vegetation or immediately after a large storm event that may push down the vegetation.

The Z_{tot} calculation resulted in the greatest toe depth requirement for the proposed bank revetment system. A summary of the Toe-down analysis results can be found in Appendix VI.

4.3.1 Minimum Revetment Height Requirement

The minimum top of revetment will be computed by the sum of the 100-year depth of flow and freeboard. The freeboard calculations will be determined using the design flowrate for the 100-year storm event. Freeboard represents the additional height required to ensure overtopping does not occur from factors not accounted for in the design water surface profile calculations. These factors include possible long-term aggradation, super-elevation at curved channels, and bed forms, in addition to less identifiable components such as separation, excessive turbulence, wave action and variation of loss coefficients.

San Bernardino County Flood Control District utilizes Los Angeles County Flood Control District Hydraulic Design Manual (LACFCD Hydraulic Design Manual) and Los Angeles County Department of Public Works Hydrology/Sedimentation Manual (LACDPW Hydrology/ Sedimentation Manual) for determining the required freeboard. According to the LACFCD Hydraulic Design Manual, for average flow velocities equal to or less than 35 fps, 2.5 ft of freeboard is required for trapezoidal channels – straight alignment and for curved alignments additional 2.5 ft is required or 1.0 ft above the superelevated water surface, whichever is greater.

According to the LACDPW Hydrology/Sedimentation Manual, required freeboard can be determined from the following equation:

$$FB = Y_{agg} + Y_{ga} + Y_{se} + \tfrac{1}{2} h$$

Where:

FB = Total freeboard

Y_{agg} = Long-term aggradation

Y_{ga} = General aggradation

Y_{se} = Superelevation (for curves only)

h = Bedform height (reference Appendix Q-9)

The minimum required freeboard are presented in Table 8. The ultimate condition 100-year water surface elevation is based upon the hydraulic model utilizing a higher Manning's value of 0.055 to provide a conservative design. A minimum of 3 feet of freeboard based upon FEMA's freeboard requirement has been achieved in preliminary design for the proposed revetment length. The components of freeboard shown above will be determined in the final design process. At locations along the proposed revetment

where it is determined that the minimum acceptable freeboard exceeds 3-ft, per the above equation, that calculated minimum freeboard will be provided in final design of the proposed revetment.

Table 8 - Summary of Freeboard Requirements

HEC-RAS Channel Station	Approx. Revetment Station	100-Year WSE	FEMA Freeboard Requirement	Min. Top of Revetment Elevation	Landmarks
36572	37440	2188	3 feet	2191	U/S Extent of Study
36318	37185	2179.9	3 feet	2182.9	End Proposed South Bank Revetment
36064	36935	2173.2	3 feet	2176.2	
35850	36760	2166.4	3 feet	2169.4	
35649	36585	2160.9	3 feet	2163.9	
35349	36280	2151.6	3 feet	2154.6	
35048	35975	2143	3 feet	2146	
34658	35575	2132.2	3 feet	2135.2	
34357	35275	2124.1	3 feet	2127.1	
34162	35075	2118.6	3 feet	2121.6	
33912	34825	2110.7	3 feet	2113.7	
33661	34575	2103.6	3 feet	2106.6	
33353	34290	2094.4	3 feet	2097.4	
33102	34045	2086.6	3 feet	2089.6	
32824	33800	2079.1	3 feet	2082.1	
32502	33455	2070.5	3 feet	2073.5	
32257	33225	2063.9	3 feet	2066.9	
32055	33000	2064.2	3 feet	2067.2	
31951	32890	2054.8	3 feet	2057.8	
31653	32530	2044.9	3 feet	2047.9	
31319	32250	2033.6	3 feet	2036.6	Glen Helen Parkway
30906	31800	2025.6	3 feet	2028.6	
30537	31345	2010.2	3 feet	2013.2	
30452	31225	2008.4	3 feet	2011.4	
30412	31200	2008	3 feet	2011	Southbound I-15 Bridge
30322	31115	2005.7	3 feet	2008.7	
30196	31000	2002	3 feet	2005	Northbound I-15 Bridge
30018	30810	1996.9	3 feet	1999.9	
29850	30665	1992.4	3 feet	1995.4	
29719	30525	1989.4	3 feet	1992.4	
29586	30405	1985.6	3 feet	1988.6	
29443	30215	1983	3 feet	1986	
29294	30015	1978.9	3 feet	1981.9	
29171	29900	1975.4	3 feet	1978.4	
29038	29765	1971.4	3 feet	1974.4	
28926	29645	1968.3	3 feet	1971.3	
28783	29515	1964.3	3 feet	1967.3	
28644	29415	1960.3	3 feet	1963.3	
28503	29300	1956.7	3 feet	1959.7	

28352	29190	1952.2	3 feet	1955.2	
28263	29090	1949.8	3 feet	1952.8	
28172	29000	1947.7	3 feet	1950.7	
28046	28860	1942.7	3 feet	1945.7	
27910	28715	1939.7	3 feet	1942.7	
27755	28540	1935.4	3 feet	1938.4	
27586	28375	1930.5	3 feet	1933.5	
27440	28225	1926.6	3 feet	1929.6	
27315	28105	1923	3 feet	1926	
27193	28085	1919.9	3 feet	1922.9	
27067	27865	1916.4	3 feet	1919.4	
26965	27755	1913.5	3 feet	1916.5	
26814	27615	1909.2	3 feet	1912.2	
26683	27495	1905.2	3 feet	1908.2	
26571	27380	1901.9	3 feet	1904.9	
26405	27215	1900.5	3 feet	1903.5	
26256	27065	1894.3	3 feet	1897.3	
26099	26900	1889.3	3 feet	1892.3	
25952	26740	1885.7	3 feet	1888.7	
25772	26550	1879.5	3 feet	1882.5	
25642	26410	1875.1	3 feet	1878.1	
25522	26265	1870.9	3 feet	1873.9	
25319	26065	1865.8	3 feet	1868.8	
25102	25880	1860	3 feet	1863	
24913	25680	1853.6	3 feet	1856.6	
24765	25525	1849.6	3 feet	1852.6	
24632	25350	1844.1	3 feet	1847.1	
24427	25180	1840.2	3 feet	1843.2	
24220	25015	1835.9	3 feet	1838.9	
24048	24850	1830.6	3 feet	1833.6	
23892	24635	1825.2	3 feet	1828.2	
23754	24425	1820.3	3 feet	1823.3	
23559	24215	1814.5	3 feet	1817.5	
23355	24010	1808	3 feet	1811	
23191	23845	1804.4	3 feet	1807.4	
23044	23700	1800.4	3 feet	1803.4	
22888	23560	1796.1	3 feet	1799.1	
22705	23375	1789.4	3 feet	1792.4	
22527	23190	1783.8	3 feet	1786.8	
22354	23015	1778.4	3 feet	1781.4	
22130	22790	1770.6	3 feet	1773.6	
21921	22565	1763.6	3 feet	1766.6	
21731	22360	1756.6	3 feet	1759.6	
21572	22190	1754.7	3 feet	1757.7	
21423	22025	1742.3	3 feet	1745.3	
21297	21880	1733.4	3 feet	1736.4	
21146	21690	1730.3	3 feet	1733.3	
21034		1726.4	3 feet	1729.4	

20892		1723	3 feet	1726	
20751		1729.9	3 feet	1732.9	
20593		1722.4	3 feet	1725.4	
20475		1716.3	3 feet	1719.3	
20320		1709.6	3 feet	1712.6	
20154		1702.7	3 feet	1705.7	
20000		1698.9	3 feet	1701.9	
19880		1696.1	3 feet	1699.1	
19726		1691.1	3 feet	1694.1	
19573		1686.3	3 feet	1689.3	
19421		1681	3 feet	1684	
19268		1676.2	3 feet	1679.2	
19116		1671	3 feet	1674	
18963		1666.1	3 feet	1669.1	
18810		1661.5	3 feet	1664.5	
18657		1657.5	3 feet	1660.5	
18504	18516	1654	3 feet	1657	
18351	18365	1650.3	3 feet	1653.3	
18198	18215	1646.5	3 feet	1649.5	
18045	18065	1644.2	3 feet	1647.2	
17893	17912	1639.6	3 feet	1642.6	
17739	17763	1636.6	3 feet	1639.6	
17585	17613	1633.1	3 feet	1636.1	
17433	17463	1629.2	3 feet	1632.2	
17295	17326	1627.9	3 feet	1630.9	
17185	17214	1624.2	3 feet	1627.2	
16968	17022	1618.5	3 feet	1621.5	
16794	16826	1614.3	3 feet	1617.3	
16644	16670	1611.6	3 feet	1614.6	
16463	16480	1606.7	3 feet	1609.7	
16274	16290	1602.4	3 feet	1605.4	
16149	16170	1600.8	3 feet	1603.8	
16005	16015	1595.9	3 feet	1598.9	
15869	15889	1593.7	3 feet	1596.7	
15728	15750	1590.3	3 feet	1593.3	
15540	15567	1585.4	3 feet	1588.4	
15355	15390	1581.9	3 feet	1584.9	
15215	15245	1578.5	3 feet	1581.5	
15035	15035	1575.2	3 feet	1578.2	
14847	14847	1571.2	3 feet	1574.2	
14621	14573	1566.5	3 feet	1569.5	
14443	14388	1562.4	3 feet	1565.4	
14267	14248	1558	3 feet	1561	
14096	14056	1554.4	3 feet	1557.4	
13938	13895	1549.8	3 feet	1552.8	
13776	13715	1545.7	3 feet	1548.7	Sycamore Creek Junction
13625	13565	1542.2	3 feet	1545.2	
13476	13414	1538.8	3 feet	1541.8	

13326	13262	1535.2	3 feet	1538.2	
13176	13113	1531.5	3 feet	1534.5	
13025	12964	1528.1	3 feet	1531.1	
12876	12813	1524.5	3 feet	1527.5	
12726	12664	1520.9	3 feet	1523.9	
12576	12513	1516.8	3 feet	1519.8	
12421	12364	1512.8	3 feet	1515.8	
12274	12214	1508.8	3 feet	1511.8	
12123	12065	1505.5	3 feet	1508.5	
11913	11875	1500.7	3 feet	1503.7	
11677	11715	1495.2	3 feet	1498.2	
11382	11480	1489.4	3 feet	1492.4	Cajon Wash Junction
11172	11290	1483.6	3 feet	1486.6	
10981	11095	1478.3	3 feet	1481.3	
10791	10910	1474.1	3 feet	1477.1	
10614	10750	1471.2	3 feet	1474.2	
10436	10550	1467.4	3 feet	1470.4	
10247	10350	1461.6	3 feet	1464.6	
10052	10185	1456.9	3 feet	1459.9	
9938	10070	1453.9	3 feet	1456.9	
9785	9915	1450	3 feet	1453	
9663	9790	1446.7	3 feet	1449.7	
9529	9675	1443.9	3 feet	1446.9	
9416	9555	1441.1	3 feet	1444.1	
9283	9415	1437.6	3 feet	1440.6	
9093	9200	1433.4	3 feet	1436.4	
8907	8940	1427.4	3 feet	1430.4	
8700	6520	1421.7	3 feet	1424.7	
8536	6330	1417.8	3 feet	1420.8	
8398	6190	1414.5	3 feet	1417.5	
8214	6080	1410.2	3 feet	1413.2	
8058	5990	1407.8	3 feet	1410.8	
7908	5830	1404.4	3 feet	1407.4	
7764	5790	1402.7	3 feet	1405.7	
7631	5655	1400.1	3 feet	1403.1	
7500	5585	1397.4	3 feet	1400.4	
7400	5480	1394.2	3 feet	1397.2	
7300	5380	1391.5	3 feet	1394.5	
7200	5275	1388.8	3 feet	1391.8	
7100	5170	1384.3	3 feet	1387.3	
7000	5065	1383.1	3 feet	1386.1	
6900	4960	1381.2	3 feet	1384.2	
6800	4865	1378.7	3 feet	1381.7	
6700	4760	1376.6	3 feet	1379.6	
6600	4650	1374.4	3 feet	1377.4	
6500	4550	1372.1	3 feet	1375.1	
6400	4450	1369.8	3 feet	1372.8	
6299	4350	1367.7	3 feet	1370.7	

6199	4250	1365.7	3 feet	1368.7	
6098	4150	1363.6	3 feet	1366.6	
5998	4045	1361.4	3 feet	1364.4	
5897	3950	1359.6	3 feet	1362.6	
5711	3925	1357.8	3 feet	1360.8	
5609	3820	1356	3 feet	1359	
5404	3625	1352.3	3 feet	1355.3	
5190	3435	1348.5	3 feet	1351.5	
4960	3365	1345.1	3 feet	1348.1	
4806	3300	1342.4	3 feet	1345.4	
4619	3135	1339	3 feet	1342	
4461	2975	1336.2	3 feet	1339.2	
4285	2850	1333	3 feet	1336	
4125	2700	1330.1	3 feet	1333.1	
3970	2522	1327.9	3 feet	1330.9	
3828	2315	1326.4	3 feet	1329.4	
3647	1969	1323.7	3 feet	1326.7	
3494	1570	1321.5	3 feet	1324.5	Begin South Bank Revetment
3340	1300	1319.2	3 feet	1322.2	
3187	1000	1316.6	3 feet	1319.6	D/S Extent of Study

4.3.2 Horizontal Alignment

The horizontal alignment of the revetment will follow the proposed tract boundary. A portion of the revetment will align with the existing CEMEX levee and levee adjacent to the golf course. A 20-foot maintenance road and v-ditch will be adjacent to the top of the revetment.

4.3.3 Project Impact on the I-15 Bridge

The south abutment and two piers of the existing I-15 Bridge will be enclosed by the proposed flood control revetment. The encroachment into the existing floodplain will alter the current hydraulic behavior in the bridge vicinity and may affect the bridge flood conveyance and scour characteristics under the existing condition. Total bridge scour is typically evaluated in terms of long term degradation/aggradation, contraction scour, and local scour. Each of the scour elements is primarily dependant upon flow velocity and the sediment transport capacity of the stream flow depicted by clearwater flow or sediment laden flow. A comparison of the calculated flow velocities at the I-15 bridge(s) under the existing and proposed conditions allows for a reliable relative comparison of the scour potential at the bridge in each condition (existing and proposed).

To identify the potential hydraulic impact created by the proposed project, flow characteristics considering before and after construction of the proposed revetment the results of the HEC-RAS analyses are compared in Table 9.

Table 9 - Project Impact on Flow Characteristics at I-15 under the 100-year Flood

I-15 Sections	Flow Velocity ft/s		Water Surface Elevation		
	Existing Condition	Proposed Condition	Existing Condition	Proposed Condition	I-15 Bridge Soffit
30537	24.72	28.33	2012.72	2010.16	2029.30
30452	22.54	19.11	2009.23	2008.41	2029.30
30412	23.47	18.78	2007.18	2007.99	2029.30
30322	19.07	16.27	2005.11	2005.70	2029.30

The results of the analyses as shown above indicate that the proposed south bank revetment would increase flow velocities at the upstream bridge face and may increase scour through the southbound I-15 Bridge. Flow velocities are decreased in the proposed condition through northbound bridge and would not be expected to negatively impact the scour characteristics through the northbound I-15 Bridge. In final design, detailed bridge scour analysis will be necessary to determine the extent of the potential increase in bridge scour at the southbound I-15 bridge The proposed south bank flood control revetment is expected to increase the maximum flow velocity and decrease the flow depth through the southbound I-15 Bridge and raise the maximum water surface elevation and decrease the flow velocity through the northbound I-15 Bridge. The potential increase of bridge scour will be addressed during the final design phase of the south bank revetment.

4.3.4 Project Impact on the Southern California Gas Company High Pressure Gas Lines

In the existing condition, there are two (2) buried high pressure gas lines that cross Lytle Creek perpendicular to the centerline approximately 1,500 feet downstream of the northbound I-15 Bridge over Lytle Creek. The existing and proposed high velocity flows in Lytle Creek have the potential to damage these gas lines. A soil cement overpour structure is proposed to be constructed over the gas lines to protect them from undermining and erosion related damage. A detail drawing of the proposed overpour structure is provided in Figure-20.

4.3.5 Sediment Transport

4.3.5.1 Methodologies for Sediment Transport Analysis

To evaluate the stability of Lytle Creek streambed and its potential of erosion and sedimentation during the passage of a flood, a detailed sediment transport analysis was performed with the proposed bank protection system in place. This analysis provided the necessary parameters for developing a sound engineering design to evaluate the stability of the proposed flood control revetment.

The potential of streambed erosion and sedimentation for a given reach is governed by the bed material transport capacity in comparison with the upstreambed material supply. The streambed will degrade when the transport capacity exceeds the rate of upstream supply. On the other hand, the streambed will aggrade if the transport capacity is less than the supply. The bed material transport is a function of the flow's hydraulic characteristics in terms of velocity, depth, and energy slope as well as a function of the particle sizes of streambed material. Numerous methods have been developed empirically with measured data in an attempt to quantify the rate of transport. These methods have been known to predict vastly different results when given the same hydraulic and bed material information. Three procedures were chosen to be applied in the sediment transport evaluation to produce a range of results that can be applied compared for reasonableness. These methods included the Meyer-Peter and Muller's bed load equation (1948), Toffaleti's (1966) transport function (1966), and Copeland's modified Laursen equation (1990).

The input data used in the sediment transport calculations included the hydraulic variables generated from the hydraulic analysis and the available grain size distribution curve (Simons, Li & Associates) from

a group of bed material samples collected in the vicinity of the I-15 Bridge. As shown by the particle size gradation curve, the bed materials in Lytle Creek are extremely coarse. The grain sizes range from 0.1mm to 500mm with a mean size equal to approximately 51mm. More than 80% of the bed materials have sizes greater than 5mm.

The sediment transport analysis conducted for the Lytle Creek wash consists of 1) a long-term stability evaluation for a series of reaches from the alluvial fan apex to the mining area, and 2) a sediment routing analysis considering a single design flood for both the existing and proposed conditions. The long-term stability evaluation was intended to determine the streambed's general trend of erosion and sedimentation by comparing the sediment transport capacities with the rates of supply under a wide range of flood conditions. The sediment routing analysis provided a short-term simulation of the streambed's dynamic vertical response throughout the passage of a maximum design event. For the sediment routing analysis, the Army Corps of Engineers' HEC-6 computer program was applied.

4.3.5.2 Fixed Boundary Sediment Transport Analysis

To facilitate the evaluation of sediment transport characteristics throughout the Lytle Creek wash, four study reaches were defined from the fan apex to the mining area. The stream area within each reach possesses similar geometric and hydraulic characteristics.

Reach 1 is the most upstream reach with an average bank to bank width of approximately 1,200 feet. Reach 2 extends from Section 6 to Section 10 with an average total width of about 1,800 feet. Reach 3 extends from Section 10 to Section 23 and is approximately from the Glen Helen Parkway to the CEMEX levee. Reach 4 is represented by Sections 23 through Section 29 along the CEMEX levee.

4.3.6 Upstream Supply Reach

Supply of bed material sediment to the alluvial fan area is determined by the capability of sediment transport in the upper canyon upstream of the fan apex. Cross-section information of the supply reach was recorded from the USGS topographic map and supplemented by survey data to provide the required channel geometric data for hydraulic and sediment transport computations.

4.3.7 Sediment Transport Rates and Stream Stability Assessment

By applying the three selected sediment transport procedures, the bed material sediment transport rates for each of the four reaches as well as the supply reach were evaluated under the peak flow conditions of the 2-, 5-, 10-, 25-, 50-, and 100-year flood events. These flood scenarios provide a broad range of flow conditions that can occur in the Lytle Creek wash over a long period of time. The sediment transport characteristics analyzed under these flood conditions should present a long-term assessment of the streambed's stability. To be conservative in design of the proposed flood protection, hydraulic computations utilized a Manning's roughness coefficient (n=0.045) in the sediment transport analysis.

Applying the Meyer-Peter and Muller, Toffaleti and Copeland's Modified Laursen procedures to determine the bed material transport rates associated with the 2-through 100-year floods, the magnitudes and trend of transport rates of the four study reaches appear to be in a close range with those of the supply reach for the flood events considered. The comparison indicates that the long-term sediment transport conditions with the alluvial fan area are generally in balance with the upstream supply. The overall streambed slope of the alluvial fan area is currently in an equilibrium condition with that of the upstream canyon. The computed sediment transport rate profiles show a fairly stable trend of sediment transport characteristics from the upper canyon to the downstream project area with minor fluctuations. Significant invert degradation or aggradation is not expected to occur.

4.3.8 Sediment Continuity Analysis

Although the sediment transport characteristics of the different study reaches are considered similar over range of flood conditions, minor differences in sediment transport rates exist among the reaches as shown by the study. The streambed aggradation and degradation effecting from the transport rate variations were evaluated by applying the principle of sediment continuity.

The streambed fluctuations computed with the sediment continuity analysis considering both high and low flood events appear to be negligible. The differences among the transport rates depicted are not significant. **It is concluded that the proposed condition Lytle Creek streambed is in a generally stable condition, given the current upstream sediment supply characteristics. Design for the proposed flood control revetment to account for significant long-term degradation need not be required.**

Table 10 - Lytle Creek Average Streambed Adjustments

Lytle Creek Average Stream Bed Adjustments Under 100-year Flood

Reach	Transport Volume Cu. Yds.	Net Volume Change Cu. Yds.	Average Flow Width feet	Reach Length feet	Elevation Adjustment feet
	Meyer-Peter and Muller Method				
Supply	465,166				
1	490,333	(25,167)	975	3,848	-0.18
2	435,821	54,512	1,632	3,083	0.29
3	489,833	(54,012)	1,558	8,788	-0.11
4	543,044	(53,211)	1,315	4,243	-0.26
	Toffaleti Equation				
Supply	41,814				
1	39,832	1,982	975	3,848	0.01
2	30,611	9,221	1,632	3,083	0.05
3	33,076	(2,465)	1,558	8,788	0.00
4	35,705	(2,629)	1,315	4,243	-0.01
	Copeland's Modified Laursen Equation				
Supply	175,835				
1	149,043	26,792	975	3,848	0.19
2	96,564	52,479	1,632	3,083	0.28
3	112,561	(15,997)	1,558	8,788	-0.03
4	127,827	(15,266)	1,315	4,243	-0.07

Lytle Creek Average Stream Bed Adjustments Under 10-year Flood

Reach	Transport Volume Cu. Yds.	Net Volume Change Cu. Yds.	Average Flow Width feet	Reach Length feet	Elevation Adjustment feet
	Meyer-Peter and Muller Method				
Supply	63,772				
1	65,175	(1,403)	425	3,848	-0.02
2	60,492	4,683	633	3,083	0.06
3	66,465	(5,973)	658	8,788	-0.03
4	79,853	(13,388)	643	4,243	-0.13
	Toffaleti Equation				
Supply	3,032				
1	3,910	(878)	425	3,848	-0.01
2	2,543	1,367	633	3,083	0.02
3	2,828	(285)	658	8,788	0.00
4	3,034	(206)	643	4,243	0.00
	Copeland's Modified Laursen Equation				
Supply	9,320				
1	12,382	(3,062)	425	3,848	-0.05
2	6,474	5,908	633	3,083	0.08
3	7,832	(1,358)	658	8,788	-0.01
4	9,042	(1,210)	643	4,243	-0.01

4.3.9 Movable Boundary Sediment Routing Analysis

The previous fixed boundary sediment transport analysis indicates that the Lytle Creek invert is in a long-term stable condition. However, short-term variations of the invert in terms of aggradation and degradation can take place throughout the course of a single flood event. To evaluate this dynamic behavior, sediment routing system analysis was performed through application of the HEC-6 program. The model synthesizes the changing river invert profiles based on varying erosion and sedimentation characteristic analyzed through the entire flood hydrograph by continually updating the cross-section geometry, hydraulics, and bed material size distributions. Major input data required for the HEC-6 sediment routing analysis included the channel cross-sectional data, discretized flood hydrograph, bed material gradation information, upstream sediment supply characteristics, and selection of sediment transport procedures.

4.3.10 Results of the Sediment Routing Model

The HEC-6 sediment routing procedure computed aggradation and degradation depths for each cross-section at every time increment of the 100-year flood hydrograph. The streambed elevations were adjusted accordingly by the computed aggradation and degradation at each time increment.

To compare the results analyzed by the three sediment transport procedures, the method developed by Meyer-Peter and Muller (1948) produced greater depths of streambed aggradation and degradation than the other two approaches. Considering the maximum erosion potential, the results computed with the Meyer-Peter and Muller method were chosen to be used in the development of design requirements for the proposed flood control revetment. There were no measured data available to suggest which of the three transport methods would be most appropriate to apply to Lytle Creek. However, the results generated using the Meyer-Peter and Muller transport procedure are probably the most reflective of the reality since the formula was developed with particle size range and flow characteristics closer to those of Lytle Creek than the data used my Toffalei and Laursen for the development of their equations.

Under the fully channelized (proposed condition) scenario, the effect considering a potential sediment dropout upstream of the uniform channel was also evaluated by the HEC-6 model. To compare the analysis results produced under all the scenarios, Table 11 listed the maximum depth of erosion that may occur within the proposed project reach over a 100-year flood event:

Table 11 - Maximum Erosion Depths within the Proposed Project Reach (in feet)

Location	Existing Condition		Proposed Condition			Maximum Value (ft)
	With Full Supply (ft)	With Zero Supply (ft)	With Full Supply (ft)	With Zero Supply (ft)	Sediment Dropout (ft)	
U/S of I-15	2.6	2.8	2.6	2.8		2.8
At I-15	1.4	1.7	1.2	1.5		1.7
I-15 to Section 17	0.0	0.0	1.7	1.8		1.8
D/S of Section 17	1.9	2.1	3.5	3.6	7.7	7.7

Design of the toe-depth for the proposed flood control revetment is based upon the total calculated maximum bed adjustment calculation which includes the values presented in Table 7.7 for long term degredation.

4.4 Sycamore Creek

There are no proposed improvements to Sycamore Creek that would be constructed as a part of the Lytle Ranch Project. The existing improvements to Sycamore Creek were constructed as a part of the Lytle North Project – Tract 15900. These improvements were designed and constructed using the ultimate condition flowrates for Sycamore Creek. The ultimate condition flowrates for the Sycamore Creek were determined using the current site plan for Neighborhood-1 along with the constructed improvements to Tract 15900.

5 Water Quality

A conceptual water quality study was performed to determine the BMPs that should be employed and constructed in order to comply with Water Quality Management Plan for San Bernardino County and requirements of the NPDES General Permit for San Bernardino County under Section 402 of the Clean Water Act, Section 6217 of the Coastal Zone Act Reauthorization Amendments, and the California Water Code. The Clean Water Act amendments of 1987 established a framework for regulating stormwater discharges from municipal, industrial, and construction activities under the NPDES program. The primary objective of the program requirements are:

1. Effectively prohibit non-stormwater discharges, and
2. Reduce the discharge of pollutants from stormwater conveyance systems to the Maximum Extent Practicable (MEP) statutory standard.

Downstream of the project site there is a 41-mile long stretch of Lytle Creek that is identified as an "impaired waterbody" or "water quality limited segment" due to the presence of excess bacteria/pathogens. Identification on the list of "impaired water bodies" indicates that said reach of Lytle Creek does not meet water quality standards, even after pollution control measures were implemented in the watershed to mitigate point source pollution sources. The law requires that jurisdictional agencies establish priority rankings for impaired water bodies and develop action plans, called Total Maximum Daily Loads (TMDL), to improve water quality. The State Water Resources Control Board (SWRCB) has established a TMDL for the impaired reach of Lytle Creek. The BMPs proposed as a part of this project are effective in the mitigation of bacteria and pathogens. Preliminary technical design data to support the structural BMPs that are proposed as a part of the project site plan are provided.

5.1 Conceptual BMP Basin Design

The Maximized Volume Method was used to determine the target capture volume of the water quality basins. The Water Quality Volume is the found by using the following equation.

WQV = Water Quality Event Depth x Runoff Coefficient x Tributary Area

Where:

Water Quality Event Depth = 0.8 in" (NOAA Atlas-14 2-year, 1-hour precipitation depths)
(2-year, 24-hour storm value established by Regional Water Quality Control Boards, Region 8)
Runoff Coefficient = Calculated using land use type and San Bernardino County Hydrology Manual.

Table 12 contains the proposed BMP calculations. In each case, the regression constant for P_6 is 1.909, the 6-hour mean storm rainfall (P_6) is 1.527 inches and the 24-hour drawdown (a) is 1.582 (San Bernardino County Water Quality Management Plan , 2005, Attachment D).

Table 12 - BMP Calculations

Neighborhood number	Basin Number	Watershed area (acres)	Watershed Impervious Ratio, i	Composite Runoff Coefficient, C_{BMP}	Max Detention Volume, P_0 (in)	Target Capture Volume (ac-ft)
1	1	5.6	0.40	0.28	0.68	0.3
1	2	10.0	0.90	0.73	1.76	1.5
1	3	36.3	0.40	0.28	0.68	2.0
1	4	2.8	0.90	0.73	1.76	0.4

Neighborhood number	Basin Number	Watershed area (acres)	Watershed Impervious Ratio, i	Composite Runoff Coefficient, C_{BMP}	Max Detention Volume, P_0 (in)	Target Capture Volume (ac-ft)
1	5	26.6	0.40	0.28	0.68	1.5
1	6	54.5	0.40	0.28	0.68	3.1
2	1	226.0	0.75	0.54	1.31	24.7
2	2	163.0	0.75	0.54	1.31	17.8
2	3	40.4	0.90	0.73	1.76	5.9
2	4	20.0	0.90	0.73	1.76	2.9
2	5	85.0	0.90	0.73	1.76	12.5
2	6	75.0	0.90	0.73	1.76	11.0
3	1	67.8	0.75	0.54	1.31	7.4
3	2	22.9	0.75	0.54	1.31	2.5
3	3	56.2	0.90	0.73	1.76	8.3
3	4	38.2	0.90	0.73	1.76	5.6
3	5	49.4	0.90	0.73	1.76	7.3
3	6	96.2	0.90	0.73	1.76	14.1
3	7	49.9	0.90	0.73	1.76	7.3
3	8	25.9	0.90	0.73	1.76	3.8
3	9	42.3	0.90	0.73	1.76	6.2
3	10	5.5	0.90	0.73	1.76	0.8
3	11	51.4	0.90	0.73	1.76	7.6
3	12	21.0	0.90	0.73	1.76	3.1
3	13	13.6	0.90	0.73	1.76	2.0
3	14	24.0	0.90	0.73	1.76	3.5
3	15	6.0	0.90	0.73	1.76	0.9
4	1	15.8	0.75	0.54	1.31	1.7
4	2	40.0	0.75	0.54	1.31	4.4
4	3	34.5	0.50	0.34	0.82	2.4

NOAA Atlas 14 Precipitation Depth for 2-year 1-hour Rainfall = 0.8

Regression Coefficient for P6 = 1.909

6-hour Mean Storm Rainfall, P6 = 1.5272 in

24-hour Drawdown, a = 1.582

5.2 Dry Extended Detention Basin BMP Description

Dry extended detention ponds (also referred to as dry ponds, extended detention basins, detention ponds, extended detention ponds) are basins whose outlets have been designed to detain the stormwater runoff from a water quality design storm for a minimum time (e.g. 24 hours) to allow particles and associated pollutants to settle. Unlike wet ponds, these facilities do not have a large permanent pool. They can also be used to provide flood control by including additional flood detention storage. Due to the simplicity of design, extended detention basins are relatively easy and inexpensive to construct and operate. Extended detention basins can provide substantial capture of sediment and the toxics fraction associated with particulates. Widespread application with sufficient capture volume can provide significant control of channel erosion and enlargement caused by changes to flow frequency relationships resulting from the increase of impervious cover in a watershed.

5.2.1 Operation and Maintenance

If the recommended design features are incorporated, the dry extended detention basins will provide moderate pollutant removal. Although they can be effective by removing some pollutants through settling, they are less effective of removing soluble pollutants because of the absence of a permanent pool. Several studies are available on the effectiveness of dry extended detention ponds including one recently concluded by Caltrans (2002).

The Lytle Creek Ranch Project proposed extended detention basins would receive flow from the mainline storm drain system via a low-flow diversion system. The low-flow diversion was designed for the 2-year storm event; however, it also limits the peak flowrate delivered to the diversion system. The basin includes a low-level stand pipe outlet structure which throttles the peak discharge leaving the basin via orifice flow openings in the stand pipe. The orifice flow openings are the main driver for the extended detention time of 24 hours. Based upon a falling head calculation, the 2-year storm volume captured in the basin will be drained from the basin over a 24-hour period providing sufficient settling and treatment time without providing sufficient time for vector growth. An emergency overflow spillway is only activated in the event that the calculated 2-year storm volume is exceeded and/or the low-level outlet facilities are clogged.

Vegetated detention basins appear to have greater pollutant removal than concrete basins; therefore, the slopes of the basin will be vegetated. Figures 8, 10, 12 and 14 show the location of extended detention basins within the Lytle Creek Ranch Project proposed development.

Routine maintenance activity is often thought to consist mostly of sediment and trash and debris removal; however, these activities often constitute only a small fraction of the maintenance hours. During a recent study by Caltrans, 72 hours of maintenance was performed annually, but only a little over 7 hours was spent on sediment and trash removal. The largest recurring activity was vegetation management and routine mowing. The largest absolute number of hours was associated with vector control because of mosquito breeding occurring in the stilling basins (an example of standing water to be avoided) installed as energy dissipaters. In most cases, basic housekeeping practices such as removal of debris accumulations and vegetation management to ensure that the basin dewaters completely in 48-72 hours is sufficient to prevent creating mosquito and other vector habitats.

Mowing should be done at least quarterly to avoid establishment of woody vegetation and for aesthetic considerations.

Typical maintenance activities and frequencies include:

1. Semiannual inspection for the beginning and end of the wet season for standing water, slope stability, sediment accumulation, trash and debris, and presence of burrows.
2. Removal of accumulated trash and debris in the basin and around the riser pipe during the semiannual inspections. The frequency of this activity may be increased to meet specific site conditions but semiannual is the minimum recommended frequency. Removed debris must be properly disposed of at facilities appropriate for processing of disposal materials.
3. Trimming of vegetation at the beginning and end of the wet season and on a quarterly basis combined with monthly inspections to prevent establishment of woody vegetation and for aesthetic and vector reasons.
4. Removal of accumulated sediment and regrading of the basin bottom when accumulated sediment volume exceeds two percent of the basin volume. Inspect the basin each year for accumulated sediment volume. Removed sediments must be properly disposed of at facilities appropriate for handling and processing of disposal materials. Disposal of soils may require permits from jurisdictional agencies.

5. Inspect facility after first large storm to determine whether the desired residence time has been achieved. The outlet orifice should be included in the inspection routine. Inspector should verify that flow through additional openings such as boltholes does not occur.

5.3 Vegetated Swale BMP Description

Vegetated swales are open, shallow channels with vegetation covering the side slopes and bottom that collect and slowly convey runoff flow to downstream discharge points. They are designed to treat runoff through filtering by the vegetation in the channel, filtering through a subsoil matrix, and/or infiltration into the underlying soils. Swales can be natural or manmade. They trap particulate pollutants (suspended solids and trace metals), promote infiltration, and reduce the flow velocity of stormwater runoff. Vegetated swales can serve as part of a stormwater drainage system and can replace curbs, gutters and storm sewer systems. If properly designed, vegetated, and operated, swales can serve as an aesthetic, potentially inexpensive urban development or roadway drainage conveyance measure with significant collateral water quality benefits.

5.3.1 Operation and Maintenance

The literature suggests that vegetated swales represent a practical and potentially effective technique for controlling urban runoff quality. While limited quantitative performance data exists for vegetated swales, check dams, slight slopes, permeable soils, dense grass cover, increased contact time, and small storm events all contribute to successful pollutant removal by the swale system. Factors decreasing the effectiveness of swales include compacted soils, short runoff contact time, large storm events, frozen ground, short grass heights, steep slopes, and high runoff velocities and discharge rates.

In order to increase the effectiveness of vegetated swales, check dams have been incorporated into the design when slopes exceed 2% at approximately (50-foot) increments along their length. These dams maximize the retention time within the swale, decrease flow velocities, and promote particulate settling. Finally, the incorporation of vegetated filter strips parallel to the top of the channel banks can help to treat sheet flows entering the swale.

The vegetated swales have been incorporated into the roadside areas and into the front yard area of individual lots where it was not possible to direct runoff from these areas to an extended detention basin due to site topography and grading limitations. The suitability of a swale at a site depends on land use, size of the area serviced, soil type, slope, imperviousness of the contributing watershed, and dimensions and slope of the swale system (Schueler et al., 1992). In general, swales can be used to serve areas of less than 10 acres, with slopes no greater than 5%.

The useful life of a vegetated swale system is directly proportional to its maintenance frequency. If properly designed and regularly maintained, vegetated swales can last indefinitely. The maintenance objectives for vegetated swale systems include keeping up the hydraulic and removal efficiency of the channel and maintaining a dense, healthy grass cover.

Maintenance activities should include periodic mowing (with grass never cut shorter than the design flow depth), weed control, watering during drought conditions, reseeding of bare areas, and clearing of debris and blockages. Cuttings should be removed from the channel and disposed of in a local composting facility. Accumulated sediment should also be removed manually to avoid concentrated flows in the swale. The application of fertilizers and pesticides should be minimal.

Another aspect of a good maintenance plan is repairing damaged areas within a channel. For example, if the channel develops ruts or holes, it should be repaired utilizing a suitable soil that is properly tamped and seeded. The grass cover should be thick; if it is not, reseed as necessary. Any standing water removed during the maintenance operation must be disposed of to a sanitary sewer at an approved discharge location. Residuals (e.g., silt, grass cuttings) must be disposed of in accordance with local or State requirements. Typical maintenance of grass swales is summarized below:

1. Inspect swales at least twice annually for erosion, damage to vegetation, and sediment and debris accumulation preferably at the end of the wet season to schedule summer maintenance and before major fall runoff to be sure the swale is ready for winter. However, additional inspection after periods of heavy runoff is desirable. The swale should be checked for debris and litter, and areas of sediment accumulation.
2. Grass height and mowing frequency may not have a large impact on pollutant removal. Consequently, mowing may only be necessary once or twice a year for safety or aesthetics or to suppress weeds and woody vegetation.
3. Trash tends to accumulate in swale areas, particularly along highways. The need for litter removal is determined through periodic inspection, but litter should always be removed prior to mowing.
4. Sediment accumulating near culverts and in channels should be removed when it builds up to 75 mm (3 in.) at any spot, or covers vegetation.
5. Regularly inspect swales for pools of standing water. Swales can become a nuisance due to mosquito breeding in standing water if obstructions develop (e.g. debris accumulation, invasive vegetation) and/or if proper drainage slopes are not implemented and maintained.

5.4 Wet Pond BMP Description

The wet BMP retention ponds utilize physical and biological techniques as treatment forms for storm water runoff and nuisance flow. The wet BMP basin will consist of aquatic vegetation essential to promote pollutant removal by sedimentation and root penetration. As runoff bypasses aquatic vegetation in wet BMPs, flow velocity is reduced allowing pollutants to settle for enhanced percolation or be absorbed by the plant root structure (vadose zone) through biological uptake. A minimum detention period is necessary to allow wet BMPs to improve storm water quality. Pollutants captured in the soil are allowed to degrade or recharge into the groundwater.

Wet retention ponds will be constructed in existing natural depressions within the stream corridor and/or excavated depressions creating ponds within the stream corridor. At Lytle Creek Ranch West, wet ponds are expected to be replenished by irrigation water drawn from onsite wells and/or from the local water purveyor. Continuous base flow is necessary in wet ponds to sustain a habitat for vegetative growth, which is required for pollutant removal.

Between storm events, the evaporation process results in concentrated levels of pollutants, salts, and algae. With subsequent storm events, existing pond water is flushed and diluted with the influent stormwater runoff. Wet BMP basins are designed to remain permanent ponds during dry conditions between storm events.

5.5 Biofilter and Water Quality Filter Description

The lake system will incorporate submerged gravel bed biofilters. Water is drawn from one end of the lake by a biofilter pump and discharged via pipelines under the lake, to each biofilter. The heart of the biofilter is the filter media, which has a high surface area to provide as much biological activity as possible. As the biofilter matures, then the biomass of bacteria steadily increases and the layer of bacteria that cover all surfaces becomes thicker. Only the outermost layer of the bacteria will be operating at peak efficiency and if the layer becomes thick enough, the inside layer may become anaerobic. The total surface area available for bacterial growth is a good predictor of the biofilter to convert ammonia.

Resistance to plugging or clogging is important since this is a serious problem for biofilters. Plugging or clogging of a filter can occur through mechanical trapping of particles. Plugging can also result from growth of the biomass and bridging across the spaces within the media. Light attenuation is important for the biofilter since nitrifying bacteria are sensitive to light.

The biofilter ponds are typically 3 to 4 feet deep, filled with gravel, and submerged 18 to 24 inches below the lake water surface. Water is distributed through the biofilter gravel bed via a herringbone slotted pipe

system. A naturally occurring biological mass (microorganisms) will coat the gravel and serve to strip the water passing through the filter of nutrients (such as nitrogen and phosphorous) that would otherwise promote algae growth within the lake. Biofilters are situated in locations in the lake where circulation is limited. Pumping reintroduces oxygen into the lake system, thereby increasing the overall dissolved oxygen levels and promoting a healthy natural environment. The combination of a limited food supply and aerobic conditions within the lake creates an inhospitable environment for undesirable organisms and reduces the potential for eutrophication. Biofilters have the ability to accomplish the following functions:

- Convert ammonia to nitrites and then to nitrogen gas
- Reduce BOD
- Add oxygen
- Remove carbon dioxide
- Remove excess nitrogen and other inert gases
- Remove turbidity and clarify water
- Remove various organics

6 Agency Agreements, Permits, and Approvals

Implementation of the recommended watershed improvements would involve various regulatory and governmental agencies for approvals and environmental clearances. The regulatory agencies focus primarily on (1) the environmental issues and impacts as related to sensitive or threatened species and their habitats, and (2) public safety. Early involvement of the jurisdictional agencies and stakeholders within the watershed will facilitate development of an integrated plan and ensures requirements associated with the agreements or permits are incorporated into the design.

6.1 General Environmental

The California Environmental Quality Act (CEQA) applies to all discretionary activities proposed to be carried out or approved by California public agencies, including state, regional, county and local agencies, unless an exemption applies. Generally, the implementation of CEQA entails three (3) separate phases: 1) preliminary review of a project to determine whether it is subject to CEQA; 2) preparation of an Initial Study to determine whether the project may have a significant environmental effect; and 3) preparation of an Environmental Impact Report (EIR) if the project may have a significant environmental effect or of a Negative Declaration if no significant effects will occur. CEQA applies only to government activities that are defined as a project. A project is defined as the whole of an action that has the potential for resulting in a physical change in the environment, directly or ultimately. [Guidelines Sec. 15378(a)] However, the effect on the environment must be *reasonably foreseeable* and the effect must be on the *physical* environment. [Pub. Res. Code Sec. 21065]. The proposed development of the Lytle Creek Ranch site will require a CEQA process.

6.1.1 Regulatory Permits

The construction of the proposed water quality basins will require regulatory permits from Regional Water Quality Control Board, which administers Section 401 Water Quality requirements.

6.1.2 San Bernardino County Flood Control District

Concurrence by the local municipal planning agency, the City Engineer (Rialto and Fontana), and SBCFCD should be obtained to ensure that the proposed Lytle Creek Ranch Stormwater Management Plan is acceptable to each agency holding jurisdictions in the Lytle Creek Ranch watershed(s).

6.1.3 Geotechnical Constraints

The primary geotechnical considerations are generally associated with the construction of the proposed water quality basins and the proposed offsite Lytle Creek bank improvements. The primary items of concern related to the detention basin construction include: (1) embankment slope stability and protection, (2) grading engineered fill including material sources, (3) foundation system requirements for the embankment, and (4) settlement. The embankment design is the critical geotechnical factor to ensure stability and protection of the public. The embankment slopes on the water side of the basin embankments should have no greater than a 4 to1 (horizontal to vertical) slope for both geotechnical stability and more importantly, public safety. The stage-storage-discharge relationships developed for the hydrology analyses of the detention basins in this study were based upon a maximum embankment slope of 4:1 (H:V).

6.1.4 Utilities

PACE performed a preliminary site visit and researched available records. The existing utilities adjacent to the proposed drainage facilities or those that potentially interfere should be incorporated into the design to allow relocation or protection. Those facilities have been accounted for in this study. Early coordination with the impacted agencies to determine specific requirements will be performed in the preliminary design phases of the project.

All proposed utilities both wet and dry that will cross the stream of an unlined or natural bottom will require adequate protection from erosion and/or undermining. In the preliminary design phase, the utility stream crossing will be identified and the method of protection prescribed. Generally, the utility will be buried at a depth greater than or equal to the calculated maximum scour depth of the creek or stream and armoring of the creek bed will be provided to prevent or decrease the likelihood of scour reaching the depth of the buried utility. Streambed armoring can employ various materials such as rock riprap, geotextile reinforcement grids, geotextile fabrics, concrete pads, and concrete armoring blocks, plantings of rooted woody vegetation, turf reinforcement textiles, jute nettings, and combinations thereof.

6.1.5 Sewer and Water

The known existing sewer and water systems within the Lytle Creek Ranch property boundary are indicated on the corresponding neighborhood exhibits. This information is based upon the current sewer index map information for the City. Sewer systems generally represent a physical constraint since the vertical alignment is difficult to modify because the systems operate by gravity.

6.1.6 Local Storm Drains

There are multiple existing storm drain improvements within the project site. Most of these improvements were implemented as a part of the Tract 15900 improvements. Each of the known facilities is indicated on the appropriate neighborhood maps.

6.1.7 Dry Utilities

Additional utilities have been identified from either the field investigation or design data indicated on historical improvement drawings. These utilities may potentially influence limits of channel reconstruction, potentially require reconstruction, or special protective measures during construction.

6.1.7.1 Electric

There is existing Southern California Edison electric that crosses Lytle Creek as well as Neighborhoods 3 and 4. Overhead regional transmission lines and towers lie within the bounds of the existing easement(s).

6.1.7.2 Gas

A high-pressure gas line is located approximately parallel to the I-15 Freeway about 300-feet east of the freeway. This existing gas line traverses across Neighborhood 3.

7 References

National Research Council, 1996, Alluvial Fan Flooding

PACE, June 2004, Revetment *Design for Lytle Creek North Development: Hydraulic Report*

PACE, November 2007, *Preliminary Engineering Investigation – Lytle Creek Floodplain Hydraulic Investigation,* Bruce Phillips, PE; Deborah de Chambeau, PE

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RBF Consulting, 2004, Lytle Creek Area Clearwater Parkway Culvert Improvement Plans

RBF Consulting, 2006, Glen Helen Parkway Improvement Plans.

San Bernardino County Flood Control District, 1986, *San Bernardino County Hydrology Manual*

San Bernardino County Flood Control District, 1985*, Design Standards Manual*

San Bernardino County Flood Control District, 2005, *San Bernardino Water Quality Management Plan, Attachment D: Treatment Control BMP Sizing Calculations*

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Appendix I

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Curve (1) Numbers of Hydrologic Soil-Cover Complexes For Pervious Areas-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
NATURAL COVERS -					
Barren (Rockland, eroded and graded land)		78	86	91	93
Chaparral, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparral, Narrowleaf (Chamise and redshank)	Poor	71	82	88	91
	Fair	55	72	81	86
Grass, Annual or Perennial	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Meadows or Cienegas (Areas with seasonally high water table, principal vegetation is sod forming grass)	Poor	63	77	85	88
	Fair	51	70	80	84
	Good	30	58	71	78
Open Brush (Soft wood shrubs - buckwheat, sage, etc.)	Poor	62	76	84	88
	Fair	46	66	77	83
	Good	41	63	75	81
Woodland (Coniferous or broadleaf trees predominate. Canopy density is at least 50 percent.)	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	25	55	70	77
Woodland, Grass (Coniferous or broadleaf trees with canopy density from 20 to 50 percent)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
URBAN COVERS -					
Residential or Commercial Landscaping (Lawn, shrubs, etc.)	Good	32	56	69	75
Turf (Irrigated and mowed grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
AGRICULTURAL COVERS -					
Fallow (Land plowed but not tilled or seeded)		77	86	91	94

SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

CURVE NUMBERS FOR PERVIOUS AREAS

Figure C-3 (1 of 2)

Curve (1) Numbers of Hydrologic Soil-Cover Complexes For Pervious Areas-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
AGRICULTURAL COVERS (Continued)					
Legumes, Close Seeded (Alfalfa, sweetclover, timothy, etc.)	Poor	66	77	85	89
	Good	58	72	81	85
Orchards, Evergreen (Citrus, avocados, etc.)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
Pasture, Dryland (Annual grasses)	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Pasture, Irrigated (Legumes and perennial grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
Row Crops (Field crops - tomatoes, sugar beets, etc.)	Poor	72	81	88	91
	Good	67	78	85	89
Small grain (Wheat, oats, barley, etc.)	Poor	65	76	84	88
	Good	63	75	83	87

Notes:

1. All curve numbers are for Antecedent Moisture Condition (AMC) II.
2. Quality of cover definitions:

   Poor-Heavily grazed, regularly burned areas, or areas of high burn potential. Less than 50 percent of the ground surface is protected by plant cover or brush and tree canopy.

   Fair-Moderate cover with 50 percent to 75 percent of the ground surface protected.

   Good-Heavy or dense cover with more than 75 percent of the ground surface protected.
3. See Figure C-2 for definition of cover types.

SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

CURVE NUMBERS FOR PERVIOUS AREAS

Figure C-3 (2 of 2)

ACTUAL IMPERVIOUS COVER

Land Use (1)	Range-Percent	Recommended Value For Average Conditions-Percent (2)
Natural or Agriculture	0 - 0	0
Public Park	10 - 25	15
School	30 - 50	40
Single Family Residential: (3)		
2.5 acre lots	5 - 15	10
1 acre lots	10 - 25	20
2 dwellings/acre	20 - 40	30
3-4 dwellings/acre	30 - 50	40
5-7 dwellings/acre	35 - 55	50
8-10 dwellings/acre	50 - 70	60
More than 10 dwellings/acre	65 - 90	80
Multiple Family Residential:		
Condominiums	45 - 70	65
Apartments	65 - 90	80
Mobile Home Park	60 - 85	75
Commercial, Downtown Business or Industrial	80 - 100	90

Notes:

1. Land use should be based on ultimate development of the watershed. Long range master plans for the County and incorporated cities should be reviewed to insure reasonable land use assumptions.

2. Recommended values are based on average conditions which may not apply to a particular study area. The percentage impervious may vary greatly even on comparable sized lots due to differences in dwelling size, improvements, etc. Landscape practices should also be considered as it is common in some areas to use ornamental gravels underlain by impervious plastic materials in place of lawns and shrubs. A field investigation of a study area shall always be made, and a review of aerial photos, where available, may assist in estimating the percentage of impervious cover in developed areas.

3. For typical equestrian subdivisions increase impervious area 5 percent over the values recommended in the table above.

SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

ACTUAL IMPERVIOUS COVER FOR DEVELOPED AREAS

Figure C-4

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Appendix II

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ACTUAL IMPERVIOUS COVER

Land Use (1)	Range-Percent	Recommended Value For Average Conditions-Percent (2)
Natural or Agriculture	0 - 0	0
Public Park	10 - 25	15
School	30 - 50	40
Single Family Residential: (3)		
2.5 acre lots	5 - 15	10
1 acre lots	10 - 25	20
2 dwellings/acre	20 - 40	30
3-4 dwellings/acre	30 - 50	40
5-7 dwellings/acre	35 - 55	50
8-10 dwellings/acre	50 - 70	60
More than 10 dwellings/acre	65 - 90	80
Multiple Family Residential:		
Condominiums	45 - 70	65
Apartments	65 - 90	80
Mobile Home Park	60 - 85	75
Commercial, Downtown Business or Industrial	80 - 100	90

Notes:

1. Land use should be based on ultimate development of the watershed. Long range master plans for the County and incorporated cities should be reviewed to insure reasonable land use assumptions.

2. Recommended values are based on average conditions which may not apply to a particular study area. The percentage impervious may vary greatly even on comparable sized lots due to differences in dwelling size, improvements, etc. Landscape practices should also be considered as it is common in some areas to use ornamental gravels underlain by impervious plastic materials in place of lawns and shrubs. A field investigation of a study area shall always be made, and a review of aerial photos, where available, may assist in estimating the percentage of impervious cover in developed areas.

3. For typical equestrian subdivisions increase impervious area 5 percent over the values recommended in the table above.

SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

ACTUAL IMPERVIOUS COVER FOR DEVELOPED AREAS

Figure C-4

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Appendix III

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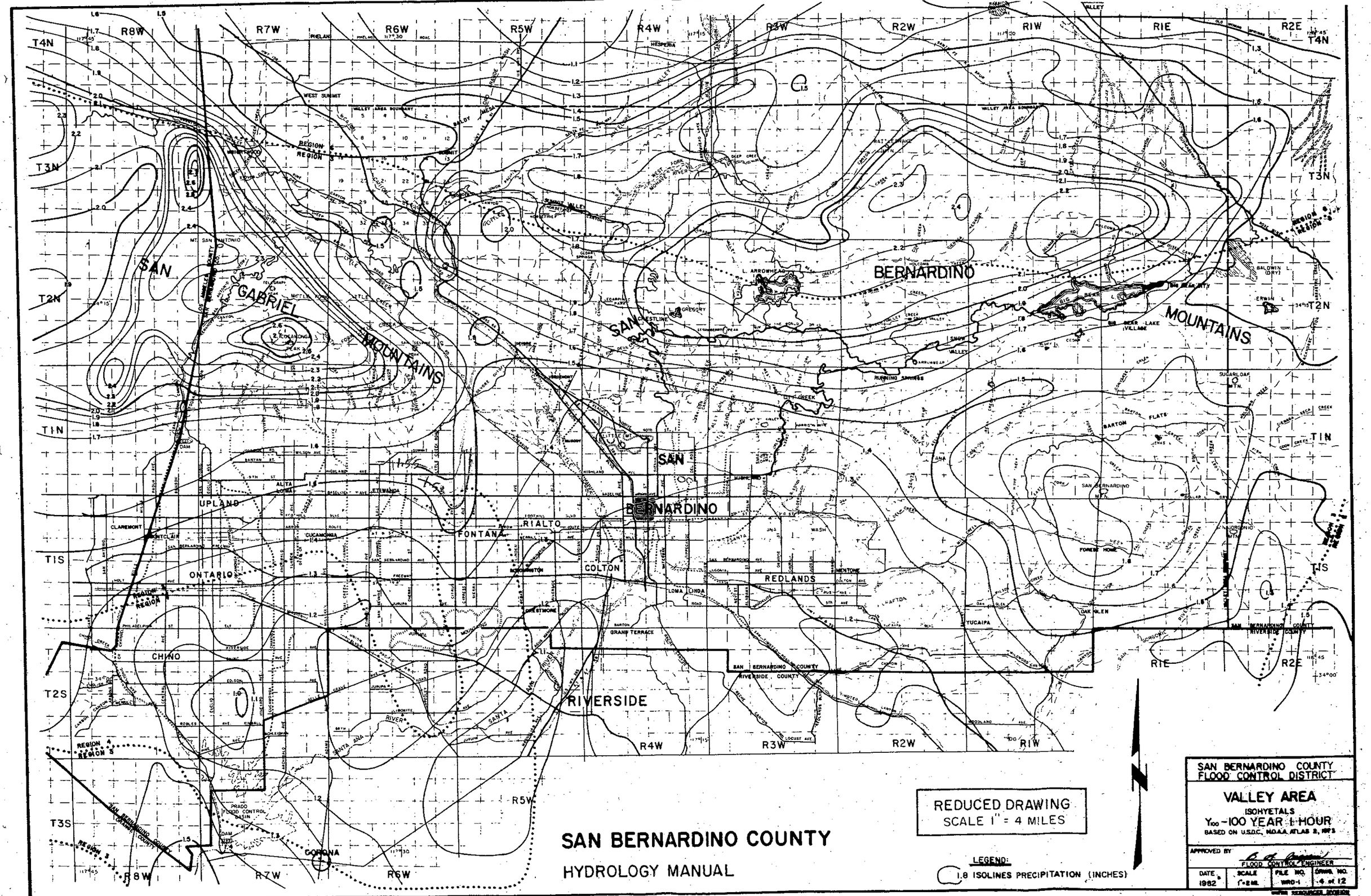
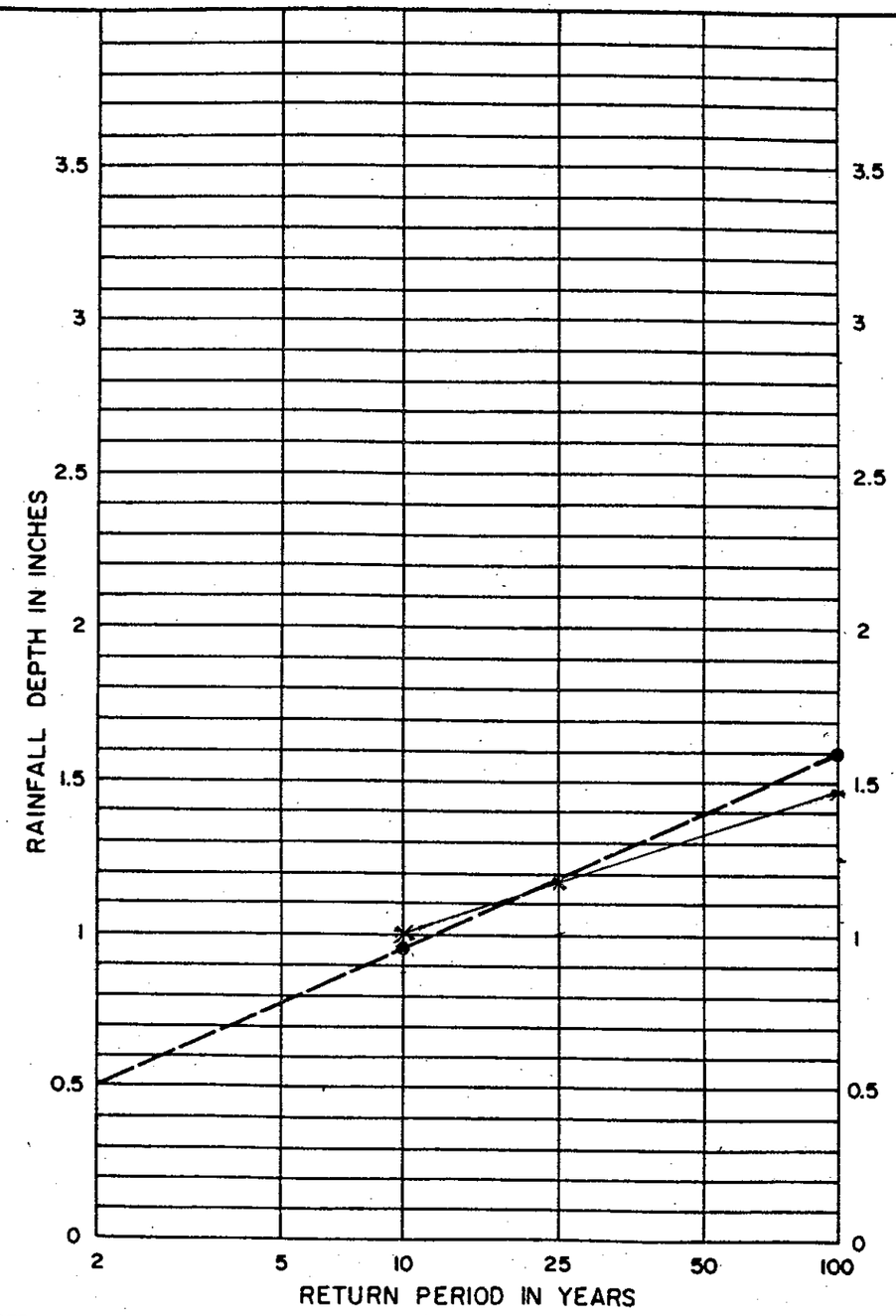

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL
REDUCED DRAWING
SCALE 1" = 4 MILES
LEGEND:
1.8 ISOLINES PRECIPITATION (INCHES)
SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT
VALLEY AREA
ISOHYETALS
Y100 -100 YEAR 1 HOUR
BASED ON U.S.D.C., N.O.A.A. ATLAS 2, 1973
APPROVED BY
FLOOD CONTROL ENGINEER
DATE 1982
SCALE 1"=2 MI.
FILE NO. WRD-1
DRWG. NO. 4 of 12
SAN GABRIEL MOUNTAINS
SAN BERNARDINO MOUNTAINS
SAN BERNARDINO
RIVERSIDE
UPLAND
ONTARIO
CHINO
FONTANA
RIALTO
COLTON
REDLANDS
YUCAIPA
CORONA
CLAREMONT
MONTCLAIR
CUCAMONGA
LOMA LINDA
GRAND TERRACE
BIG BEAR LAKE
SAN BERNARDINO COUNTY
RIVERSIDE COUNTY
ORANGE COUNTY
PRADO FLOOD CONTROL BASIN
T4N
T3N
T2N
T1N
T1S
T2S
T3S
R8W
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E

FIGURE B-4



NOTE:

1. FOR INTERMEDIATE RETURN PERIODS PLOT 10-YEAR AND 100-YEAR ONE HOUR VALUES FROM MAPS, THEN CONNECT POINTS AND READ VALUE FOR DESIRED RETURN PERIOD. FOR EXAMPLE GIVEN 10-YEAR ONE HOUR = 0.95" AND 100-YEAR ONE HOUR = 1.60", 25-YEAR ONE HOUR = 1.18".

REFERENCE: NOAA ATLAS 2, VOLUME XI - CAL., 1973

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

RAINFALL DEPTH VERSUS RETURN PERIOD FOR PARTIAL DURATION SERIES

FIGURE D-2

PACE
Advanced Water Engineering

Appendix IV

Appendix IV

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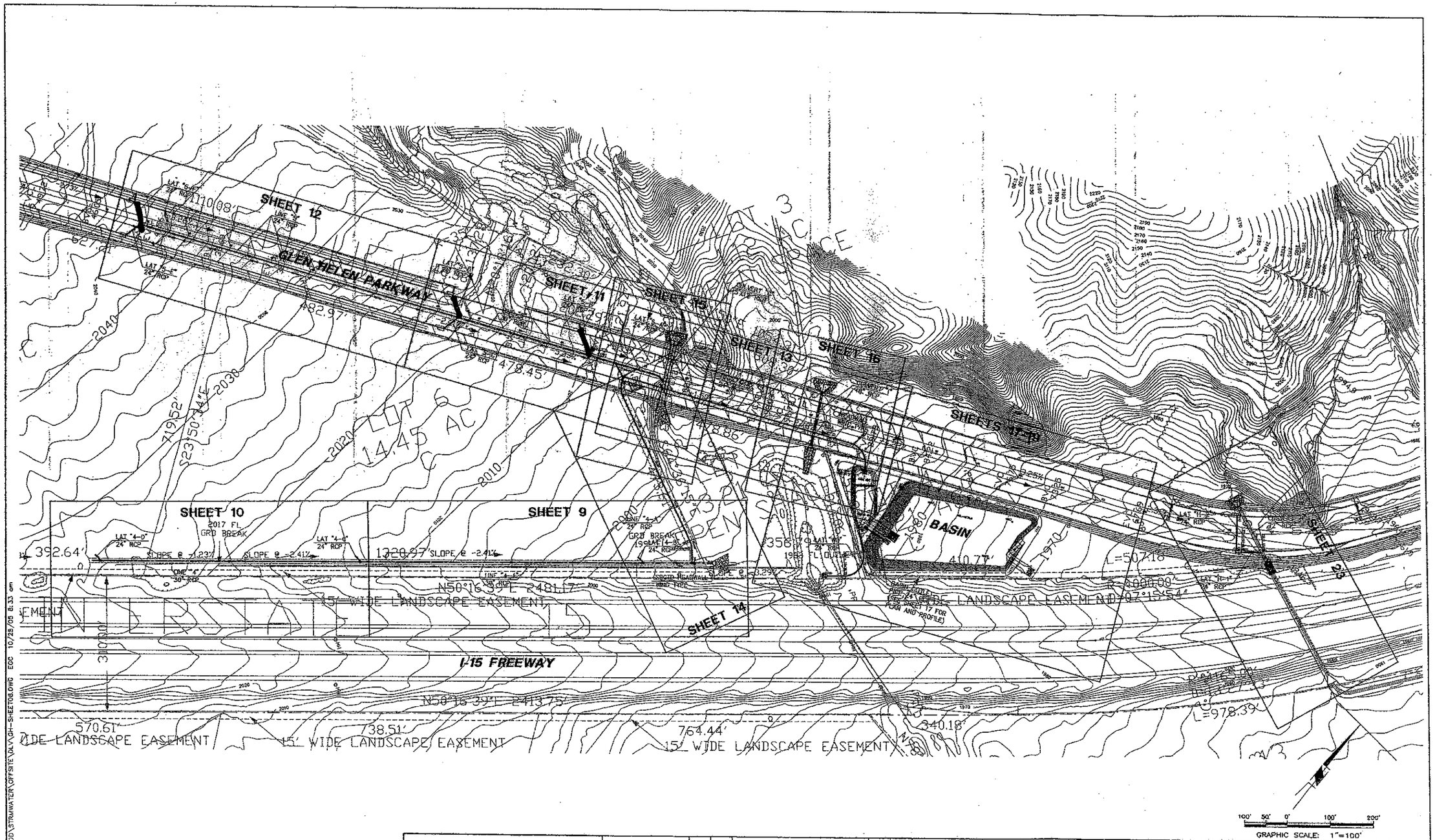

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THOMAS J. RYAN — DATE 10-25-05
RCE NO. C61701 EXP 06-30-07

REGISTERED PROFESSIONAL ENGINEER — THOMAS J. RYAN — No. C61701 — Exp. 6-30-07 — CIVIL — STATE OF CALIFORNIA

DATE	BY	DESCRIPTION	APP'D	DATE

REVISIONS

COUNTY OF SAN BERNARDINO
DEPARTMENT OF PUBLIC WORKS

DESIGNED BY: TJR — DRAWN BY: EG — CHECKED BY: GR — APPROVED BY:

SUBMITTED BY: — RECOMMENDED: — APPROVED BY: — 12-1-05
LAND DEVELOPMENT ENGINEER — DATE — ASST DIRECTOR OF PUBLIC WORKS — DATE — DIRECTOR OF PUBLIC WORKS — DATE

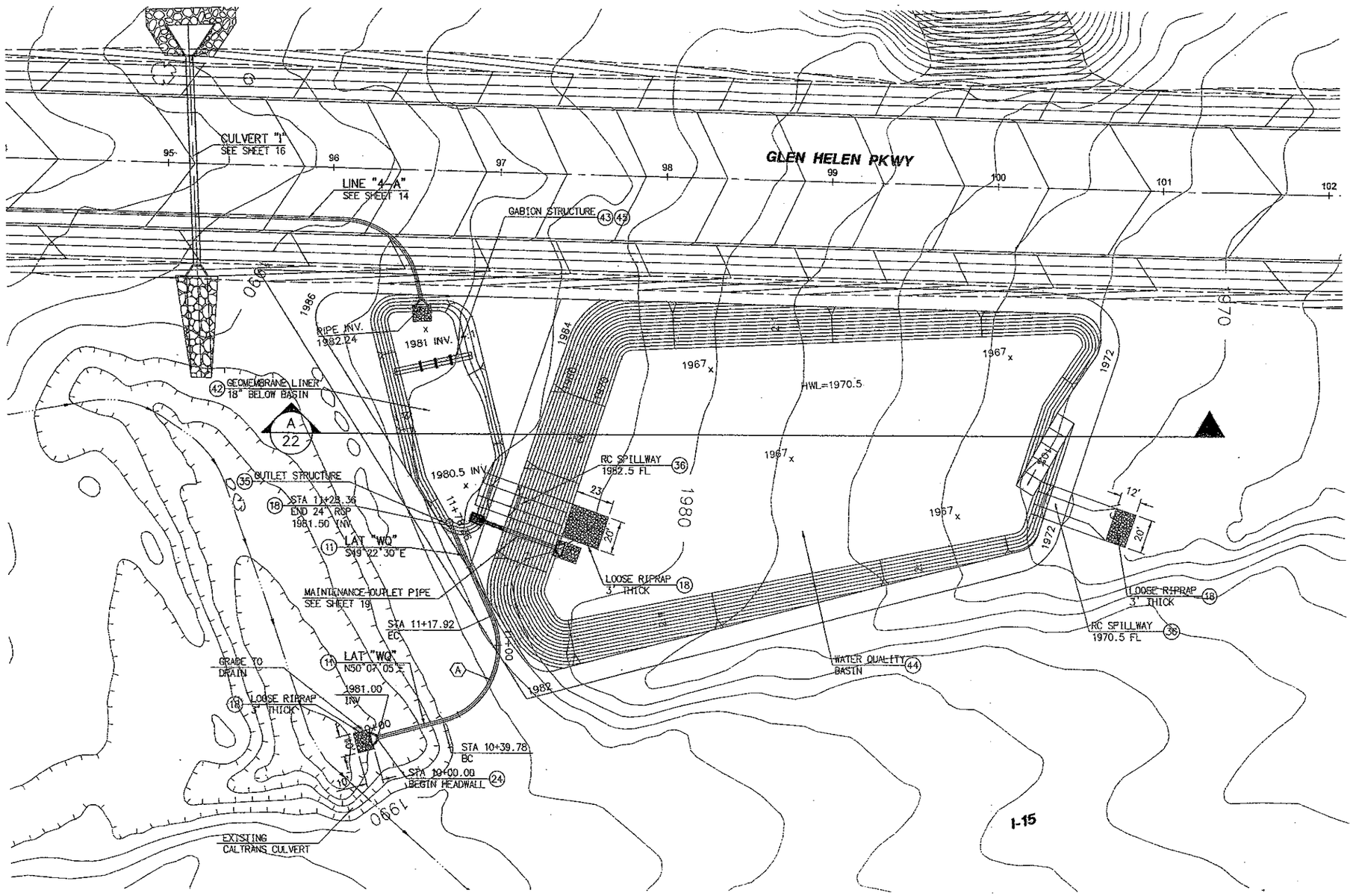
CHANNEL IMPROVEMENT PLANS
GLEN HELEN PARKWAY
INDEX SHEET 2

FOR: LYTLE CREEK DEVELOPMENT

SHEET 8 OF 29

FILE NO.

H:\PDATA\10103515\CADD\STRMWATER\OFFSITE\DLV\GH-SHEET08.DWG ECC 10/25/05 8:33 am



CONSTRUCTION NOTES

(11) — INSTALL 24" RCP STORM DRAIN (D-LOAD PER PROFILE)

(18) — CONSTRUCT LOOSE RIPRAP PER PLAN, PROFILE, AND DETAIL ON SHEET 15.

(24) — CONSTRUCT HEADWALL, WING TYPE PER SBCTD STD 209.

(33) — CONSTRUCT INTAKE STRUCTURE, GATE, STEM, AND OPERATOR PEDESTAL PER DETAILS ON SHEET 19.

(35) — CONSTRUCT BASIN OUTLET STRUCTURE PER PLAN, AND DETAILS ON SHEET 19.

(36) — CONSTRUCT RC SPILLWAY PER PLAN AND DETAIL ON SHEET 20.

(42) — INSTALL LAYFIELD PVC 30 GEOMOMBRANE LINER OR APPROVED EQUAL.

(43) — INSTALL MACCAFERRI GABION STRUCTURES (OR APPROVED EQUAL) PER PLAN AND DETAIL ON SHEET 22.

(44) — EXCAVATE BASIN PER PLAN AND PROFILE.

(45) — INSTALL GRAVEL BEDDING PER PLAN AND DETAILS ON SHEET 22.

CURVE DATA				
○	Δ	RADIUS	LENGTH	TANGENT
A	99°29'35"	45.00'	78.14'	53.15'

30' 15' 0' 30' 60'

GRAPHIC SCALE: 1"=30'

H:\PDATA\10103315\CADD\STRMWATER\OFFSITE\OLV\OH-SHEET17.DWG EGC 10/25/05 8:47 am

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DATE	BY	DESCRIPTION	APP'D	DATE

REVISIONS

COUNTY OF SAN BERNARDINO
DEPARTMENT OF PUBLIC WORKS

DESIGNED BY: LR — DRAWN BY: EC — CHECKED BY: LR

SUBMITTED BY: C.D.C.
RECOMMENDED FOR APPROVAL BY: 12-1-05
LAND DEVELOPMENT ENGINEER — DATE

APPROVED BY:
ASST DIRECTOR OF PUBLIC WORKS — DATE
DIRECTOR OF PUBLIC WORKS — DATE

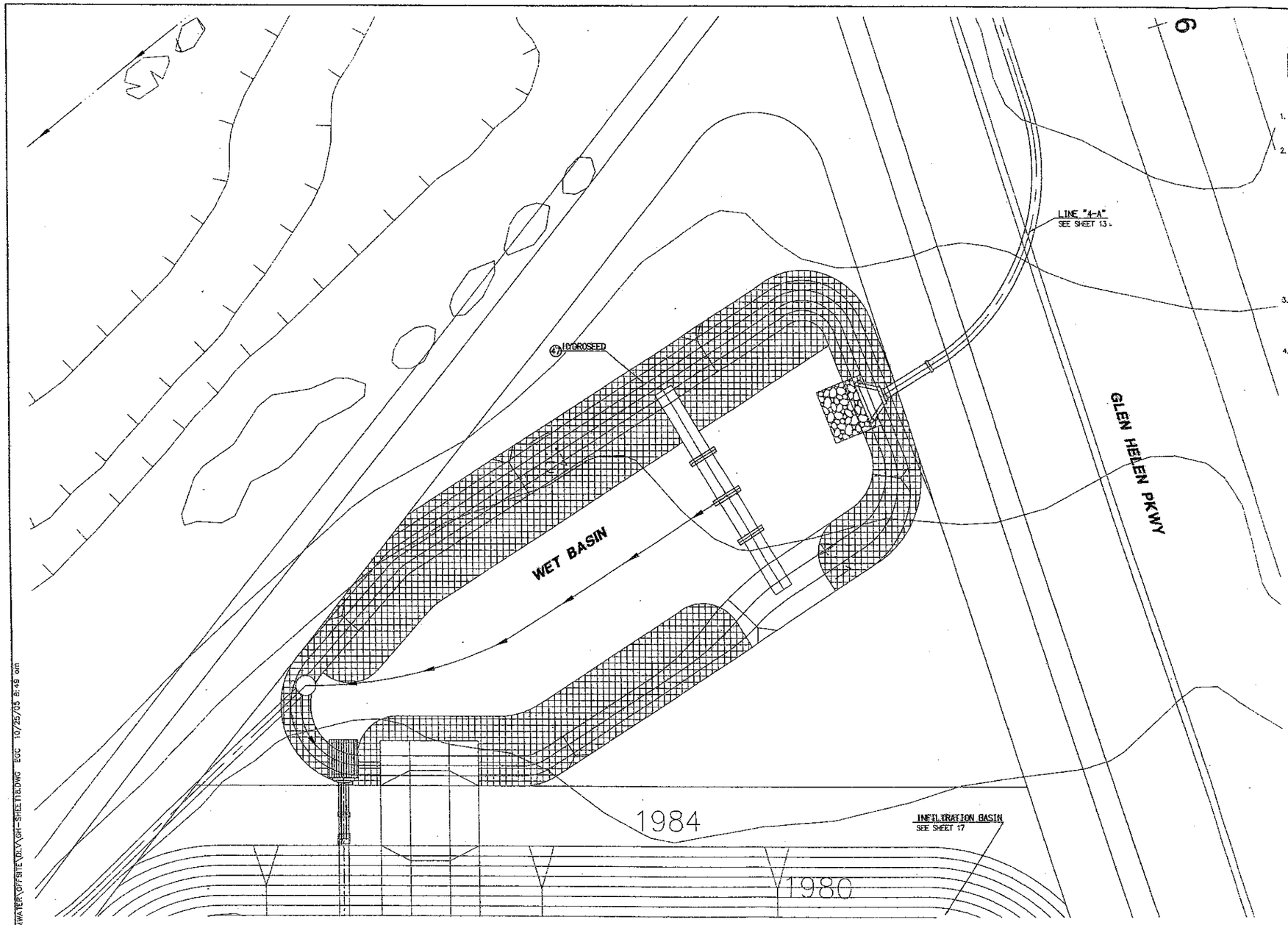
CHANNEL IMPROVEMENT PLANS
GLEN HELEN PARKWAY

PLAN
WATER QUALITY
GRADING PLAN

FOR: LYTLE CREEK DEVELOPMENT

SHEET 17 OF 29

FILE NO.



LEGEND

AREA TO BE HYDROSEEDED, SEE NOTES BELOW.

HYDROSEEDING NOTES

1. GENERAL SPECIFICATIONS

   ALL AREAS INDICATED ON THESE PLANS SHALL BE HYDROSEEDED.

2. HYDROSEEDING MIXTURES AND RATES OF APPLICATION

SPECIES	BULK SEED LBS/ ACRE
ARISTIDA TERNIPES VAR. HAMULOSA	4.0
DESCHAMPSIA CESPITOSA	4.0
FESTUCA RUBRA "MOLATE"	10.0
HORDEUM CALIFORNICUM	6.0
HORDEUM DEPRESSUM	4.0
MUHLENBERGIA MICROSPERMA	4.0
VULPIA MICROSTACHYS	5.0
	37.0

SEED MIX AVAILABLE FROM S & S SEEDS (805/684-0436)

3. HYDROSEEDING SUSPENSION OR SLURRY COMPOSITION

   A. SEED MIXTURE @ REQ. RATE PER ACRE
   B. VIRGIN WOOD CELLULOSE FIBER "CONWED" OR EQUAL @ 1,500# PER ACRE
   C. ECOLOGY CONTROL "M" BINDER @ 150# PER ACRE

4. APPLICATION PROCEDURES AND EQUIPMENT:

   A. EQUIPMENT. HYDRAULIC EQUIPMENT USED FOR THE APPLICATION OF THE FERTILIZER, SEED, AND SLURRY OF PREPARED WOOD PULP SHALL BE OF THE "SUPER HYDROSEEDER" TYPE. THIS EQUIPMENT SHALL HAVE A BUILT-IN AGITATION SYSTEM AND OPERATING CAPACITY SUFFICIENT TO AGITATE, SUSPEND AND HOMOGENEOUSLY MIX A SLURRY CONTAINING NOT LESS THAN 40# OF FIBER MULCH PLUS A COMBINED TOTAL OF 7# FERTILIZER SOLIDS FOR EACH 100 GALLONS OF WATER.

   THE SLURRY DISTRIBUTION LINES SHALL BE LARGE ENOUGH TO PREVENT STOPPAGE AND SHALL BE EQUIPPED WITH A SET OF HYDRAULIC SPRAY NOZZLES WHICH WILL PROVIDE A CONTINUOUS NON-FLUCTUATING DISCHARGE. THE SLURRY TANK SHALL HAVE A MINIMUM CAPACITY OF 1500 GALLONS AND SHALL BE MOUNTED ON A TRAVELING UNIT, EITHER SELF-PROPELLED OR DRAWN BY A SEPARATE UNIT, WHICH WILL PLACE THE SLURRY TANK SPRAY NOZZLES WITHIN SUFFICIENT PROXIMITY TO THE AREAS TO BE SEEDED.

   B. PREPARATION. THE SLURRY PREPARATION SHALL TAKE PLACE AT THE SITE OF WORK AND SHALL BEGIN BY ADDING WATER TO THE TANK WHEN THE ENGINE IS AT HALF-THROTTLE. WHEN THE WATER LEVEL HAS REACHED THE EIGHT OF THE AGITATOR SHAFT, GOOD RECIRCULATION SHALL BE ESTABLISHED AND, AT THIS TIME, THE SEED SHALL BE ADDED. FERTILIZERS SHALL THEN BE ADDED, FOLLOWED BY WOOD PULP MULCH.

   MULCH SHALL ONLY BE ADDED TO THE MIXTURE AFTER THE SEED AND WHEN THE TANK IS AT LEAST ONE-THIRD (1/3) FILLED WITH WATER.

   THE ENGINE THROTTLE SHALL BE OPENED TO FULL SPEED WHEN THE TANK IS AT LEAST ONE-THIRD (1/3) FILLED WITH WATER.

   THE ENGINE THROTTLE SHALL BE OPENED TO FULL SPEED WHEN THE TANK IS HALF-FILLED WITH WATER. ALL THE WOOD PULP MULCH SHALL BE ADDED BY THE TIME THE TANK IS TWO THIRDS (2/3) TO THREE FOURTHS (3/4) FULL. SPRAYING SHALL COMMENCE IMMEDIATELY WHEN THE TANK IS FULL.

   C. APPLICATION. THE OPERATOR SHALL SPRAY THE AREA WITH A UNIFORM, VISIBLE COAT BY USING THE GREEN COLOR OF THE WOOD PULP AS A GUIDE. THE SLURRY SHALL BE APPLIED IN A SWEEPING MOTION, IN AN ARCHED STREAM SO AS TO FALL LIKE RAIN, ALLOWING THE WOOD FIBERS TO BUILD ON EACH OTHER UNTIL A GOOD COAT IS ACHIEVED, AND THE MATERIAL IS SPREAD AT THE REQUIRED RATE PER ACRE.

   D. ALL BARE SPOTS SHALL BE RESEEDED WITHIN THIRTY (30) DAYS TO THE SATISFACTION OF THE OWNER OR OWNER'S REPRESENTATIVE.

   E. DESIGNATED AREAS MUST BE HYDROSEEDED AND ESTABLISHED PRIOR TO RAINY SEASON.

CONSTRUCTION NOTES

(47) — APPLY HYDROSEED PER PLAN AND DETAILS HEREON.

10' 5' 0' 10' 20'
GRAPHIC SCALE: 1"=10'

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RCE NO. 061701 EXP. 06-30-07

REGISTERED PROFESSIONAL ENGINEER — THOMAS J. RYAN — No. C61701 — Exp. 6-30-07 — CIVIL — STATE OF CALIFORNIA

DATE	BY	DESCRIPTION	APP'D	DATE

REVISIONS

COUNTY OF SAN BERNARDINO
DEPARTMENT OF PUBLIC WORKS

DESIGNED BY:	DRAWN BY:	CHECKED BY:	APPROVED BY:
EGR	SG	TJR	

SUBMITTED BY: C.D.E. — RECOMMENDED/APPROVED BY: (SPECIAL) — 11-1-05
LAND DEVELOPMENT ENGINEER — DATE
ASST DIRECTOR OF PUBLIC WORKS — DATE
DIRECTOR OF PUBLIC WORKS — DATE

CHANNEL IMPROVEMENT PLANS
GLEN HELEN PARKWAY
BASIN 4
WATER QUALITY
VEGETATION PLAN
FOR LYTLE CREEK DEVELOPMENT

SHEET 18 OF 29
FILE NO.

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PACE
Advanced Water Engineering

Appendix V

Appendix V

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****************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
         (c) Copyright 1983-2007 Advanced Engineering Software (aes)
             Ver. 13.5  Release Date: 02/06/2007  License ID 1527

                          Analysis prepared by:



 ************************* DESCRIPTION OF STUDY *************************
* Lytle Creek Ranch                                                        *
* Existing - 100YR                                                         *
* Neighborhood 1                                                           *
 ****************************************************************************

  FILE NAME: EX_LYTLE.DAT
  TIME/DATE OF STUDY: 10:36 07/22/2008
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

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

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.4800

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 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   1005.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   934.98
  ELEVATION DATA: UPSTREAM(FEET) =   2585.59  DOWNSTREAM(FEET) =   2470.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   21.913
```



```
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.708
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        6.00      0.24     1.000    88   21.91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     13.35
  TOTAL AREA(ACRES) =      6.00   PEAK FLOW RATE(CFS) =     13.35

****************************************************************************
  FLOW PROCESS FROM NODE   1005.00 TO NODE   1015.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2470.00  DOWNSTREAM(FEET) =   2330.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   414.29   CHANNEL SLOPE =  0.3379
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      13.35
  FLOW VELOCITY(FEET/SEC) =   8.51 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.81   Tc(MIN.) =   22.72
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1015.00 =    1349.27 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1010.00 TO NODE   1015.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   22.72
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.650
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        7.47      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    7.47      SUBAREA RUNOFF(CFS) =   16.23
  EFFECTIVE AREA(ACRES) =     13.47   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       13.5       PEAK FLOW RATE(CFS) =      29.27

****************************************************************************
  FLOW PROCESS FROM NODE   1015.00 TO NODE   1025.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2330.00  DOWNSTREAM(FEET) =   2320.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   218.94   CHANNEL SLOPE =  0.0457
  CHANNEL FLOW THRU SUBAREA(CFS) =      29.27
  FLOW VELOCITY(FEET/SEC) =   7.11 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.51   Tc(MIN.) =   23.24
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1025.00 =    1568.21 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1020.00 TO NODE   1025.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   23.24
```

```
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.615
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       15.17      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   15.17      SUBAREA RUNOFF(CFS) =   32.48
  EFFECTIVE AREA(ACRES) =     28.64   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       28.6       PEAK FLOW RATE(CFS) =      61.32

****************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1035.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2320.00  DOWNSTREAM(FEET) =   2270.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   910.57   CHANNEL SLOPE =  0.0549
  CHANNEL FLOW THRU SUBAREA(CFS) =      61.32
  FLOW VELOCITY(FEET/SEC) =   9.62 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.58   Tc(MIN.) =   24.81
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1035.00 =    2478.78 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1030.00 TO NODE   1035.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   24.81
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.514
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.32      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       28.01      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   28.33      SUBAREA RUNOFF(CFS) =   57.91
  EFFECTIVE AREA(ACRES) =     56.97   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       57.0       PEAK FLOW RATE(CFS) =     116.62

****************************************************************************
  FLOW PROCESS FROM NODE   1035.00 TO NODE   1045.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2270.00  DOWNSTREAM(FEET) =   2258.84
  CHANNEL LENGTH THRU SUBAREA(FEET) =    88.58   CHANNEL SLOPE =  0.1260
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =     116.62
  FLOW VELOCITY(FEET/SEC) =  15.72 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.09   Tc(MIN.) =   24.91
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1045.00 =    2567.36 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1040.00 TO NODE   1045.00 IS CODE =  81
```



```
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   24.91
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.508
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.36      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       24.84      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   25.20      SUBAREA RUNOFF(CFS) =   51.35
  EFFECTIVE AREA(ACRES) =     82.17   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       82.2       PEAK FLOW RATE(CFS) =     167.68

****************************************************************************
  FLOW PROCESS FROM NODE   1045.00 TO NODE   1055.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2258.84  DOWNSTREAM(FEET) =   2185.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   996.38   CHANNEL SLOPE =  0.0737
  CHANNEL FLOW THRU SUBAREA(CFS) =     167.68
  FLOW VELOCITY(FEET/SEC) =  15.08 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.10   Tc(MIN.) =   26.01
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1055.00 =    3563.74 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1050.00 TO NODE   1055.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   26.01
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.444
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        7.96      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       30.56      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.35
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   38.52      SUBAREA RUNOFF(CFS) =   72.44
  EFFECTIVE AREA(ACRES) =    120.69   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      120.7       PEAK FLOW RATE(CFS) =     235.37

****************************************************************************
  FLOW PROCESS FROM NODE   1055.00 TO NODE   1100.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2185.40  DOWNSTREAM(FEET) =   2170.32
  CHANNEL LENGTH THRU SUBAREA(FEET) =   343.70   CHANNEL SLOPE =  0.0439
  CHANNEL FLOW THRU SUBAREA(CFS) =     235.37
  FLOW VELOCITY(FEET/SEC) =  12.92 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
  TRAVEL TIME(MIN.) =   0.44   Tc(MIN.) =   26.45
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1100.00 =    3907.44 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1090.00 TO NODE   1100.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   26.45
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.419
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        3.36      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       38.76      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   42.12      SUBAREA RUNOFF(CFS) =   81.03
  EFFECTIVE AREA(ACRES) =    162.81   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      162.8       PEAK FLOW RATE(CFS) =     313.72

****************************************************************************
  FLOW PROCESS FROM NODE   1000.00 TO NODE   1100.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1060.00 TO NODE   1065.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1641.29
  ELEVATION DATA: UPSTREAM(FEET) =   3088.01  DOWNSTREAM(FEET) =   2760.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   24.931
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.507
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        8.24      0.24     1.000    88   24.93
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     16.84
  TOTAL AREA(ACRES) =      8.24   PEAK FLOW RATE(CFS) =     16.84

****************************************************************************
  FLOW PROCESS FROM NODE   1065.00 TO NODE   1075.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2760.00  DOWNSTREAM(FEET) =   2481.73
  CHANNEL LENGTH THRU SUBAREA(FEET) =   694.41   CHANNEL SLOPE =  0.4007
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      16.84
  FLOW VELOCITY(FEET/SEC) =   9.05 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```



```
  TRAVEL TIME(MIN.) =   1.28   Tc(MIN.) =   26.21
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1075.00 =    2335.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1070.00 TO NODE   1075.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   26.21
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.433
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        9.99      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    9.99      SUBAREA RUNOFF(CFS) =   19.75
  EFFECTIVE AREA(ACRES) =     18.23   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       18.2       PEAK FLOW RATE(CFS) =      36.04

****************************************************************************
  FLOW PROCESS FROM NODE   1075.00 TO NODE   1085.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2481.73  DOWNSTREAM(FEET) =   2370.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   468.39   CHANNEL SLOPE =  0.2385
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      36.04
  FLOW VELOCITY(FEET/SEC) =  11.15 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.70   Tc(MIN.) =   26.91
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1085.00 =    2804.09 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1080.00 TO NODE   1085.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   26.91
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.394
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       17.55      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   17.55      SUBAREA RUNOFF(CFS) =   34.09
  EFFECTIVE AREA(ACRES) =     35.78   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       35.8       PEAK FLOW RATE(CFS) =      69.51

****************************************************************************
  FLOW PROCESS FROM NODE   1085.00 TO NODE   1100.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2370.00  DOWNSTREAM(FEET) =   2170.32
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1501.84   CHANNEL SLOPE =  0.1330
```

```
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      69.51
  FLOW VELOCITY(FEET/SEC) =  13.47 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.86   Tc(MIN.) =   28.77
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1100.00 =    4305.93 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1095.00 TO NODE   1100.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   28.77
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.300
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       28.84      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   28.84      SUBAREA RUNOFF(CFS) =   53.58
  EFFECTIVE AREA(ACRES) =     64.62   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       64.6       PEAK FLOW RATE(CFS) =     120.06

****************************************************************************
  FLOW PROCESS FROM NODE   1100.00 TO NODE   1100.00 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      120.06   28.77    2.300  0.24( 0.24) 1.00      64.6    1060.00
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1100.00 =    4305.93 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      313.72   26.45    2.419  0.28( 0.28) 1.00     162.8    1000.00
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1100.00 =    3907.44 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      430.47   26.45    2.419  0.27( 0.27) 1.00     222.2    1000.00
      2      416.38   28.77    2.300  0.27( 0.27) 1.00     227.4    1060.00
    TOTAL AREA(ACRES) =       227.4

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      430.47  Tc(MIN.) =   26.453
  EFFECTIVE AREA(ACRES) =    222.23  AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      227.4
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1100.00 =    4305.93 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1100.00 TO NODE   1100.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================
```



```
****************************************************************************
  FLOW PROCESS FROM NODE   1100.00 TO NODE   1110.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2170.32  DOWNSTREAM(FEET) =   2152.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   532.23   CHANNEL SLOPE =  0.0344
  CHANNEL FLOW THRU SUBAREA(CFS) =     430.47
  FLOW VELOCITY(FEET/SEC) =  13.85 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.64   Tc(MIN.) =   27.09
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1110.00 =    4838.16 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1105.00 TO NODE   1110.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.09
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.385
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        3.93      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       26.86      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.31
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   30.79      SUBAREA RUNOFF(CFS) =   57.52
  EFFECTIVE AREA(ACRES) =    253.02   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      258.2       PEAK FLOW RATE(CFS) =     481.09

****************************************************************************
  FLOW PROCESS FROM NODE   1110.00 TO NODE   1120.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2152.00  DOWNSTREAM(FEET) =   2120.83
  CHANNEL LENGTH THRU SUBAREA(FEET) =   806.31   CHANNEL SLOPE =  0.0387
  CHANNEL FLOW THRU SUBAREA(CFS) =     481.09
  FLOW VELOCITY(FEET/SEC) =  15.21 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.88   Tc(MIN.) =   27.98
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1120.00 =    5644.47 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1115.00 TO NODE   1120.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.98
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.339
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.64      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       39.10      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
```

```
  SUBAREA AREA(ACRES) =   39.74      SUBAREA RUNOFF(CFS) =   74.89
  EFFECTIVE AREA(ACRES) =    292.76   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      298.0       PEAK FLOW RATE(CFS) =     545.63

****************************************************************************
  FLOW PROCESS FROM NODE   1120.00 TO NODE   1130.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2120.83  DOWNSTREAM(FEET) =   2115.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   139.01   CHANNEL SLOPE =  0.0398
  CHANNEL FLOW THRU SUBAREA(CFS) =     545.63
  FLOW VELOCITY(FEET/SEC) =  16.06 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.14   Tc(MIN.) =   28.12
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1130.00 =    5783.48 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1125.00 TO NODE   1130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   28.12
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.332
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.02      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       12.56      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   12.58      SUBAREA RUNOFF(CFS) =   23.72
  EFFECTIVE AREA(ACRES) =    305.34   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      310.5       PEAK FLOW RATE(CFS) =     567.45

****************************************************************************
  FLOW PROCESS FROM NODE   1130.00 TO NODE   1165.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2115.30  DOWNSTREAM(FEET) =   2068.39
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1101.70   CHANNEL SLOPE =  0.0426
  CHANNEL FLOW THRU SUBAREA(CFS) =     567.45
  FLOW VELOCITY(FEET/SEC) =  16.83 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.09   Tc(MIN.) =   29.21
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1165.00 =    6885.18 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1160.00 TO NODE   1165.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   29.21
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.279
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
```



```
  "CHAPARRAL,BROADLEAF"      A        6.00      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        3.46      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    9.46      SUBAREA RUNOFF(CFS) =   14.31
  EFFECTIVE AREA(ACRES) =    314.80   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      320.0       PEAK FLOW RATE(CFS) =     567.45
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1100.00 TO NODE   1165.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1135.00 TO NODE   1140.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1273.62
  ELEVATION DATA: UPSTREAM(FEET) =   2459.84  DOWNSTREAM(FEET) =   2146.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   21.602
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.732
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        4.78      0.81     1.000    51   21.60
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        1.10      0.24     1.000    88   21.60
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.70
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     10.75
  TOTAL AREA(ACRES) =      5.88   PEAK FLOW RATE(CFS) =     10.75

****************************************************************************
  FLOW PROCESS FROM NODE   1140.00 TO NODE   1150.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2146.00  DOWNSTREAM(FEET) =   2111.92
  CHANNEL LENGTH THRU SUBAREA(FEET) =   712.16   CHANNEL SLOPE =  0.0479
  CHANNEL FLOW THRU SUBAREA(CFS) =      10.75
  FLOW VELOCITY(FEET/SEC) =   5.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.13   Tc(MIN.) =   23.73
  LONGEST FLOWPATH FROM NODE   1135.00 TO NODE   1150.00 =    1985.78 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1145.00 TO NODE   1150.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   23.73
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.582
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
      LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        4.23      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        5.51      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.48
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    9.74      SUBAREA RUNOFF(CFS) =   18.39
  EFFECTIVE AREA(ACRES) =     15.62   AREA-AVERAGED Fm(INCH/HR) =  0.57
  AREA-AVERAGED Fp(INCH/HR) =  0.57  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       15.6       PEAK FLOW RATE(CFS) =      28.34

****************************************************************************
  FLOW PROCESS FROM NODE   1150.00 TO NODE   1165.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2111.92  DOWNSTREAM(FEET) =   2068.39
  CHANNEL LENGTH THRU SUBAREA(FEET) =   988.93   CHANNEL SLOPE =  0.0440
  CHANNEL FLOW THRU SUBAREA(CFS) =      28.34
  FLOW VELOCITY(FEET/SEC) =   6.92 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.38   Tc(MIN.) =   26.12
  LONGEST FLOWPATH FROM NODE   1135.00 TO NODE   1165.00 =    2974.71 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1155.00 TO NODE   1165.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   26.12
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.438
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       11.68      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        5.15      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.63
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   16.83      SUBAREA RUNOFF(CFS) =   27.34
  EFFECTIVE AREA(ACRES) =     32.45   AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       32.5       PEAK FLOW RATE(CFS) =      53.65

****************************************************************************
  FLOW PROCESS FROM NODE   1165.00 TO NODE   1165.00 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       53.65   26.12    2.438  0.60( 0.60) 1.00      32.5    1135.00
  LONGEST FLOWPATH FROM NODE   1135.00 TO NODE   1165.00 =    2974.71 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      567.45   29.21    2.279  0.28( 0.28) 1.00     314.8    1000.00
      2      547.11   31.56    2.176  0.28( 0.28) 1.00     320.0    1060.00
```



```
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1165.00 =    6885.18 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      601.11   26.12    2.438  0.31( 0.31) 1.00     313.9    1135.00
      2      616.47   29.21    2.279  0.31( 0.31) 1.00     347.2    1000.00
      3      593.12   31.56    2.176  0.31( 0.31) 1.00     352.4    1060.00
    TOTAL AREA(ACRES) =       352.4

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      616.47  Tc(MIN.) =   29.213
  EFFECTIVE AREA(ACRES) =    347.25  AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.31  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       352.4
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1165.00 =    6885.18 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1165.00 TO NODE   1165.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1165.00 TO NODE   1190.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2068.39  DOWNSTREAM(FEET) =   2046.41
  CHANNEL LENGTH THRU SUBAREA(FEET) =   520.57   CHANNEL SLOPE =  0.0422
  CHANNEL FLOW THRU SUBAREA(CFS) =     616.47
  FLOW VELOCITY(FEET/SEC) =  17.21 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.50   Tc(MIN.) =   29.72
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1190.00 =    7405.75 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1180.00 TO NODE   1190.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   29.72
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.256
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        1.10      0.81     1.000    51
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.10      SUBAREA RUNOFF(CFS) =    1.43
  EFFECTIVE AREA(ACRES) =    348.35   AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.31  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      353.5       PEAK FLOW RATE(CFS) =     616.47
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1165.00 TO NODE   1190.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

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

```
  FLOW PROCESS FROM NODE   1170.00 TO NODE   1175.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1340.07
  ELEVATION DATA: UPSTREAM(FEET) =   2530.00  DOWNSTREAM(FEET) =   2100.98

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   20.921
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.785
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.09      0.81     1.000    51   20.92
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        4.96      0.24     1.000    88   20.92
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     11.54
  TOTAL AREA(ACRES) =      5.05   PEAK FLOW RATE(CFS) =     11.54

****************************************************************************
  FLOW PROCESS FROM NODE   1175.00 TO NODE   1190.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2100.98  DOWNSTREAM(FEET) =   2046.41
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1165.47   CHANNEL SLOPE =  0.0468
  CHANNEL FLOW THRU SUBAREA(CFS) =      11.54
  FLOW VELOCITY(FEET/SEC) =   5.61 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.46   Tc(MIN.) =   24.38
  LONGEST FLOWPATH FROM NODE   1170.00 TO NODE   1190.00 =    2505.54 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1185.00 TO NODE   1190.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   24.38
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.540
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       15.63      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        0.75      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.78
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   16.38      SUBAREA RUNOFF(CFS) =   25.92
  EFFECTIVE AREA(ACRES) =     21.43   AREA-AVERAGED Fm(INCH/HR) =  0.66
  AREA-AVERAGED Fp(INCH/HR) =  0.66  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       21.4       PEAK FLOW RATE(CFS) =      36.35

****************************************************************************
  FLOW PROCESS FROM NODE   1190.00 TO NODE   1190.00 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       36.35   24.38    2.540  0.66( 0.66) 1.00      21.4    1170.00
  LONGEST FLOWPATH FROM NODE   1170.00 TO NODE   1190.00 =    2505.54 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      601.11   26.63    2.410  0.31( 0.31) 1.00     315.0    1135.00
      2      616.47   29.72    2.256  0.31( 0.31) 1.00     348.3    1000.00
      3      593.12   32.07    2.155  0.31( 0.31) 1.00     353.5    1060.00
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1190.00 =    7405.75 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      621.13   24.38    2.540  0.34( 0.34) 1.00     309.9    1170.00
      2      634.95   26.63    2.410  0.33( 0.33) 1.00     336.4    1135.00
      3      647.34   29.72    2.256  0.33( 0.33) 1.00     369.8    1000.00
      4      622.04   32.07    2.155  0.33( 0.33) 1.00     375.0    1060.00
    TOTAL AREA(ACRES) =       375.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      647.34  Tc(MIN.) =   29.717
  EFFECTIVE AREA(ACRES) =    369.78  AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.33  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      375.0
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1190.00 =    7405.75 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1190.00 TO NODE   1190.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1190.00 TO NODE   1255.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2046.41  DOWNSTREAM(FEET) =   2015.72
  CHANNEL LENGTH THRU SUBAREA(FEET) =   982.54   CHANNEL SLOPE =  0.0312
  CHANNEL FLOW THRU SUBAREA(CFS) =     647.34
  FLOW VELOCITY(FEET/SEC) =  15.04 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.09   Tc(MIN.) =   30.81
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1255.00 =    8388.29 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1245.00 TO NODE   1255.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   30.81
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.208
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        6.29      0.81     1.000    51
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
```

```
  SUBAREA AREA(ACRES) =    6.29      SUBAREA RUNOFF(CFS) =    7.92
  EFFECTIVE AREA(ACRES) =    376.07   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      381.3       PEAK FLOW RATE(CFS) =     647.34
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1190.00 TO NODE   1255.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1195.00 TO NODE   1200.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   901.83
  ELEVATION DATA: UPSTREAM(FEET) =   2570.00  DOWNSTREAM(FEET) =   2274.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.770
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.071
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        8.51      0.24     1.000    88   17.77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     21.72
  TOTAL AREA(ACRES) =      8.51   PEAK FLOW RATE(CFS) =     21.72

****************************************************************************
  FLOW PROCESS FROM NODE   1200.00 TO NODE   1210.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2274.20  DOWNSTREAM(FEET) =   2199.46
  CHANNEL LENGTH THRU SUBAREA(FEET) =   475.41   CHANNEL SLOPE =  0.1572
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      21.72
  FLOW VELOCITY(FEET/SEC) =   9.69 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.82   Tc(MIN.) =   18.59
  LONGEST FLOWPATH FROM NODE   1195.00 TO NODE   1210.00 =    1377.24 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1205.00 TO NODE   1210.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.59
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.990
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        5.31      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.31      SUBAREA RUNOFF(CFS) =   13.16
```



```
  EFFECTIVE AREA(ACRES) =     13.82   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       13.8       PEAK FLOW RATE(CFS) =      34.25

****************************************************************************
  FLOW PROCESS FROM NODE   1210.00 TO NODE   1220.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2199.46  DOWNSTREAM(FEET) =   2134.89
  CHANNEL LENGTH THRU SUBAREA(FEET) =   707.16   CHANNEL SLOPE =  0.0913
  CHANNEL FLOW THRU SUBAREA(CFS) =      34.25
  FLOW VELOCITY(FEET/SEC) =  10.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.12   Tc(MIN.) =   19.71
  LONGEST FLOWPATH FROM NODE   1195.00 TO NODE   1220.00 =    2084.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1215.00 TO NODE   1220.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.71
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.886
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        1.89      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        9.85      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   11.74      SUBAREA RUNOFF(CFS) =   27.03
  EFFECTIVE AREA(ACRES) =     25.56   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       25.6       PEAK FLOW RATE(CFS) =      59.99

****************************************************************************
  FLOW PROCESS FROM NODE   1220.00 TO NODE   1230.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2134.89  DOWNSTREAM(FEET) =   2052.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   926.61   CHANNEL SLOPE =  0.0895
  CHANNEL FLOW THRU SUBAREA(CFS) =      59.99
  FLOW VELOCITY(FEET/SEC) =  12.20 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.27   Tc(MIN.) =   20.98
  LONGEST FLOWPATH FROM NODE   1195.00 TO NODE   1230.00 =    3011.01 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1225.00 TO NODE   1230.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.98
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.781
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        2.86      0.81     1.000    51
```

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  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        1.56      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.61
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.42      SUBAREA RUNOFF(CFS) =    8.65
  EFFECTIVE AREA(ACRES) =     29.98   AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.33  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       30.0       PEAK FLOW RATE(CFS) =      66.21

****************************************************************************
  FLOW PROCESS FROM NODE   1230.00 TO NODE   1240.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2052.00  DOWNSTREAM(FEET) =   2038.67
  CHANNEL LENGTH THRU SUBAREA(FEET) =   268.08   CHANNEL SLOPE =  0.0497
  CHANNEL FLOW THRU SUBAREA(CFS) =      66.21
  FLOW VELOCITY(FEET/SEC) =   9.37 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.48   Tc(MIN.) =   21.45
  LONGEST FLOWPATH FROM NODE   1195.00 TO NODE   1240.00 =    3279.09 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1235.00 TO NODE   1240.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.45
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.743
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        1.55      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       18.35      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   19.90      SUBAREA RUNOFF(CFS) =   44.11
  EFFECTIVE AREA(ACRES) =     49.88   AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.31  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       49.9       PEAK FLOW RATE(CFS) =     109.31

****************************************************************************
  FLOW PROCESS FROM NODE   1240.00 TO NODE   1255.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2038.67  DOWNSTREAM(FEET) =   2015.72
  CHANNEL LENGTH THRU SUBAREA(FEET) =   432.85   CHANNEL SLOPE =  0.0530
  CHANNEL FLOW THRU SUBAREA(CFS) =     109.31
  FLOW VELOCITY(FEET/SEC) =  11.23 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.64   Tc(MIN.) =   22.10
  LONGEST FLOWPATH FROM NODE   1195.00 TO NODE   1255.00 =    3711.94 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1250.00 TO NODE   1255.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   22.10
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.695
```



```
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        5.43      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        9.86      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   15.29      SUBAREA RUNOFF(CFS) =   31.04
  EFFECTIVE AREA(ACRES) =     65.17   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       65.2       PEAK FLOW RATE(CFS) =     138.19

****************************************************************************
  FLOW PROCESS FROM NODE   1255.00 TO NODE   1255.00 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      138.19   22.10    2.695  0.34( 0.34) 1.00      65.2    1195.00
  LONGEST FLOWPATH FROM NODE   1195.00 TO NODE   1255.00 =    3711.94 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      621.13   25.49    2.474  0.35( 0.35) 1.00     316.2    1170.00
      2      634.95   27.72    2.352  0.34( 0.34) 1.00     342.7    1135.00
      3      647.34   30.81    2.208  0.34( 0.34) 1.00     376.1    1000.00
      4      622.04   33.17    2.112  0.34( 0.34) 1.00     381.3    1060.00
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1255.00 =    8388.29 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      732.65   22.10    2.695  0.34( 0.34) 1.00     339.3    1195.00
      2      746.34   25.49    2.474  0.34( 0.34) 1.00     381.4    1170.00
      3      753.03   27.72    2.352  0.34( 0.34) 1.00     407.9    1135.00
      4      756.96   30.81    2.208  0.34( 0.34) 1.00     441.2    1000.00
      5      726.03   33.17    2.112  0.34( 0.34) 1.00     446.4    1060.00
    TOTAL AREA(ACRES) =       446.4

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      756.96  Tc(MIN.) =   30.806
  EFFECTIVE AREA(ACRES) =    441.24  AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      446.4
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1255.00 =    8388.29 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1255.00 TO NODE   1255.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1255.00 TO NODE   1270.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2015.72  DOWNSTREAM(FEET) =   1988.99
  CHANNEL LENGTH THRU SUBAREA(FEET) =   640.32   CHANNEL SLOPE =  0.0417
  CHANNEL FLOW THRU SUBAREA(CFS) =     756.96
  FLOW VELOCITY(FEET/SEC) =  18.29 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.58   Tc(MIN.) =   31.39
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1270.00 =    9028.61 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1260.00 TO NODE   1270.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   31.39
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.183
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        2.40      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        1.30      0.43     1.000    77
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        0.14      0.24     1.000    88
  COMMERCIAL                 A        5.15      0.80     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.68
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.484
  SUBAREA AREA(ACRES) =    8.99      SUBAREA RUNOFF(CFS) =   15.01
  EFFECTIVE AREA(ACRES) =    450.23   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =      455.4       PEAK FLOW RATE(CFS) =     756.96
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1265.00 TO NODE   1270.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   31.39
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.183
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       14.64      0.81     1.000    51
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   14.64      SUBAREA RUNOFF(CFS) =   18.12
  EFFECTIVE AREA(ACRES) =    464.87   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =      470.1       PEAK FLOW RATE(CFS) =     766.16

****************************************************************************
  FLOW PROCESS FROM NODE   1270.00 TO NODE   1285.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1988.99  DOWNSTREAM(FEET) =   1969.51
  CHANNEL LENGTH THRU SUBAREA(FEET) =   618.63   CHANNEL SLOPE =  0.0315
  CHANNEL FLOW THRU SUBAREA(CFS) =     766.16
  FLOW VELOCITY(FEET/SEC) =  15.95 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.65   Tc(MIN.) =   32.04
```



```
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1285.00 =    9647.24 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1275.00 TO NODE   1285.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   32.04
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.157
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        1.67      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        4.74      0.43     1.000    77
  COMMERCIAL                 A        0.99      0.80     0.100    52
  COMMERCIAL                 B        0.49      0.45     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.53
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.831
  SUBAREA AREA(ACRES) =    7.89      SUBAREA RUNOFF(CFS) =   12.16
  EFFECTIVE AREA(ACRES) =    472.76   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =      478.0       PEAK FLOW RATE(CFS) =     767.21

****************************************************************************
  FLOW PROCESS FROM NODE   1280.00 TO NODE   1285.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   32.04
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.157
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.17      0.80     0.100    52
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        5.55      0.43     1.000    77
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        3.45      0.24     1.000    88
  COMMERCIAL                 A        0.10      0.80     0.100    52
  COMMERCIAL                 B        0.17      0.45     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.36
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.958
  SUBAREA AREA(ACRES) =    9.44      SUBAREA RUNOFF(CFS) =   15.40
  EFFECTIVE AREA(ACRES) =    482.20   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =      487.4       PEAK FLOW RATE(CFS) =     782.60

****************************************************************************
  FLOW PROCESS FROM NODE   1285.00 TO NODE   1295.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1969.51  DOWNSTREAM(FEET) =   1944.57
  CHANNEL LENGTH THRU SUBAREA(FEET) =   237.10   CHANNEL SLOPE =  0.1052
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =     782.60
  FLOW VELOCITY(FEET/SEC) =  28.61 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.14   Tc(MIN.) =   32.17
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1295.00 =    9884.34 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1290.00 TO NODE   1295.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   32.17
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.151
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        6.24      0.80     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    6.24      SUBAREA RUNOFF(CFS) =   11.63
  EFFECTIVE AREA(ACRES) =    488.44   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      493.6       PEAK FLOW RATE(CFS) =     791.82

****************************************************************************
  FLOW PROCESS FROM NODE   1295.00 TO NODE   5015.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1944.57  DOWNSTREAM(FEET) =   1915.12
  CHANNEL LENGTH THRU SUBAREA(FEET) =   741.51   CHANNEL SLOPE =  0.0397
  CHANNEL FLOW THRU SUBAREA(CFS) =     791.82
  FLOW VELOCITY(FEET/SEC) =  18.10 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.68   Tc(MIN.) =   32.86
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   5015.00 =   10625.85 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5005.00 TO NODE   5015.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   32.86
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.124
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        5.31      0.81     1.000    51
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.31      SUBAREA RUNOFF(CFS) =    6.29
  EFFECTIVE AREA(ACRES) =    493.75   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      499.0       PEAK FLOW RATE(CFS) =     791.82
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1255.00 TO NODE   5015.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   2000.00 TO NODE   2005.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
```



```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   881.73
  ELEVATION DATA: UPSTREAM(FEET) =   2570.00  DOWNSTREAM(FEET) =   2320.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   18.131
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.035
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        6.17      0.24     1.000    88   18.13
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     15.54
  TOTAL AREA(ACRES) =      6.17   PEAK FLOW RATE(CFS) =     15.54

****************************************************************************
  FLOW PROCESS FROM NODE   2005.00 TO NODE   2015.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2320.00  DOWNSTREAM(FEET) =   2270.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   235.73   CHANNEL SLOPE =  0.2121
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      15.54
  FLOW VELOCITY(FEET/SEC) =   8.86 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.44   Tc(MIN.) =   18.57
  LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   2015.00 =    1117.46 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2010.00 TO NODE   2015.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.57
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.991
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        9.01      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    9.01      SUBAREA RUNOFF(CFS) =   22.34
  EFFECTIVE AREA(ACRES) =     15.18   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       15.2       PEAK FLOW RATE(CFS) =      37.64

****************************************************************************
  FLOW PROCESS FROM NODE   2015.00 TO NODE   2025.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2270.00  DOWNSTREAM(FEET) =   2124.09
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1009.79   CHANNEL SLOPE =  0.1445
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      37.64
  FLOW VELOCITY(FEET/SEC) =  11.29 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.49   Tc(MIN.) =   20.07
  LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   2025.00 =    2127.25 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   2020.00 TO NODE   2025.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.07
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.855
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       14.98      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   14.98      SUBAREA RUNOFF(CFS) =   35.32
  EFFECTIVE AREA(ACRES) =     30.16   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       30.2       PEAK FLOW RATE(CFS) =      71.10

****************************************************************************
  FLOW PROCESS FROM NODE   2025.00 TO NODE   2100.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2124.09  DOWNSTREAM(FEET) =   2040.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   994.58   CHANNEL SLOPE =  0.0845
  CHANNEL FLOW THRU SUBAREA(CFS) =      71.10
  FLOW VELOCITY(FEET/SEC) =  12.47 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.33   Tc(MIN.) =   21.40
  LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   2100.00 =    3121.83 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2090.00 TO NODE   2100.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.40
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.748
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       26.65      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   26.65      SUBAREA RUNOFF(CFS) =   60.24
  EFFECTIVE AREA(ACRES) =     56.81   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       56.8       PEAK FLOW RATE(CFS) =     128.42

****************************************************************************
  FLOW PROCESS FROM NODE   2000.00 TO NODE   2100.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   2030.00 TO NODE   2035.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
```



```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1295.16
  ELEVATION DATA: UPSTREAM(FEET) =   2650.00  DOWNSTREAM(FEET) =   2480.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   24.667
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.523
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        8.96      0.24     1.000    88   24.67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     18.44
  TOTAL AREA(ACRES) =      8.96   PEAK FLOW RATE(CFS) =     18.44

****************************************************************************
  FLOW PROCESS FROM NODE   2035.00 TO NODE   2045.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2480.00  DOWNSTREAM(FEET) =   2479.99
  CHANNEL LENGTH THRU SUBAREA(FEET) =   139.83   CHANNEL SLOPE =  0.0001
  NOTE: CHANNEL SLOPE OF .001 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      18.44
  FLOW VELOCITY(FEET/SEC) =   0.93 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.51   Tc(MIN.) =   27.18
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2045.00 =    1434.99 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2040.00 TO NODE   2045.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.18
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.380
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        9.97      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    9.97      SUBAREA RUNOFF(CFS) =   19.24
  EFFECTIVE AREA(ACRES) =     18.93   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       18.9       PEAK FLOW RATE(CFS) =      36.53

****************************************************************************
  FLOW PROCESS FROM NODE   2045.00 TO NODE   2055.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2480.00  DOWNSTREAM(FEET) =   2437.17
  CHANNEL LENGTH THRU SUBAREA(FEET) =   418.80   CHANNEL SLOPE =  0.1023
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      36.53
  FLOW VELOCITY(FEET/SEC) =  11.19 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.62   Tc(MIN.) =   27.80
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2055.00 =    1853.79 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   2050.00 TO NODE   2055.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.80
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.348
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       18.71      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   18.71      SUBAREA RUNOFF(CFS) =   35.56
  EFFECTIVE AREA(ACRES) =     37.64   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       37.6       PEAK FLOW RATE(CFS) =      71.54

****************************************************************************
  FLOW PROCESS FROM NODE   2055.00 TO NODE   2065.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2437.17  DOWNSTREAM(FEET) =   2400.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   383.83   CHANNEL SLOPE =  0.0968
  CHANNEL FLOW THRU SUBAREA(CFS) =      71.54
  FLOW VELOCITY(FEET/SEC) =  13.37 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.48   Tc(MIN.) =   28.28
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2065.00 =    2237.62 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2060.00 TO NODE   2065.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   28.28
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.324
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       19.84      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   19.84      SUBAREA RUNOFF(CFS) =   37.28
  EFFECTIVE AREA(ACRES) =     57.48   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       57.5       PEAK FLOW RATE(CFS) =     108.02

****************************************************************************
  FLOW PROCESS FROM NODE   2065.00 TO NODE   2075.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2400.00  DOWNSTREAM(FEET) =   2360.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   929.03   CHANNEL SLOPE =  0.0431
  CHANNEL FLOW THRU SUBAREA(CFS) =     108.02
  FLOW VELOCITY(FEET/SEC) =  10.08 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.54   Tc(MIN.) =   29.82
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2075.00 =    3166.65 FEET.
```



```
****************************************************************************
  FLOW PROCESS FROM NODE   2070.00 TO NODE   2075.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   29.82
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.251
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       39.28      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   39.28      SUBAREA RUNOFF(CFS) =   71.25
  EFFECTIVE AREA(ACRES) =     96.76   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       96.8       PEAK FLOW RATE(CFS) =     175.51

****************************************************************************
  FLOW PROCESS FROM NODE   2075.00 TO NODE   2085.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2360.00  DOWNSTREAM(FEET) =   2100.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2087.32   CHANNEL SLOPE =  0.1246
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =     175.51
  FLOW VELOCITY(FEET/SEC) =  17.81 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.95   Tc(MIN.) =   31.77
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2085.00 =    5253.97 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2080.00 TO NODE   2085.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   31.77
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.167
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       24.41      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   24.41      SUBAREA RUNOFF(CFS) =   42.43
  EFFECTIVE AREA(ACRES) =    121.17   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      121.2       PEAK FLOW RATE(CFS) =     210.62

****************************************************************************
  FLOW PROCESS FROM NODE   2085.00 TO NODE   2100.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2100.00  DOWNSTREAM(FEET) =   2040.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   802.26   CHANNEL SLOPE =  0.0748
  CHANNEL FLOW THRU SUBAREA(CFS) =     210.62
  FLOW VELOCITY(FEET/SEC) =  16.30 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
  TRAVEL TIME(MIN.) =   0.82   Tc(MIN.) =   32.59
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2100.00 =    6056.23 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2086.00 TO NODE   2100.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   32.59
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.134
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       39.06      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   39.06      SUBAREA RUNOFF(CFS) =   66.74
  EFFECTIVE AREA(ACRES) =    160.23   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      160.2       PEAK FLOW RATE(CFS) =     273.77

****************************************************************************
  FLOW PROCESS FROM NODE   2100.00 TO NODE   2100.00 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      273.77   32.59    2.134  0.24( 0.24) 1.00     160.2    2030.00
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2100.00 =    6056.23 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      128.42   21.40    2.748  0.24( 0.24) 1.00      56.8    2000.00
  LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   2100.00 =    3121.83 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
      1      366.18   21.40    2.748  0.24( 0.24) 1.00     162.0    2000.00
      2      370.83   32.59    2.134  0.24( 0.24) 1.00     217.0    2030.00
    TOTAL AREA(ACRES) =       217.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      370.83  Tc(MIN.) =   32.592
  EFFECTIVE AREA(ACRES) =    217.04  AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      217.0
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2100.00 =    6056.23 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2100.00 TO NODE   2100.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   2100.00 TO NODE   2145.00 IS CODE =  52
----------------------------------------------------------------------------
```



```
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2040.00  DOWNSTREAM(FEET) =   2023.15
  CHANNEL LENGTH THRU SUBAREA(FEET) =   345.39   CHANNEL SLOPE =  0.0488
  CHANNEL FLOW THRU SUBAREA(CFS) =     370.83
  FLOW VELOCITY(FEET/SEC) =  15.72 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.37   Tc(MIN.) =   32.96
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2145.00 =    6401.62 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2135.00 TO NODE   2145.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   32.96
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.120
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.59      0.27     0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.59      SUBAREA RUNOFF(CFS) =    4.63
  EFFECTIVE AREA(ACRES) =    219.63   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =      219.6       PEAK FLOW RATE(CFS) =     372.67

****************************************************************************
  FLOW PROCESS FROM NODE   2100.00 TO NODE   2145.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   2105.00 TO NODE   2110.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1421.19
  ELEVATION DATA: UPSTREAM(FEET) =   2657.32  DOWNSTREAM(FEET) =   2285.88

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   22.306
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.680
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        8.91      0.24     1.000    88   22.31
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     19.60
  TOTAL AREA(ACRES) =      8.91   PEAK FLOW RATE(CFS) =     19.60

****************************************************************************
  FLOW PROCESS FROM NODE   2110.00 TO NODE   2120.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   2285.88  DOWNSTREAM(FEET) =   2198.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   442.60   CHANNEL SLOPE =  0.1986
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      19.60
  FLOW VELOCITY(FEET/SEC) =   9.42 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.78   Tc(MIN.) =   23.09
  LONGEST FLOWPATH FROM NODE   2105.00 TO NODE   2120.00 =    1863.79 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2115.00 TO NODE   2120.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   23.09
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.625
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        8.11      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    8.11      SUBAREA RUNOFF(CFS) =   17.44
  EFFECTIVE AREA(ACRES) =     17.02   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       17.0       PEAK FLOW RATE(CFS) =      36.59

****************************************************************************
  FLOW PROCESS FROM NODE   2120.00 TO NODE   2130.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2198.00  DOWNSTREAM(FEET) =   2116.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1192.21   CHANNEL SLOPE =  0.0688
  CHANNEL FLOW THRU SUBAREA(CFS) =      36.59
  FLOW VELOCITY(FEET/SEC) =   9.29 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.14   Tc(MIN.) =   25.23
  LONGEST FLOWPATH FROM NODE   2105.00 TO NODE   2130.00 =    3056.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2125.00 TO NODE   2130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   25.23
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.489
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       15.16      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   15.16      SUBAREA RUNOFF(CFS) =   30.74
  EFFECTIVE AREA(ACRES) =     32.18   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       32.2       PEAK FLOW RATE(CFS) =      65.25

****************************************************************************
  FLOW PROCESS FROM NODE   2130.00 TO NODE   2145.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
```



```
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2116.00  DOWNSTREAM(FEET) =   2023.15
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1492.80   CHANNEL SLOPE =  0.0622
  CHANNEL FLOW THRU SUBAREA(CFS) =      65.25
  FLOW VELOCITY(FEET/SEC) =  10.43 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.39   Tc(MIN.) =   27.61
  LONGEST FLOWPATH FROM NODE   2105.00 TO NODE   2145.00 =    4548.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2140.00 TO NODE   2145.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.61
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.358
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       19.27      0.24     1.000    88
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      D        0.87      0.14     1.000    93
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   20.14      SUBAREA RUNOFF(CFS) =   38.53
  EFFECTIVE AREA(ACRES) =     52.32   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       52.3       PEAK FLOW RATE(CFS) =      99.98

****************************************************************************
  FLOW PROCESS FROM NODE   2145.00 TO NODE   2145.00 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       99.98   27.61    2.358  0.23( 0.23) 1.00      52.3    2105.00
  LONGEST FLOWPATH FROM NODE   2105.00 TO NODE   2145.00 =    4548.80 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      368.13   21.76    2.720  0.24( 0.23) 0.99     164.6    2000.00
      2      372.67   32.96    2.120  0.24( 0.23) 0.99     219.6    2030.00
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2145.00 =    6401.62 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      460.36   21.76    2.720  0.24( 0.23) 0.99     205.8    2000.00
      2      470.48   27.61    2.358  0.24( 0.23) 0.99     245.7    2105.00
      3      461.47   32.96    2.120  0.24( 0.23) 1.00     271.9    2030.00
    TOTAL AREA(ACRES) =       271.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      470.48  Tc(MIN.) =   27.614
  EFFECTIVE AREA(ACRES) =    245.67  AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =      271.9
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2145.00 =    6401.62 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   2145.00 TO NODE   2145.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   2145.00 TO NODE   2160.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2023.15  DOWNSTREAM(FEET) =   2002.49
  CHANNEL LENGTH THRU SUBAREA(FEET) =   797.93   CHANNEL SLOPE =  0.0259
  CHANNEL FLOW THRU SUBAREA(CFS) =     470.48
  FLOW VELOCITY(FEET/SEC) =  12.36 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.08   Tc(MIN.) =   28.69
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2160.00 =    7199.55 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2150.00 TO NODE   2160.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   28.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.304
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        3.24      0.24     1.000    88
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      D        3.04      0.14     1.000    93
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.19
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    6.28      SUBAREA RUNOFF(CFS) =   11.95
  EFFECTIVE AREA(ACRES) =    251.95   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =      278.2       PEAK FLOW RATE(CFS) =     470.48
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   2155.00 TO NODE   2160.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   28.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.304
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        6.21      0.24     1.000    88
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      D        8.51      0.14     1.000    93
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   14.72      SUBAREA RUNOFF(CFS) =   28.13
  EFFECTIVE AREA(ACRES) =    266.67   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      292.9       PEAK FLOW RATE(CFS) =     497.68
```



```
****************************************************************************
  FLOW PROCESS FROM NODE   2160.00 TO NODE   2170.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2002.49  DOWNSTREAM(FEET) =   1994.85
  CHANNEL LENGTH THRU SUBAREA(FEET) =   305.65   CHANNEL SLOPE =  0.0250
  CHANNEL FLOW THRU SUBAREA(CFS) =     497.68
  FLOW VELOCITY(FEET/SEC) =  12.36 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.41   Tc(MIN.) =   29.10
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2170.00 =    7505.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2165.00 TO NODE   2170.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   29.10
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.285
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       12.45      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      D        0.33      0.14     1.000    93
  COMMERCIAL                 A        4.88      0.80     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.79
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.751
  SUBAREA AREA(ACRES) =   17.66      SUBAREA RUNOFF(CFS) =   26.87
  EFFECTIVE AREA(ACRES) =    284.33   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      310.6       PEAK FLOW RATE(CFS) =     519.83

****************************************************************************
  FLOW PROCESS FROM NODE   2170.00 TO NODE   2235.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1994.85  DOWNSTREAM(FEET) =   1980.54
  CHANNEL LENGTH THRU SUBAREA(FEET) =   630.31   CHANNEL SLOPE =  0.0227
  CHANNEL FLOW THRU SUBAREA(CFS) =     519.83
  FLOW VELOCITY(FEET/SEC) =  11.95 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.88   Tc(MIN.) =   29.98
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2235.00 =    8135.51 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2145.00 TO NODE   2235.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   2175.00 TO NODE   2180.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1624.95
  ELEVATION DATA: UPSTREAM(FEET) =   2360.47  DOWNSTREAM(FEET) =   1995.03
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   24.252
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.549
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       21.07      0.24     1.000    88   24.25
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     43.85
  TOTAL AREA(ACRES) =     21.07   PEAK FLOW RATE(CFS) =     43.85

****************************************************************************
  FLOW PROCESS FROM NODE   2180.00 TO NODE   2185.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1995.03  DOWNSTREAM(FEET) =   1988.53
  CHANNEL LENGTH THRU SUBAREA(FEET) =   158.18   CHANNEL SLOPE =  0.0411
  CHANNEL FLOW THRU SUBAREA(CFS) =      43.85
  FLOW VELOCITY(FEET/SEC) =   7.56 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.35   Tc(MIN.) =   24.60
  LONGEST FLOWPATH FROM NODE   2175.00 TO NODE   2185.00 =    1783.13 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2183.00 TO NODE   2185.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   24.60
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.527
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.41      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        0.07      0.24     1.000    88
  COMMERCIAL                 A        0.96      0.80     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.44      SUBAREA RUNOFF(CFS) =    2.89
  EFFECTIVE AREA(ACRES) =     22.51   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.96
  TOTAL AREA(ACRES) =       22.5       PEAK FLOW RATE(CFS) =      46.33

****************************************************************************
  FLOW PROCESS FROM NODE   2185.00 TO NODE   2235.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1988.53  DOWNSTREAM(FEET) =   1980.54
  CHANNEL LENGTH THRU SUBAREA(FEET) =   318.51   CHANNEL SLOPE =  0.0251
  CHANNEL FLOW THRU SUBAREA(CFS) =      46.33
  FLOW VELOCITY(FEET/SEC) =   6.00 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.89   Tc(MIN.) =   25.49
  LONGEST FLOWPATH FROM NODE   2175.00 TO NODE   2235.00 =    2101.64 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2175.00 TO NODE   2235.00 IS CODE =  10
```



```
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   2195.00 TO NODE   2200.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   675.26
  ELEVATION DATA: UPSTREAM(FEET) =   2049.00  DOWNSTREAM(FEET) =   2042.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   31.585
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.175
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        3.59      0.81     1.000    51   31.58
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      4.42
  TOTAL AREA(ACRES) =      3.59   PEAK FLOW RATE(CFS) =      4.42

****************************************************************************
  FLOW PROCESS FROM NODE   2200.00 TO NODE   2210.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2042.00  DOWNSTREAM(FEET) =   2025.88
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1100.24   CHANNEL SLOPE =  0.0147
  CHANNEL FLOW THRU SUBAREA(CFS) =       4.42
  FLOW VELOCITY(FEET/SEC) =   2.48 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.39   Tc(MIN.) =   38.98
  LONGEST FLOWPATH FROM NODE   2195.00 TO NODE   2210.00 =    1775.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2205.00 TO NODE   2210.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   38.98
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.917
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        9.62      0.81     1.000    51
  COMMERCIAL                 A        0.04      0.80     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.996
  SUBAREA AREA(ACRES) =    9.66      SUBAREA RUNOFF(CFS) =    9.67
  EFFECTIVE AREA(ACRES) =     13.25   AREA-AVERAGED Fm(INCH/HR) =  0.81
  AREA-AVERAGED Fp(INCH/HR) =  0.81  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       13.2       PEAK FLOW RATE(CFS) =      13.25

****************************************************************************
  FLOW PROCESS FROM NODE   2210.00 TO NODE   2220.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2025.88  DOWNSTREAM(FEET) =  2013.62
  FLOW LENGTH(FEET) =   598.68   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.39
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.25
  PIPE TRAVEL TIME(MIN.) =   1.06    Tc(MIN.) =   40.04
  LONGEST FLOWPATH FROM NODE   2195.00 TO NODE   2220.00 =    2374.18 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2215.00 TO NODE   2220.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   40.04
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.887
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        9.06      0.81     1.000    51
  COMMERCIAL                 A        0.05      0.80     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.995
  SUBAREA AREA(ACRES) =    9.11      SUBAREA RUNOFF(CFS) =    8.88
  EFFECTIVE AREA(ACRES) =     22.36   AREA-AVERAGED Fm(INCH/HR) =  0.81
  AREA-AVERAGED Fp(INCH/HR) =  0.81  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       22.4       PEAK FLOW RATE(CFS) =      21.76

****************************************************************************
  FLOW PROCESS FROM NODE   2220.00 TO NODE   2235.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2013.62  DOWNSTREAM(FEET) =  1980.54
  FLOW LENGTH(FEET) =  1111.83   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.35
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.76
  PIPE TRAVEL TIME(MIN.) =   1.50    Tc(MIN.) =   41.54
  LONGEST FLOWPATH FROM NODE   2195.00 TO NODE   2235.00 =    3486.01 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2230.00 TO NODE   2235.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   41.54
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.845
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       12.92      0.81     1.000    51
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   12.92      SUBAREA RUNOFF(CFS) =   12.06
  EFFECTIVE AREA(ACRES) =     35.28   AREA-AVERAGED Fm(INCH/HR) =  0.81
  AREA-AVERAGED Fp(INCH/HR) =  0.81  AREA-AVERAGED Ap =  1.00
```



```
  TOTAL AREA(ACRES) =       35.3       PEAK FLOW RATE(CFS) =      33.00

****************************************************************************
  FLOW PROCESS FROM NODE   2145.00 TO NODE   2235.00 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       33.00   41.54    1.845  0.81( 0.81) 1.00      35.3    2195.00
  LONGEST FLOWPATH FROM NODE   2195.00 TO NODE   2235.00 =    3486.01 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      518.67   24.14    2.556  0.26( 0.26) 0.98     244.5    2000.00
      2      519.83   29.98    2.244  0.26( 0.25) 0.98     284.3    2105.00
      3      506.74   35.34    2.033  0.26( 0.25) 0.98     310.6    2030.00
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2235.00 =    8135.51 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      550.95   24.14    2.556  0.31( 0.30) 0.98     265.0    2000.00
      2      552.79   29.98    2.244  0.30( 0.30) 0.98     309.8    2105.00
      3      539.73   35.34    2.033  0.31( 0.30) 0.98     340.6    2030.00
      4      486.31   41.54    1.845  0.31( 0.31) 0.98     345.9    2195.00
    TOTAL AREA(ACRES) =       345.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      552.79  Tc(MIN.) =   29.982
  EFFECTIVE AREA(ACRES) =    309.80  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.31  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      345.9
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2235.00 =    8135.51 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2145.00 TO NODE   2235.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
==============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   2175.00 TO NODE   2235.00 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      550.95   24.14    2.556  0.31( 0.30) 0.98     265.0    2000.00
      2      552.79   29.98    2.244  0.30( 0.30) 0.98     309.8    2105.00
      3      539.73   35.34    2.033  0.31( 0.30) 0.98     340.6    2030.00
      4      486.31   41.54    1.845  0.31( 0.31) 0.98     345.9    2195.00
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2235.00 =    8135.51 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       46.33   25.49    2.474  0.25( 0.24) 0.96      22.5    2175.00
```

```
  LONGEST FLOWPATH FROM NODE   2175.00 TO NODE   2235.00 =    2101.64 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
      1      596.44   24.14    2.556  0.30( 0.29) 0.98     286.3    2000.00
      2      597.71   25.49    2.474  0.30( 0.29) 0.98     297.8    2175.00
      3      594.35   29.98    2.244  0.30( 0.29) 0.98     332.3    2105.00
      4      576.93   35.34    2.033  0.30( 0.30) 0.98     363.1    2030.00
      5      519.61   41.54    1.845  0.31( 0.30) 0.98     368.4    2195.00
    TOTAL AREA(ACRES) =       368.4

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      597.71  Tc(MIN.) =   25.486
  EFFECTIVE AREA(ACRES) =    297.82  AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.31  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      368.4
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2235.00 =    8135.51 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2175.00 TO NODE   2235.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   2235.00 TO NODE   2245.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1980.54  DOWNSTREAM(FEET) =   1980.53
  CHANNEL LENGTH THRU SUBAREA(FEET) =   291.29   CHANNEL SLOPE =  0.0000
  NOTE: CHANNEL SLOPE OF .001 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =     597.71
  FLOW VELOCITY(FEET/SEC) =   2.62 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.85   Tc(MIN.) =   27.34
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2245.00 =    8426.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2240.00 TO NODE   2245.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.34
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.372
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       17.03      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        0.25      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   17.28      SUBAREA RUNOFF(CFS) =   24.41
  EFFECTIVE AREA(ACRES) =    315.10   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.33  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      385.7       PEAK FLOW RATE(CFS) =     597.71
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   2245.00 TO NODE   2255.00 IS CODE =  52
```



```
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1981.09  DOWNSTREAM(FEET) =   1910.32
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1818.04   CHANNEL SLOPE =  0.0389
  CHANNEL FLOW THRU SUBAREA(CFS) =     597.71
  FLOW VELOCITY(FEET/SEC) =  16.36 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.85   Tc(MIN.) =   29.19
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2255.00 =   10244.84 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2250.00 TO NODE   2255.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   29.19
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.280
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        7.20      0.81     1.000    51
  COMMERCIAL                 A        0.51      0.80     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.940
  SUBAREA AREA(ACRES) =    7.71      SUBAREA RUNOFF(CFS) =   10.55
  EFFECTIVE AREA(ACRES) =    322.81   AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      393.4       PEAK FLOW RATE(CFS) =     597.71
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   2255.00 TO NODE   5035.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1910.32  DOWNSTREAM(FEET) =   1901.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   482.15   CHANNEL SLOPE =  0.0193
  CHANNEL FLOW THRU SUBAREA(CFS) =     597.71
  FLOW VELOCITY(FEET/SEC) =  11.53 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.70   Tc(MIN.) =   29.89
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   5035.00 =   10726.99 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5025.00 TO NODE   5035.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   29.89
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.248
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        3.69      0.81     1.000    51
  COMMERCIAL                 A        0.61      0.80     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.872
  SUBAREA AREA(ACRES) =    4.30      SUBAREA RUNOFF(CFS) =    5.97
  EFFECTIVE AREA(ACRES) =    327.11   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.35  AREA-AVERAGED Ap =  0.98
```

```
  TOTAL AREA(ACRES) =      397.7       PEAK FLOW RATE(CFS) =     597.71
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   2235.00 TO NODE   5035.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3000.00 TO NODE   3005.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1429.11
  ELEVATION DATA: UPSTREAM(FEET) =   2032.95  DOWNSTREAM(FEET) =   1999.69

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   36.263
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.002
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        7.41      0.81     1.000    51   36.26
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      7.96
  TOTAL AREA(ACRES) =      7.41   PEAK FLOW RATE(CFS) =      7.96

****************************************************************************
  FLOW PROCESS FROM NODE   3005.00 TO NODE   3282.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1999.69  DOWNSTREAM(FEET) =   1920.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2019.34   CHANNEL SLOPE =  0.0391
  CHANNEL FLOW THRU SUBAREA(CFS) =       7.96
  FLOW VELOCITY(FEET/SEC) =   4.67 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.21   Tc(MIN.) =   43.47
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3282.00 =    3448.45 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3280.00 TO NODE   3285.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   43.47
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.796
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       30.28      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        3.12      0.43     1.000    77
  COMMERCIAL                 A        0.04      0.80     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.77
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.999
  SUBAREA AREA(ACRES) =   33.44      SUBAREA RUNOFF(CFS) =   30.80
  EFFECTIVE AREA(ACRES) =     40.85   AREA-AVERAGED Fm(INCH/HR) =  0.78
```



```
  AREA-AVERAGED Fp(INCH/HR) =  0.78  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       40.9       PEAK FLOW RATE(CFS) =      37.39

****************************************************************************
  FLOW PROCESS FROM NODE   3000.00 TO NODE   3285.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3010.00 TO NODE   3015.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1265.11
  ELEVATION DATA: UPSTREAM(FEET) =   2520.00  DOWNSTREAM(FEET) =   2087.32

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   20.177
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.846
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       11.32      0.24     1.000    88   20.18
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      26.59
  TOTAL AREA(ACRES) =     11.32   PEAK FLOW RATE(CFS) =     26.59

****************************************************************************
  FLOW PROCESS FROM NODE   3015.00 TO NODE   3050.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2087.32  DOWNSTREAM(FEET) =   2030.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   792.90   CHANNEL SLOPE =  0.0723
  CHANNEL FLOW THRU SUBAREA(CFS) =      26.59
  FLOW VELOCITY(FEET/SEC) =   8.71 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.52   Tc(MIN.) =   21.69
  LONGEST FLOWPATH FROM NODE   3010.00 TO NODE   3050.00 =    2058.01 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3040.00 TO NODE   3050.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.725
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.14      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        7.47      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    7.61      SUBAREA RUNOFF(CFS) =   16.97
  EFFECTIVE AREA(ACRES) =     18.93   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
```

```
  TOTAL AREA(ACRES) =       18.9       PEAK FLOW RATE(CFS) =      42.33

****************************************************************************
  FLOW PROCESS FROM NODE   3010.00 TO NODE   3050.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   21.69
  RAINFALL INTENSITY(INCH/HR) =   2.72
  AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      18.93
  TOTAL STREAM AREA(ACRES) =      18.93
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      42.33

****************************************************************************
  FLOW PROCESS FROM NODE   3020.00 TO NODE   3025.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1362.02
  ELEVATION DATA: UPSTREAM(FEET) =   2570.00  DOWNSTREAM(FEET) =   2200.29

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   21.765
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.720
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        9.29      0.24     1.000    88   21.76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     20.77
  TOTAL AREA(ACRES) =      9.29   PEAK FLOW RATE(CFS) =     20.77

****************************************************************************
  FLOW PROCESS FROM NODE   3025.00 TO NODE   3035.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2200.29  DOWNSTREAM(FEET) =   2100.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   493.08   CHANNEL SLOPE =  0.2034
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      20.77
  FLOW VELOCITY(FEET/SEC) =   9.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.86   Tc(MIN.) =   22.62
  LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   3035.00 =    1855.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3030.00 TO NODE   3035.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   22.62
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.657
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```



```
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        6.57      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    6.57      SUBAREA RUNOFF(CFS) =   14.32
  EFFECTIVE AREA(ACRES) =     15.86   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       15.9       PEAK FLOW RATE(CFS) =      34.56

****************************************************************************
  FLOW PROCESS FROM NODE   3035.00 TO NODE   3050.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2100.00  DOWNSTREAM(FEET) =   2030.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1385.76   CHANNEL SLOPE =  0.0505
  CHANNEL FLOW THRU SUBAREA(CFS) =      34.56
  FLOW VELOCITY(FEET/SEC) =   7.83 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.95   Tc(MIN.) =   25.57
  LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   3050.00 =    3240.86 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3045.00 TO NODE   3050.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   25.57
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.469
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       11.17      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        3.87      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.66
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   15.04      SUBAREA RUNOFF(CFS) =   24.47
  EFFECTIVE AREA(ACRES) =     30.90   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       30.9       PEAK FLOW RATE(CFS) =      56.34

****************************************************************************
  FLOW PROCESS FROM NODE   3020.00 TO NODE   3050.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   25.57
  RAINFALL INTENSITY(INCH/HR) =   2.47
  AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      30.90
  TOTAL STREAM AREA(ACRES) =      30.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      56.34

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

```
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
     1       42.33   21.69    2.725  0.24( 0.24) 1.00      18.9    3010.00
     2       56.34   25.57    2.469  0.44( 0.44) 1.00      30.9    3020.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
     1       96.17   21.69    2.725  0.36( 0.36) 1.00      45.1    3010.00
     2       94.31   25.57    2.469  0.37( 0.37) 1.00      49.8    3020.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      96.17    Tc(MIN.) =    21.69
  EFFECTIVE AREA(ACRES) =      45.14   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       49.8
  LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   3050.00 =    3240.86 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3050.00 TO NODE   3060.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2030.00  DOWNSTREAM(FEET) =   2020.67
  CHANNEL LENGTH THRU SUBAREA(FEET) =   187.88   CHANNEL SLOPE =  0.0497
  CHANNEL FLOW THRU SUBAREA(CFS) =      96.17
  FLOW VELOCITY(FEET/SEC) =  10.45 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.30   Tc(MIN.) =   21.99
  LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   3060.00 =    3428.74 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3055.00 TO NODE   3060.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.99
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.703
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.83      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        0.72      0.24     1.000    88
  COMMERCIAL                 A        1.76      0.80     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.521
  SUBAREA AREA(ACRES) =    3.31      SUBAREA RUNOFF(CFS) =    7.17
  EFFECTIVE AREA(ACRES) =     48.45   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =       53.1       PEAK FLOW RATE(CFS) =     102.43

****************************************************************************
  FLOW PROCESS FROM NODE   3060.00 TO NODE   3070.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2020.67  DOWNSTREAM(FEET) =   1997.05
  CHANNEL LENGTH THRU SUBAREA(FEET) =   351.12   CHANNEL SLOPE =  0.0673
```



```
  CHANNEL FLOW THRU SUBAREA(CFS) =     102.43
  FLOW VELOCITY(FEET/SEC) =  12.40 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.47   Tc(MIN.) =   22.47
  LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   3070.00 =    3779.86 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3065.00 TO NODE   3070.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   22.47
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.668
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        2.15      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       13.30      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.32
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   15.45      SUBAREA RUNOFF(CFS) =   32.71
  EFFECTIVE AREA(ACRES) =     63.90   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.35  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =       68.6       PEAK FLOW RATE(CFS) =     133.65

****************************************************************************
  FLOW PROCESS FROM NODE   3070.00 TO NODE   3080.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1997.05  DOWNSTREAM(FEET) =   1971.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   732.12   CHANNEL SLOPE =  0.0356
  CHANNEL FLOW THRU SUBAREA(CFS) =     133.65
  FLOW VELOCITY(FEET/SEC) =   9.77 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.25   Tc(MIN.) =   23.71
  LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   3080.00 =    4511.98 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3075.00 TO NODE   3080.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   23.71
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.583
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       23.86      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        2.86      0.43     1.000    77
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       13.68      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.59
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   40.40      SUBAREA RUNOFF(CFS) =   72.55
  EFFECTIVE AREA(ACRES) =    104.30   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      109.0       PEAK FLOW RATE(CFS) =     201.30

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

```
  FLOW PROCESS FROM NODE   3080.00 TO NODE   3155.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1971.00  DOWNSTREAM(FEET) =   1940.07
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1490.85   CHANNEL SLOPE =  0.0207
  CHANNEL FLOW THRU SUBAREA(CFS) =     201.30
  FLOW VELOCITY(FEET/SEC) =   8.46 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.94   Tc(MIN.) =   26.65
  LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   3155.00 =    6002.83 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3150.00 TO NODE   3155.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   26.65
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.408
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       15.78      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        0.38      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   16.16      SUBAREA RUNOFF(CFS) =   23.40
  EFFECTIVE AREA(ACRES) =    120.46   AREA-AVERAGED Fm(INCH/HR) =  0.49
  AREA-AVERAGED Fp(INCH/HR) =  0.49  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =      125.2       PEAK FLOW RATE(CFS) =     208.31

****************************************************************************
  FLOW PROCESS FROM NODE   3050.00 TO NODE   3155.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   26.65
  RAINFALL INTENSITY(INCH/HR) =   2.41
  AREA-AVERAGED Fm(INCH/HR) =  0.49
  AREA-AVERAGED Fp(INCH/HR) =  0.49
  AREA-AVERAGED Ap =  0.99
  EFFECTIVE STREAM AREA(ACRES) =     120.46
  TOTAL STREAM AREA(ACRES) =     125.15
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     208.31

****************************************************************************
  FLOW PROCESS FROM NODE   3085.00 TO NODE   3090.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1932.96
  ELEVATION DATA: UPSTREAM(FEET) =   2160.00  DOWNSTREAM(FEET) =   1966.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   30.548
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.219
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
```



```
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        8.47      0.81     1.000    51   30.55
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       13.50      0.43     1.000    77   30.55
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.58
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     32.44
  TOTAL AREA(ACRES) =     21.97   PEAK FLOW RATE(CFS) =     32.44

****************************************************************************
  FLOW PROCESS FROM NODE   3090.00 TO NODE   3140.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1966.00  DOWNSTREAM(FEET) =   1942.98
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1168.97   CHANNEL SLOPE =  0.0197
  CHANNEL FLOW THRU SUBAREA(CFS) =      32.44
  FLOW VELOCITY(FEET/SEC) =   4.80 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.06   Tc(MIN.) =   34.60
  LONGEST FLOWPATH FROM NODE   3085.00 TO NODE   3140.00 =    3101.93 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3135.00 TO NODE   3140.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   34.60
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.059
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        7.54      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        4.37      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.67
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   11.91      SUBAREA RUNOFF(CFS) =   14.88
  EFFECTIVE AREA(ACRES) =     33.88   AREA-AVERAGED Fm(INCH/HR) =  0.61
  AREA-AVERAGED Fp(INCH/HR) =  0.61  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       33.9       PEAK FLOW RATE(CFS) =      44.16

****************************************************************************
  FLOW PROCESS FROM NODE   3085.00 TO NODE   3140.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   34.60
  RAINFALL INTENSITY(INCH/HR) =   2.06
  AREA-AVERAGED Fm(INCH/HR) =  0.61
  AREA-AVERAGED Fp(INCH/HR) =  0.61
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      33.88
  TOTAL STREAM AREA(ACRES) =      33.88
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      44.16

****************************************************************************
  FLOW PROCESS FROM NODE   3095.00 TO NODE   3100.00 IS CODE =  21
----------------------------------------------------------------------------
```

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   889.90
  ELEVATION DATA: UPSTREAM(FEET) =   2300.00  DOWNSTREAM(FEET) =   2083.12

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   18.757
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.973
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        7.54      0.43     1.000    77   18.76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     17.23
  TOTAL AREA(ACRES) =      7.54   PEAK FLOW RATE(CFS) =     17.23

****************************************************************************
  FLOW PROCESS FROM NODE   3100.00 TO NODE   3115.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2083.12  DOWNSTREAM(FEET) =   2030.21
  CHANNEL LENGTH THRU SUBAREA(FEET) =   466.33   CHANNEL SLOPE =  0.1135
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      17.23
  FLOW VELOCITY(FEET/SEC) =   9.10 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.85   Tc(MIN.) =   19.61
  LONGEST FLOWPATH FROM NODE   3095.00 TO NODE   3115.00 =    1356.23 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3105.00 TO NODE   3115.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   19.61
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.895
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        4.87      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.87      SUBAREA RUNOFF(CFS) =   10.79
  EFFECTIVE AREA(ACRES) =     12.41   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       12.4       PEAK FLOW RATE(CFS) =      27.49

****************************************************************************
  FLOW PROCESS FROM NODE   3110.00 TO NODE   3115.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   19.61
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.895
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
```



```
  "CHAPARRAL,BROADLEAF"      B        9.80      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    9.80      SUBAREA RUNOFF(CFS) =   21.71
  EFFECTIVE AREA(ACRES) =     22.21   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       22.2       PEAK FLOW RATE(CFS) =      49.19

****************************************************************************
  FLOW PROCESS FROM NODE   3115.00 TO NODE   3125.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2030.21  DOWNSTREAM(FEET) =   1967.61
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1009.89   CHANNEL SLOPE =  0.0620
  CHANNEL FLOW THRU SUBAREA(CFS) =      49.19
  FLOW VELOCITY(FEET/SEC) =   9.59 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.75   Tc(MIN.) =   21.37
  LONGEST FLOWPATH FROM NODE   3095.00 TO NODE   3125.00 =    2366.12 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3120.00 TO NODE   3125.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   21.37
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.750
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        6.24      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        5.87      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.63
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   12.11      SUBAREA RUNOFF(CFS) =   23.14
  EFFECTIVE AREA(ACRES) =     34.32   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       34.3       PEAK FLOW RATE(CFS) =      69.43

****************************************************************************
  FLOW PROCESS FROM NODE   3125.00 TO NODE   3140.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1967.61  DOWNSTREAM(FEET) =   1942.98
  CHANNEL LENGTH THRU SUBAREA(FEET) =   867.02   CHANNEL SLOPE =  0.0284
  CHANNEL FLOW THRU SUBAREA(CFS) =      69.43
  FLOW VELOCITY(FEET/SEC) =   7.18 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.01   Tc(MIN.) =   23.38
  LONGEST FLOWPATH FROM NODE   3095.00 TO NODE   3140.00 =    3233.14 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3130.00 TO NODE   3140.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   23.38
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.605
  SUBAREA LOSS RATE DATA(AMC III):
```

```
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL GOOD COVER
"CHAPARRAL,BROADLEAF"      A        1.08      0.81     1.000    51
NATURAL GOOD COVER
"CHAPARRAL,BROADLEAF"      B        3.31      0.43     1.000    77
COMMERCIAL                 A        0.08      0.80     0.100    52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.53
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.984
SUBAREA AREA(ACRES) =    4.47      SUBAREA RUNOFF(CFS) =    8.40
EFFECTIVE AREA(ACRES) =     38.79   AREA-AVERAGED Fm(INCH/HR) =  0.50
AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =       38.8       PEAK FLOW RATE(CFS) =      73.36

****************************************************************************
FLOW PROCESS FROM NODE   3140.00 TO NODE   3155.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1942.98  DOWNSTREAM(FEET) =   1940.07
CHANNEL LENGTH THRU SUBAREA(FEET) =    81.38   CHANNEL SLOPE =  0.0358
CHANNEL FLOW THRU SUBAREA(CFS) =      73.36
FLOW VELOCITY(FEET/SEC) =   8.19 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   0.17   Tc(MIN.) =   23.54
LONGEST FLOWPATH FROM NODE   3095.00 TO NODE   3155.00 =    3314.52 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   3145.00 TO NODE   3155.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   23.54
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.594
SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL GOOD COVER
"CHAPARRAL,BROADLEAF"      B        0.07      0.43     1.000    77
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =    0.07      SUBAREA RUNOFF(CFS) =    0.14
EFFECTIVE AREA(ACRES) =     38.86   AREA-AVERAGED Fm(INCH/HR) =  0.50
AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =       38.9       PEAK FLOW RATE(CFS) =      73.36
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
FLOW PROCESS FROM NODE   3095.00 TO NODE   3155.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  3
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
TIME OF CONCENTRATION(MIN.) =   23.54
RAINFALL INTENSITY(INCH/HR) =   2.59
AREA-AVERAGED Fm(INCH/HR) =  0.50
AREA-AVERAGED Fp(INCH/HR) =  0.50
AREA-AVERAGED Ap =  1.00
EFFECTIVE STREAM AREA(ACRES) =      38.86
TOTAL STREAM AREA(ACRES) =      38.86
PEAK FLOW RATE(CFS) AT CONFLUENCE =      73.36
```



```
** CONFLUENCE DATA **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1      208.31   26.65    2.408  0.49( 0.49) 0.99     120.5    3010.00
    1      194.95   30.61    2.216  0.49( 0.49) 0.99     125.2    3020.00
    2       44.16   34.60    2.059  0.61( 0.61) 1.00      33.9    3085.00
    3       73.36   23.54    2.594  0.50( 0.50) 1.00      38.9    3095.00

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

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1      316.35   23.54    2.594  0.51( 0.51) 0.99     168.3    3095.00
    2      317.37   26.65    2.408  0.51( 0.51) 0.99     185.4    3010.00
    3      298.36   30.61    2.216  0.51( 0.51) 0.99     194.0    3020.00
    4      276.00   34.60    2.059  0.51( 0.51) 0.99     197.9    3085.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     317.37    Tc(MIN.) =    26.65
EFFECTIVE AREA(ACRES) =     185.42   AREA-AVERAGED Fm(INCH/HR) =  0.51
AREA-AVERAGED Fp(INCH/HR) =  0.51  AREA-AVERAGED Ap =  0.99
TOTAL AREA(ACRES) =      197.9
LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   3155.00 =    6002.83 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   3155.00 TO NODE   3285.00 IS CODE =  52
----------------------------------------------------------------------------
>>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1940.07  DOWNSTREAM(FEET) =   1920.70
CHANNEL LENGTH THRU SUBAREA(FEET) =  1269.59   CHANNEL SLOPE =  0.0153
CHANNEL FLOW THRU SUBAREA(CFS) =     317.37
FLOW VELOCITY(FEET/SEC) =   8.37 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   2.53   Tc(MIN.) =   29.18
LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   3285.00 =    7272.42 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   3285.00 TO NODE   3285.00 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      316.35   26.08    2.440  0.51( 0.51) 0.99     168.3    3095.00
    2      317.37   29.18    2.281  0.51( 0.51) 0.99     185.4    3010.00
    3      298.36   33.19    2.111  0.51( 0.51) 0.99     194.0    3020.00
    4      276.00   37.25    1.970  0.51( 0.51) 0.99     197.9    3085.00
LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   3285.00 =    7272.42 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       37.39   43.47    1.796  0.78( 0.78) 1.00      40.9    3000.00
LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3285.00 =    3448.45 FEET.

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
```

```
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
      1      352.99   26.08    2.440  0.55( 0.54) 0.99     192.8    3095.00
      2      354.44   29.18    2.281  0.55( 0.54) 0.99     212.8    3010.00
      3      335.75   33.19    2.111  0.55( 0.55) 0.99     225.2    3020.00
      4      313.38   37.25    1.970  0.55( 0.55) 0.99     232.9    3085.00
      5      280.39   43.47    1.796  0.56( 0.56) 0.99     238.7    3000.00
    TOTAL AREA(ACRES) =       238.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      354.44  Tc(MIN.) =   29.178
  EFFECTIVE AREA(ACRES) =    212.83  AREA-AVERAGED Fm(INCH/HR) =  0.54
  AREA-AVERAGED Fp(INCH/HR) =  0.55  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =      238.7
  LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   3285.00 =    7272.42 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3000.00 TO NODE   3285.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3285.00 TO NODE   3285.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3165.00 TO NODE   3170.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1040.69
  ELEVATION DATA: UPSTREAM(FEET) =   2290.72  DOWNSTREAM(FEET) =   2088.96

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   20.904
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.786
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        9.37      0.43     1.000    77   20.90
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     19.84
  TOTAL AREA(ACRES) =      9.37   PEAK FLOW RATE(CFS) =     19.84

****************************************************************************
  FLOW PROCESS FROM NODE   3170.00 TO NODE   3180.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2088.96  DOWNSTREAM(FEET) =   2012.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   377.15   CHANNEL SLOPE =  0.2041
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      19.84
  FLOW VELOCITY(FEET/SEC) =   9.45 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.66   Tc(MIN.) =   21.57
  LONGEST FLOWPATH FROM NODE   3165.00 TO NODE   3180.00 =    1417.84 FEET.
```



```
****************************************************************************
  FLOW PROCESS FROM NODE   3175.00 TO NODE   3180.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.57
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.734
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        4.08      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.08      SUBAREA RUNOFF(CFS) =    8.45
  EFFECTIVE AREA(ACRES) =     13.45   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       13.4       PEAK FLOW RATE(CFS) =      27.85

****************************************************************************
  FLOW PROCESS FROM NODE   3180.00 TO NODE   3190.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2012.00  DOWNSTREAM(FEET) =   1961.02
  CHANNEL LENGTH THRU SUBAREA(FEET) =   906.75   CHANNEL SLOPE =  0.0562
  CHANNEL FLOW THRU SUBAREA(CFS) =      27.85
  FLOW VELOCITY(FEET/SEC) =   7.78 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.94   Tc(MIN.) =   23.51
  LONGEST FLOWPATH FROM NODE   3165.00 TO NODE   3190.00 =    2324.59 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3185.00 TO NODE   3190.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   23.51
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.596
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        2.70      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        4.75      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    7.45      SUBAREA RUNOFF(CFS) =   13.59
  EFFECTIVE AREA(ACRES) =     20.90   AREA-AVERAGED Fm(INCH/HR) =  0.48
  AREA-AVERAGED Fp(INCH/HR) =  0.48  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       20.9       PEAK FLOW RATE(CFS) =      39.77

****************************************************************************
  FLOW PROCESS FROM NODE   3190.00 TO NODE   3235.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1961.02  DOWNSTREAM(FEET) =   1948.84
  CHANNEL LENGTH THRU SUBAREA(FEET) =   445.86   CHANNEL SLOPE =  0.0273
  CHANNEL FLOW THRU SUBAREA(CFS) =      39.77
  FLOW VELOCITY(FEET/SEC) =   5.99 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
  TRAVEL TIME(MIN.) =   1.24   Tc(MIN.) =   24.75
  LONGEST FLOWPATH FROM NODE   3165.00 TO NODE   3235.00 =    2770.45 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3225.00 TO NODE   3235.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   24.75
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.518
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        8.72      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        3.98      0.43     1.000    77
  COMMERCIAL                 A        1.45      0.80     0.100    52
  COMMERCIAL                 B        0.22      0.45     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.69
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.895
  SUBAREA AREA(ACRES) =   14.37      SUBAREA RUNOFF(CFS) =   24.55
  EFFECTIVE AREA(ACRES) =     35.27   AREA-AVERAGED Fm(INCH/HR) =  0.54
  AREA-AVERAGED Fp(INCH/HR) =  0.56  AREA-AVERAGED Ap =  0.96
  TOTAL AREA(ACRES) =       35.3       PEAK FLOW RATE(CFS) =      62.83

****************************************************************************
  FLOW PROCESS FROM NODE   3165.00 TO NODE   3235.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   24.75
  RAINFALL INTENSITY(INCH/HR) =   2.52
  AREA-AVERAGED Fm(INCH/HR) =  0.54
  AREA-AVERAGED Fp(INCH/HR) =  0.56
  AREA-AVERAGED Ap =  0.96
  EFFECTIVE STREAM AREA(ACRES) =      35.27
  TOTAL STREAM AREA(ACRES) =      35.27
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      62.83

****************************************************************************
  FLOW PROCESS FROM NODE   3195.00 TO NODE   3200.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   942.90
  ELEVATION DATA: UPSTREAM(FEET) =   2293.29  DOWNSTREAM(FEET) =   2110.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   20.089
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.853
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        7.82      0.43     1.000    77   20.09
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     17.03
  TOTAL AREA(ACRES) =      7.82   PEAK FLOW RATE(CFS) =     17.03
```



```
****************************************************************************
  FLOW PROCESS FROM NODE   3200.00 TO NODE   3210.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2110.20  DOWNSTREAM(FEET) =   2038.11
  CHANNEL LENGTH THRU SUBAREA(FEET) =   678.25   CHANNEL SLOPE =  0.1063
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      17.03
  FLOW VELOCITY(FEET/SEC) =   9.08 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.25   Tc(MIN.) =   21.33
  LONGEST FLOWPATH FROM NODE   3195.00 TO NODE   3210.00 =    1621.15 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3205.00 TO NODE   3210.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.33
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.752
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       10.71      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   10.71      SUBAREA RUNOFF(CFS) =   22.35
  EFFECTIVE AREA(ACRES) =     18.53   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       18.5       PEAK FLOW RATE(CFS) =      38.66

****************************************************************************
  FLOW PROCESS FROM NODE   3210.00 TO NODE   3220.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2038.11  DOWNSTREAM(FEET) =   1997.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   636.39   CHANNEL SLOPE =  0.0646
  CHANNEL FLOW THRU SUBAREA(CFS) =      38.66
  FLOW VELOCITY(FEET/SEC) =   9.14 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.16   Tc(MIN.) =   22.49
  LONGEST FLOWPATH FROM NODE   3195.00 TO NODE   3220.00 =    2257.54 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3215.00 TO NODE   3220.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   22.49
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.666
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        2.20      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       12.64      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.49
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
```

```
  SUBAREA AREA(ACRES) =   14.84      SUBAREA RUNOFF(CFS) =   29.07
  EFFECTIVE AREA(ACRES) =     33.37   AREA-AVERAGED Fm(INCH/HR) =  0.46
  AREA-AVERAGED Fp(INCH/HR) =  0.46  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       33.4       PEAK FLOW RATE(CFS) =      66.30

****************************************************************************
  FLOW PROCESS FROM NODE   3220.00 TO NODE   3235.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1997.00  DOWNSTREAM(FEET) =   1948.84
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1441.25   CHANNEL SLOPE =  0.0334
  CHANNEL FLOW THRU SUBAREA(CFS) =      66.30
  FLOW VELOCITY(FEET/SEC) =   7.68 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.13   Tc(MIN.) =   25.62
  LONGEST FLOWPATH FROM NODE   3195.00 TO NODE   3235.00 =    3698.79 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3230.00 TO NODE   3235.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   25.62
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.466
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       15.39      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       19.69      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   35.08      SUBAREA RUNOFF(CFS) =   58.97
  EFFECTIVE AREA(ACRES) =     68.45   AREA-AVERAGED Fm(INCH/HR) =  0.53
  AREA-AVERAGED Fp(INCH/HR) =  0.53  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       68.5       PEAK FLOW RATE(CFS) =     119.26

****************************************************************************
  FLOW PROCESS FROM NODE   3195.00 TO NODE   3235.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   25.62
  RAINFALL INTENSITY(INCH/HR) =   2.47
  AREA-AVERAGED Fm(INCH/HR) =  0.53
  AREA-AVERAGED Fp(INCH/HR) =  0.53
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      68.45
  TOTAL STREAM AREA(ACRES) =      68.45
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     119.26

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       62.83   24.75    2.518  0.56( 0.54) 0.96      35.3    3165.00
      2      119.26   25.62    2.466  0.53( 0.53) 1.00      68.5    3195.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
```



```
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      181.11   24.75    2.518  0.54( 0.53) 0.99     101.4    3165.00
      2      180.45   25.62    2.466  0.54( 0.53) 0.99     103.7    3195.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     181.11    Tc(MIN.) =    24.75
  EFFECTIVE AREA(ACRES) =     101.40   AREA-AVERAGED Fm(INCH/HR) =  0.53
  AREA-AVERAGED Fp(INCH/HR) =  0.54  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =      103.7
  LONGEST FLOWPATH FROM NODE   3195.00 TO NODE   3235.00 =    3698.79 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3235.00 TO NODE   3270.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1948.84  DOWNSTREAM(FEET) =   1925.41
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1342.45   CHANNEL SLOPE =  0.0175
  CHANNEL FLOW THRU SUBAREA(CFS) =     181.11
  FLOW VELOCITY(FEET/SEC) =   7.51 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.98   Tc(MIN.) =   27.73
  LONGEST FLOWPATH FROM NODE   3195.00 TO NODE   3270.00 =    5041.24 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3260.00 TO NODE   3270.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.73
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.352
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        2.78      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        4.01      0.43     1.000    77
  COMMERCIAL                 A        0.21      0.80     0.100    52
  COMMERCIAL                 B        0.14      0.45     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.59
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.956
  SUBAREA AREA(ACRES) =    7.14      SUBAREA RUNOFF(CFS) =   11.50
  EFFECTIVE AREA(ACRES) =    108.54   AREA-AVERAGED Fm(INCH/HR) =  0.53
  AREA-AVERAGED Fp(INCH/HR) =  0.54  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      110.9       PEAK FLOW RATE(CFS) =     181.11
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   3235.00 TO NODE   3270.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   27.73
  RAINFALL INTENSITY(INCH/HR) =   2.35
  AREA-AVERAGED Fm(INCH/HR) =  0.53
  AREA-AVERAGED Fp(INCH/HR) =  0.54
```

```
  AREA-AVERAGED Ap =  0.98
  EFFECTIVE STREAM AREA(ACRES) =     108.54
  TOTAL STREAM AREA(ACRES) =     110.86
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     181.11

****************************************************************************
  FLOW PROCESS FROM NODE   3240.00 TO NODE   3245.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   901.76
  ELEVATION DATA: UPSTREAM(FEET) =   2036.00  DOWNSTREAM(FEET) =   1951.05

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   22.805
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.644
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        5.46      0.43     1.000    77   22.81
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     10.86
  TOTAL AREA(ACRES) =      5.46   PEAK FLOW RATE(CFS) =     10.86

****************************************************************************
  FLOW PROCESS FROM NODE   3245.00 TO NODE   3255.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1951.05  DOWNSTREAM(FEET) =   1930.77
  CHANNEL LENGTH THRU SUBAREA(FEET) =   377.36   CHANNEL SLOPE =  0.0537
  CHANNEL FLOW THRU SUBAREA(CFS) =      10.86
  FLOW VELOCITY(FEET/SEC) =   5.92 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.06   Tc(MIN.) =   23.87
  LONGEST FLOWPATH FROM NODE   3240.00 TO NODE   3255.00 =    1279.12 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3250.00 TO NODE   3255.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   23.87
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.573
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        1.29      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        2.52      0.43     1.000    77
  COMMERCIAL                 A        1.65      0.80     0.100    52
  COMMERCIAL                 B        0.05      0.45     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.722
  SUBAREA AREA(ACRES) =    5.51      SUBAREA RUNOFF(CFS) =   10.72
  EFFECTIVE AREA(ACRES) =     10.97   AREA-AVERAGED Fm(INCH/HR) =  0.42
  AREA-AVERAGED Fp(INCH/HR) =  0.49  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =       11.0       PEAK FLOW RATE(CFS) =      21.23
```



```
****************************************************************************
  FLOW PROCESS FROM NODE   3255.00 TO NODE   3270.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1930.77  DOWNSTREAM(FEET) =   1925.41
  CHANNEL LENGTH THRU SUBAREA(FEET) =   190.00   CHANNEL SLOPE =  0.0282
  CHANNEL FLOW THRU SUBAREA(CFS) =      21.23
  FLOW VELOCITY(FEET/SEC) =   5.11 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.62   Tc(MIN.) =   24.49
  LONGEST FLOWPATH FROM NODE   3240.00 TO NODE   3270.00 =    1469.12 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3265.00 TO NODE   3270.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   24.49
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.534
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.68      0.81     1.000    51
  COMMERCIAL                 A        0.06      0.80     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.927
  SUBAREA AREA(ACRES) =    0.74      SUBAREA RUNOFF(CFS) =    1.19
  EFFECTIVE AREA(ACRES) =     11.71   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.51  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =       11.7       PEAK FLOW RATE(CFS) =      22.03

****************************************************************************
  FLOW PROCESS FROM NODE   3240.00 TO NODE   3270.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   24.49
  RAINFALL INTENSITY(INCH/HR) =   2.53
  AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.51
  AREA-AVERAGED Ap =  0.86
  EFFECTIVE STREAM AREA(ACRES) =      11.71
  TOTAL STREAM AREA(ACRES) =      11.71
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      22.03

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      181.11   27.73    2.352  0.54( 0.53) 0.98     108.5    3165.00
      1      180.45   28.60    2.308  0.54( 0.53) 0.98     110.9    3195.00
      2       22.03   24.49    2.534  0.51( 0.44) 0.86      11.7    3240.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
```

```
     1      198.00   24.49    2.534  0.54( 0.52) 0.97     107.6    3240.00
     2      201.22   27.73    2.352  0.54( 0.53) 0.97     120.2    3165.00
     3      200.10   28.60    2.308  0.54( 0.53) 0.97     122.6    3195.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     201.22    Tc(MIN.) =    27.73
  EFFECTIVE AREA(ACRES) =     120.25   AREA-AVERAGED Fm(INCH/HR) =  0.53
  AREA-AVERAGED Fp(INCH/HR) =  0.54  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =      122.6
  LONGEST FLOWPATH FROM NODE   3195.00 TO NODE   3270.00 =    5041.24 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3270.00 TO NODE   3285.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1925.41  DOWNSTREAM(FEET) =   1920.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   311.65   CHANNEL SLOPE =  0.0151
  CHANNEL FLOW THRU SUBAREA(CFS) =     201.22
  FLOW VELOCITY(FEET/SEC) =   7.22 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.72   Tc(MIN.) =   28.45
  LONGEST FLOWPATH FROM NODE   3195.00 TO NODE   3285.00 =    5352.89 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3275.00 TO NODE   3285.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   28.45
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.316
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        1.02      0.81     1.000    51
  COMMERCIAL                 A        0.09      0.80     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.927
  SUBAREA AREA(ACRES) =    1.11      SUBAREA RUNOFF(CFS) =    1.57
  EFFECTIVE AREA(ACRES) =    121.36   AREA-AVERAGED Fm(INCH/HR) =  0.53
  AREA-AVERAGED Fp(INCH/HR) =  0.54  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =      123.7       PEAK FLOW RATE(CFS) =     201.22
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   3285.00 TO NODE   3285.00 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      198.00   25.21    2.490  0.54( 0.53) 0.97     108.7    3240.00
     2      201.22   28.45    2.316  0.54( 0.53) 0.97     121.4    3165.00
     3      200.10   29.32    2.274  0.54( 0.53) 0.97     123.7    3195.00
  LONGEST FLOWPATH FROM NODE   3195.00 TO NODE   3285.00 =    5352.89 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      352.99   26.08    2.440  0.55( 0.54) 0.99     192.8    3095.00
```



```
     2      354.44   29.18    2.281  0.55( 0.54) 0.99     212.8    3010.00
     3      335.75   33.19    2.111  0.55( 0.55) 0.99     225.2    3020.00
     4      313.38   37.25    1.970  0.55( 0.55) 0.99     232.9    3085.00
     5      280.39   43.47    1.796  0.56( 0.56) 0.99     238.7    3000.00
  LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   3285.00 =    7272.42 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      548.26   25.21    2.490  0.55( 0.54) 0.98     295.1    3240.00
     2      551.86   26.08    2.440  0.55( 0.54) 0.98     304.9    3095.00
     3      555.32   28.45    2.316  0.55( 0.54) 0.98     329.5    3165.00
     4      554.73   29.18    2.281  0.55( 0.54) 0.98     336.1    3010.00
     5      553.86   29.32    2.274  0.55( 0.54) 0.98     337.0    3195.00
     6      517.19   33.19    2.111  0.55( 0.54) 0.99     348.8    3020.00
     7      478.65   37.25    1.970  0.55( 0.54) 0.99     356.6    3085.00
     8      425.66   43.47    1.796  0.55( 0.55) 0.99     362.4    3000.00
   TOTAL AREA(ACRES) =       362.4

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      555.32  Tc(MIN.) =   28.449
  EFFECTIVE AREA(ACRES) =    329.50  AREA-AVERAGED Fm(INCH/HR) =  0.54
  AREA-AVERAGED Fp(INCH/HR) =  0.55  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      362.4
  LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   3285.00 =    7272.42 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3285.00 TO NODE   3285.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3285.00 TO NODE   5015.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1920.70  DOWNSTREAM(FEET) =   1915.12
  CHANNEL LENGTH THRU SUBAREA(FEET) =   166.52   CHANNEL SLOPE =  0.0335
  CHANNEL FLOW THRU SUBAREA(CFS) =     555.32
  FLOW VELOCITY(FEET/SEC) =  14.83 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.19   Tc(MIN.) =   28.64
  LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   5015.00 =    7438.94 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5010.00 TO NODE   5015.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   28.64
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.307
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        1.30      0.81     1.000    51
  COMMERCIAL                 A        0.05      0.80     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.967
  SUBAREA AREA(ACRES) =    1.35      SUBAREA RUNOFF(CFS) =    1.85
  EFFECTIVE AREA(ACRES) =    330.85   AREA-AVERAGED Fm(INCH/HR) =  0.54
  AREA-AVERAGED Fp(INCH/HR) =  0.55  AREA-AVERAGED Ap =  0.98
```

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  TOTAL AREA(ACRES) =      363.8       PEAK FLOW RATE(CFS) =     555.32
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5015.00 TO NODE   5015.00 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      548.26   25.40    2.479  0.55( 0.54) 0.98     296.5    3240.00
      2      551.86   26.26    2.430  0.55( 0.54) 0.98     306.2    3095.00
      3      555.32   28.64    2.307  0.55( 0.54) 0.98     330.8    3165.00
      4      554.73   29.37    2.272  0.55( 0.54) 0.98     337.5    3010.00
      5      553.86   29.51    2.265  0.55( 0.54) 0.98     338.3    3195.00
      6      517.19   33.38    2.104  0.55( 0.54) 0.99     350.2    3020.00
      7      478.65   37.44    1.964  0.55( 0.54) 0.99     357.9    3085.00
      8      425.66   43.68    1.791  0.56( 0.55) 0.99     363.8    3000.00
  LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   5015.00 =    7438.94 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      779.05   24.16    2.554  0.38( 0.37) 0.97     391.8    1195.00
      2      786.57   27.55    2.361  0.37( 0.36) 0.97     433.9    1170.00
      3      790.44   29.77    2.253  0.37( 0.36) 0.97     460.4    1135.00
      4      791.82   32.86    2.124  0.36( 0.35) 0.98     493.7    1000.00
      5      760.64   35.25    2.036  0.36( 0.35) 0.98     499.0    1060.00
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   5015.00 =   10625.85 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1320.87   24.16    2.554  0.45( 0.44) 0.98     673.8    1195.00
      2     1330.05   25.40    2.479  0.45( 0.44) 0.98     703.6    3240.00
      3     1335.57   26.26    2.430  0.45( 0.44) 0.98     724.2    3095.00
      4     1340.30   27.55    2.361  0.45( 0.44) 0.98     753.4    1170.00
      5     1343.79   28.64    2.307  0.45( 0.44) 0.98     777.7    3165.00
      6     1344.46   29.37    2.272  0.45( 0.44) 0.98     793.0    3010.00
      7     1343.85   29.51    2.265  0.45( 0.44) 0.98     795.6    3195.00
      8     1341.82   29.77    2.253  0.45( 0.44) 0.98     799.5    1135.00
      9     1313.98   32.86    2.124  0.44( 0.43) 0.98     842.3    1000.00
     10     1302.20   33.38    2.104  0.44( 0.43) 0.98     845.1    3020.00
     11     1260.09   35.25    2.036  0.44( 0.43) 0.98     852.7    1060.00
     12     1206.59   37.44    1.964  0.44( 0.43) 0.98     856.9    3085.00
     13     1075.26   43.68    1.791  0.44( 0.44) 0.98     862.7    3000.00
    TOTAL AREA(ACRES) =       862.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     1344.46  Tc(MIN.) =   29.365
  EFFECTIVE AREA(ACRES) =    793.00  AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      862.7
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   5015.00 =   10625.85 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5015.00 TO NODE   5015.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================
```



```
****************************************************************************
  FLOW PROCESS FROM NODE   5015.00 TO NODE   5015.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   4000.00 TO NODE   4005.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   987.39
  ELEVATION DATA: UPSTREAM(FEET) =   2424.77  DOWNSTREAM(FEET) =   2084.29

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   18.243
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.023
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        6.66      0.24     1.000    88   18.24
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     16.71
  TOTAL AREA(ACRES) =      6.66   PEAK FLOW RATE(CFS) =     16.71

****************************************************************************
  FLOW PROCESS FROM NODE   4005.00 TO NODE   4015.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2084.29  DOWNSTREAM(FEET) =   2037.74
  CHANNEL LENGTH THRU SUBAREA(FEET) =   317.49   CHANNEL SLOPE =  0.1466
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      16.71
  FLOW VELOCITY(FEET/SEC) =   9.03 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.59   Tc(MIN.) =   18.83
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4015.00 =    1304.88 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4010.00 TO NODE   4015.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.83
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.967
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        8.61      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    8.61      SUBAREA RUNOFF(CFS) =   21.16
  EFFECTIVE AREA(ACRES) =     15.27   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       15.3       PEAK FLOW RATE(CFS) =      37.53

****************************************************************************
  FLOW PROCESS FROM NODE   4015.00 TO NODE   4030.00 IS CODE =  52
```

```
---------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2037.74  DOWNSTREAM(FEET) =   1965.22
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1038.96   CHANNEL SLOPE =  0.0698
  CHANNEL FLOW THRU SUBAREA(CFS) =      37.53
  FLOW VELOCITY(FEET/SEC) =   9.42 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.84   Tc(MIN.) =   20.67
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4030.00 =    2343.84 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4025.00 TO NODE   4030.00 IS CODE =  81
---------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
  MAINLINE Tc(MIN.) =   20.67
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.805
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        1.76      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        1.77      0.43     1.000    77
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        6.03      0.24     1.000    88
  COMMERCIAL                 A        0.02      0.80     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.38
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.998
  SUBAREA AREA(ACRES) =    9.58      SUBAREA RUNOFF(CFS) =   20.93
  EFFECTIVE AREA(ACRES) =     24.85   AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       24.9       PEAK FLOW RATE(CFS) =      56.25

****************************************************************************
  FLOW PROCESS FROM NODE   4020.00 TO NODE   4030.00 IS CODE =  81
---------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
  MAINLINE Tc(MIN.) =   20.67
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.805
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.05      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       10.49      0.24     1.000    88
  COMMERCIAL                 C        0.01      0.27     0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.999
  SUBAREA AREA(ACRES) =   10.55      SUBAREA RUNOFF(CFS) =   24.37
  EFFECTIVE AREA(ACRES) =     35.40   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       35.4       PEAK FLOW RATE(CFS) =      80.62

****************************************************************************
  FLOW PROCESS FROM NODE   4030.00 TO NODE   4040.00 IS CODE =  52
---------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
===========================================================================
```



```
  ELEVATION DATA: UPSTREAM(FEET) =   1965.22  DOWNSTREAM(FEET) =   1962.31
  CHANNEL LENGTH THRU SUBAREA(FEET) =   116.99   CHANNEL SLOPE =  0.0249
  CHANNEL FLOW THRU SUBAREA(CFS) =      80.62
  FLOW VELOCITY(FEET/SEC) =   7.02 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.28   Tc(MIN.) =   20.94
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4040.00 =    2460.83 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4035.00 TO NODE   4040.00 IS CODE =  81
---------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
  MAINLINE Tc(MIN.) =   20.94
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.783
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.12      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        0.07      0.24     1.000    88
  COMMERCIAL                 A        3.77      0.80     0.100    52
  COMMERCIAL                 B        0.02      0.45     0.100    76
  COMMERCIAL                 C        0.66      0.27     0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.68
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.137
  SUBAREA AREA(ACRES) =    4.64      SUBAREA RUNOFF(CFS) =   11.23
  EFFECTIVE AREA(ACRES) =     40.04   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       40.0       PEAK FLOW RATE(CFS) =      91.14

****************************************************************************
  FLOW PROCESS FROM NODE   4040.00 TO NODE   4050.00 IS CODE =  52
---------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
===========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1962.31  DOWNSTREAM(FEET) =   1954.45
  CHANNEL LENGTH THRU SUBAREA(FEET) =   269.60   CHANNEL SLOPE =  0.0292
  CHANNEL FLOW THRU SUBAREA(CFS) =      91.14
  FLOW VELOCITY(FEET/SEC) =   7.88 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.57   Tc(MIN.) =   21.51
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4050.00 =    2730.43 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4045.00 TO NODE   4050.00 IS CODE =  81
---------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
===========================================================================
  MAINLINE Tc(MIN.) =   21.51
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.739
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        5.37      0.81     1.000    51
  COMMERCIAL                 A        6.24      0.80     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.516
  SUBAREA AREA(ACRES) =   11.61      SUBAREA RUNOFF(CFS) =   24.26
  EFFECTIVE AREA(ACRES) =     51.65   AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  0.81
  TOTAL AREA(ACRES) =       51.7       PEAK FLOW RATE(CFS) =     113.80
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   4050.00 TO NODE   5015.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1954.45  DOWNSTREAM(FEET) =   1915.12
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1231.49   CHANNEL SLOPE =  0.0319
  CHANNEL FLOW THRU SUBAREA(CFS) =     113.80
  FLOW VELOCITY(FEET/SEC) =   8.82 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.33   Tc(MIN.) =   23.84
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   5015.00 =    3961.92 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5000.00 TO NODE   5015.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   23.84
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.575
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       13.81      0.81     1.000    51
  COMMERCIAL                 A        1.59      0.80     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.907
  SUBAREA AREA(ACRES) =   15.40      SUBAREA RUNOFF(CFS) =   25.53
  EFFECTIVE AREA(ACRES) =     67.05   AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.47  AREA-AVERAGED Ap =  0.83
  TOTAL AREA(ACRES) =       67.1       PEAK FLOW RATE(CFS) =     131.72

****************************************************************************
  FLOW PROCESS FROM NODE   5015.00 TO NODE   5015.00 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      131.72   23.84    2.575  0.47( 0.39) 0.83      67.1    4000.00
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   5015.00 =    3961.92 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     1320.87   24.16    2.554  0.45( 0.44) 0.98     673.8    1195.00
      2     1330.05   25.40    2.479  0.45( 0.44) 0.98     703.6    3240.00
      3     1335.57   26.26    2.430  0.45( 0.44) 0.98     724.2    3095.00
      4     1340.30   27.55    2.361  0.45( 0.44) 0.98     753.4    1170.00
      5     1343.79   28.64    2.307  0.45( 0.44) 0.98     777.7    3165.00
      6     1344.46   29.37    2.272  0.45( 0.44) 0.98     793.0    3010.00
      7     1343.85   29.51    2.265  0.45( 0.44) 0.98     795.6    3195.00
      8     1341.82   29.77    2.253  0.45( 0.44) 0.98     799.5    1135.00
      9     1313.98   32.86    2.124  0.44( 0.43) 0.98     842.3    1000.00
     10     1302.20   33.38    2.104  0.44( 0.43) 0.98     845.1    3020.00
     11     1260.09   35.25    2.036  0.44( 0.43) 0.98     852.7    1060.00
     12     1206.59   37.44    1.964  0.44( 0.43) 0.98     856.9    3085.00
     13     1075.26   43.68    1.791  0.44( 0.44) 0.98     862.7    3000.00
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   5015.00 =   10625.85 FEET.
```



```
  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1447.72   23.84    2.575  0.45( 0.43) 0.96     731.9    4000.00
      2     1451.35   24.16    2.554  0.45( 0.43) 0.96     740.9    1195.00
      3     1455.99   25.40    2.479  0.45( 0.43) 0.96     770.7    3240.00
      4     1458.53   26.26    2.430  0.45( 0.43) 0.96     791.2    3095.00
      5     1459.12   27.55    2.361  0.45( 0.43) 0.97     820.5    1170.00
      6     1459.33   28.64    2.307  0.45( 0.43) 0.97     844.8    3165.00
      7     1457.92   29.37    2.272  0.45( 0.43) 0.97     860.0    3010.00
      8     1456.90   29.51    2.265  0.45( 0.43) 0.97     862.6    3195.00
      9     1454.14   29.77    2.253  0.45( 0.43) 0.97     866.6    1135.00
     10     1418.50   32.86    2.124  0.44( 0.43) 0.97     909.4    1000.00
     11     1405.50   33.38    2.104  0.44( 0.43) 0.97     912.1    3020.00
     12     1359.31   35.25    2.036  0.44( 0.43) 0.97     919.8    1060.00
     13     1301.45   37.44    1.964  0.44( 0.43) 0.97     923.9    3085.00
     14     1159.66   43.68    1.791  0.45( 0.43) 0.97     929.8    3000.00
    TOTAL AREA(ACRES) =       929.8

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     1459.33  Tc(MIN.) =   28.637
  EFFECTIVE AREA(ACRES) =    844.75  AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =      929.8
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   5015.00 =   10625.85 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5015.00 TO NODE   5015.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5015.00 TO NODE   5020.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1915.12  DOWNSTREAM(FEET) =   1907.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   247.47   CHANNEL SLOPE =  0.0328
  CHANNEL FLOW THRU SUBAREA(CFS) =    1459.33
  FLOW VELOCITY(FEET/SEC) =  20.10 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.21   Tc(MIN.) =   28.84
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   5020.00 =   10873.32 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5017.00 TO NODE   5020.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   28.84
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.297
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.22      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        0.78      0.43     1.000    77
  COMMERCIAL                 A        1.05      0.80     0.100    52
  COMMERCIAL                 B        0.26      0.45     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.54
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.490
  SUBAREA AREA(ACRES) =    2.31      SUBAREA RUNOFF(CFS) =    4.22
  EFFECTIVE AREA(ACRES) =    847.06   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =      932.1       PEAK FLOW RATE(CFS) =    1459.33
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5020.00 TO NODE   5035.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1907.00  DOWNSTREAM(FEET) =   1901.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   357.04   CHANNEL SLOPE =  0.0168
  CHANNEL FLOW THRU SUBAREA(CFS) =    1459.33
  FLOW VELOCITY(FEET/SEC) =  14.38 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.41   Tc(MIN.) =   29.26
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   5035.00 =   11230.36 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5030.00 TO NODE   5035.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   29.26
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.277
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.71      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        8.68      0.43     1.000    77
  COMMERCIAL                 A        0.03      0.80     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.46
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.997
  SUBAREA AREA(ACRES) =    9.42      SUBAREA RUNOFF(CFS) =   15.40
  EFFECTIVE AREA(ACRES) =    856.48   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =      941.5       PEAK FLOW RATE(CFS) =    1459.33
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5035.00 TO NODE   5035.00 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     1447.72   24.46    2.535  0.45( 0.43) 0.96     743.7    4000.00
      2     1451.35   24.78    2.516  0.45( 0.43) 0.96     752.6    1195.00
      3     1455.99   26.02    2.443  0.45( 0.43) 0.96     782.4    3240.00
      4     1458.53   26.88    2.396  0.45( 0.43) 0.96     802.9    3095.00
      5     1459.12   28.16    2.330  0.45( 0.43) 0.96     832.2    1170.00
      6     1459.33   29.26    2.277  0.45( 0.43) 0.97     856.5    3165.00
      7     1457.92   29.98    2.244  0.45( 0.43) 0.97     871.8    3010.00
      8     1456.90   30.13    2.237  0.45( 0.43) 0.97     874.4    3195.00
      9     1454.14   30.39    2.226  0.45( 0.43) 0.97     878.3    1135.00
     10     1418.50   33.48    2.100  0.44( 0.43) 0.97     921.1    1000.00
     11     1405.50   34.01    2.081  0.44( 0.43) 0.97     923.9    3020.00
```



```
     12     1359.31   35.88    2.015  0.44( 0.43) 0.97     931.5    1060.00
     13     1301.45   38.09    1.944  0.44( 0.43) 0.97     935.6    3085.00
     14     1159.66   44.34    1.774  0.45( 0.43) 0.97     941.5    3000.00
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   5035.00 =   11230.36 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      596.44   28.54    2.311  0.35( 0.34) 0.98     315.6    2000.00
      2      597.71   29.89    2.248  0.35( 0.34) 0.98     327.1    2175.00
      3      594.35   34.39    2.067  0.34( 0.33) 0.98     361.6    2105.00
      4      576.93   39.79    1.894  0.34( 0.33) 0.98     392.4    2030.00
      5      519.61   46.14    1.733  0.35( 0.34) 0.98     397.7    2195.00
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   5035.00 =   10726.99 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q       Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1     2016.99   24.46    2.535  0.42( 0.41) 0.97    1014.1    4000.00
      2     2022.89   24.78    2.516  0.42( 0.41) 0.97    1026.6    1195.00
      3     2036.07   26.02    2.443  0.42( 0.41) 0.97    1070.1    3240.00
      4     2044.38   26.88    2.396  0.42( 0.41) 0.97    1100.2    3095.00
      5     2053.20   28.16    2.330  0.42( 0.41) 0.97    1143.6    1170.00
      6     2055.64   28.54    2.311  0.42( 0.41) 0.97    1156.2    2000.00
      7     2056.44   29.26    2.277  0.42( 0.41) 0.97    1178.2    3165.00
      8     2055.82   29.89    2.248  0.42( 0.41) 0.97    1196.8    2175.00
      9     2055.55   29.98    2.244  0.42( 0.41) 0.97    1199.6    3010.00
     10     2054.42   30.13    2.237  0.42( 0.41) 0.97    1203.3    3195.00
     11     2051.47   30.39    2.226  0.42( 0.41) 0.97    1209.3    1135.00
     12     2013.53   33.48    2.100  0.41( 0.40) 0.97    1275.8    1000.00
     13     2000.14   34.01    2.081  0.41( 0.40) 0.97    1282.5    3020.00
     14     1990.44   34.39    2.067  0.41( 0.40) 0.97    1287.0    2105.00
     15     1948.84   35.88    2.015  0.41( 0.40) 0.97    1301.6    1060.00
     16     1883.88   38.09    1.944  0.41( 0.40) 0.97    1318.3    3085.00
     17     1839.67   39.79    1.894  0.41( 0.40) 0.97    1329.7    2030.00
     18     1695.51   44.34    1.774  0.42( 0.40) 0.97    1337.7    3000.00
     19     1643.11   46.14    1.733  0.42( 0.40) 0.97    1339.2    2195.00
    TOTAL AREA(ACRES) =      1339.2

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     2056.44  Tc(MIN.) =   29.255
  EFFECTIVE AREA(ACRES) =   1178.18  AREA-AVERAGED Fm(INCH/HR) =  0.41
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =     1339.2
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   5035.00 =   11230.36 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2235.00 TO NODE   5035.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5035.00 TO NODE   5045.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1901.00  DOWNSTREAM(FEET) =   1865.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1632.04   CHANNEL SLOPE =  0.0221
  CHANNEL FLOW THRU SUBAREA(CFS) =    2056.44
  FLOW VELOCITY(FEET/SEC) =  18.46 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.47   Tc(MIN.) =   30.73
```

```
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   5045.00 =   12862.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5040.00 TO NODE   5045.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   30.73
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.211
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        7.84      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       17.54      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.55
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   25.38      SUBAREA RUNOFF(CFS) =   37.96
  EFFECTIVE AREA(ACRES) =   1203.56   AREA-AVERAGED Fm(INCH/HR) =  0.41
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =     1364.6       PEAK FLOW RATE(CFS) =    2056.44
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5045.00 TO NODE   5060.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1865.00  DOWNSTREAM(FEET) =   1812.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2107.09   CHANNEL SLOPE =  0.0252
  CHANNEL FLOW THRU SUBAREA(CFS) =    2056.44
  FLOW VELOCITY(FEET/SEC) =  19.71 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.78   Tc(MIN.) =   32.51
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   5060.00 =   14969.49 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5055.00 TO NODE   5060.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   32.51
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.138
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        7.38      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       16.99      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.55
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   24.37      SUBAREA RUNOFF(CFS) =   34.88
  EFFECTIVE AREA(ACRES) =   1227.93   AREA-AVERAGED Fm(INCH/HR) =  0.41
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =     1388.9       PEAK FLOW RATE(CFS) =    2056.44
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5050.00 TO NODE   5060.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```



```
============================================================================
  MAINLINE Tc(MIN.) =   32.51
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.138
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       12.33      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   12.33      SUBAREA RUNOFF(CFS) =   18.91
  EFFECTIVE AREA(ACRES) =   1240.26   AREA-AVERAGED Fm(INCH/HR) =  0.41
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =     1401.3       PEAK FLOW RATE(CFS) =    2056.44
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5060.00 TO NODE   5075.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1812.00  DOWNSTREAM(FEET) =   1806.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   363.97   CHANNEL SLOPE =  0.0165
  CHANNEL FLOW THRU SUBAREA(CFS) =    2056.44
  FLOW VELOCITY(FEET/SEC) =  15.96 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.38   Tc(MIN.) =   32.89
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   5075.00 =   15333.46 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5065.00 TO NODE   5075.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   32.89
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.123
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        1.44      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        4.53      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.52
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.97      SUBAREA RUNOFF(CFS) =    8.59
  EFFECTIVE AREA(ACRES) =   1246.23   AREA-AVERAGED Fm(INCH/HR) =  0.41
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =     1407.2       PEAK FLOW RATE(CFS) =    2056.44
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5070.00 TO NODE   5075.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   32.89
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.123
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.18      0.81     1.000    51
```

```
NATURAL GOOD COVER
"CHAPARRAL,BROADLEAF"      B       16.53      0.43     1.000    77
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =   16.71      SUBAREA RUNOFF(CFS) =   25.34
EFFECTIVE AREA(ACRES) =   1262.94   AREA-AVERAGED Fm(INCH/HR) =  0.41
AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  0.97
TOTAL AREA(ACRES) =     1423.9       PEAK FLOW RATE(CFS) =    2056.44
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
==========================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =     1423.9  TC(MIN.) =     32.89
EFFECTIVE AREA(ACRES) =   1262.94  AREA-AVERAGED Fm(INCH/HR)=  0.41
AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap = 0.971
PEAK FLOW RATE(CFS)   =    2056.44

** PEAK FLOW RATE TABLE **
```

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	2016.99	28.12	2.332	0.43(0.42)	0.97	1098.9	4000.00
2	2022.89	28.44	2.316	0.43(0.42)	0.97	1111.4	1195.00
3	2036.07	29.66	2.258	0.43(0.42)	0.97	1154.8	3240.00
4	2044.38	30.52	2.220	0.43(0.42)	0.97	1184.9	3095.00
5	2053.20	31.80	2.166	0.43(0.41)	0.97	1228.4	1170.00
6	2055.64	32.18	2.151	0.43(0.41)	0.97	1241.0	2000.00
7	2056.44	32.89	2.123	0.43(0.41)	0.97	1262.9	3165.00
8	2055.82	33.52	2.099	0.43(0.41)	0.97	1281.6	2175.00
9	2055.55	33.62	2.095	0.43(0.41)	0.97	1284.4	3010.00
10	2054.42	33.77	2.090	0.43(0.41)	0.97	1288.1	3195.00
11	2051.47	34.03	2.080	0.43(0.41)	0.97	1294.0	1135.00
12	2013.53	37.14	1.973	0.42(0.41)	0.97	1360.5	1000.00
13	2000.14	37.68	1.957	0.42(0.41)	0.97	1367.3	3020.00
14	1990.44	38.06	1.945	0.42(0.41)	0.97	1371.8	2105.00
15	1948.84	39.59	1.899	0.42(0.41)	0.97	1386.4	1060.00
16	1883.88	41.83	1.838	0.42(0.41)	0.97	1403.1	3085.00
17	1839.67	43.57	1.793	0.42(0.41)	0.97	1414.4	2030.00
18	1695.51	48.22	1.687	0.42(0.41)	0.97	1422.5	3000.00
19	1643.11	50.06	1.650	0.42(0.41)	0.97	1423.9	2195.00

```
==========================================================================
==========================================================================
END OF RATIONAL METHOD 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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             Ver. 14.0  Release Date: 06/01/2007  License ID 1527

                         Analysis prepared by:




 ---------------------------------------------------------------------------
   FILE NAME: EXUH1295.DAT
   TIME/DATE OF STUDY: 08:30 07/24/2008


                        ** INPUT SUMMARY **


 ***************************************************************************
   FLOW PROCESS FROM NODE   1295.00 TO NODE   1295.00 IS CODE =   1
 ---------------------------------------------------------------------------
   >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS) ADDED TO STREAM #1<<<<<
 ===========================================================================
   WATERSHED AREA =     493.600 ACRES; BASEFLOW =   0.000 CFS/SQUARE-MILE
   *USER ENTERED "LAG" TIME =    0.430 HOURS
   VALLEY(UNDEVELOPED)/DESERT S-GRAPH SELECTED
   MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) =  0.260; LOW LOSS FRACTION = 0.160
   SPECIFIED PEAK RAINFALL DEPTHS(INCH):
   5-MINUTE =  0.30; 30-MINUTE =  0.97;  1-HOUR =  1.50
     3-HOUR =  3.10;    6-HOUR =  4.50; 24-HOUR = 12.00
   PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
   5-MINUTE = 0.978; 30-MINUTE = 0.978;  1-HOUR = 0.978
     3-HOUR = 0.997;    6-HOUR = 0.998; 24-HOUR = 0.999
 ===========================================================================


+-----------------------------------------------------------------------------------------
--------------------------------+
 |                                      * AES FLOODSCx PROGRAM RESULTS SUMMARY *
                                |
 |INPUT FILENAME: [EXUH1295.DAT  ]
                Page:   1 of    |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |UPSTREAM  DOWNSTREAM|                               | UPSTREAM   DOWNSTREAM|
TIME(2) TO | MAX. STORAGE|           |
 | NODE #     NODE #  | HYDROLOGIC/HYDRAULIC PROCESS   |PEAK (CFS)  PEAK (CFS)| PEAK
(HR)  | MODELED (AF)| FOOTNOTES |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |  1295.00    1295.00| Subarea (UH) Added to Stream #1|       0.0       701.1|
16.417 |             |           |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |Notes: 1 = BASIN MODEL VOLUME EXCEEDED; 2 = TIME IS AT END OF 5-MINUTE UNIT
```



```
INTERVAL                                |
 |       3 = RUNOFF ESTIMATES DO NOT EXTEND PAST 2 DAYS AFTER THE PEAK DAY OF THE
DESIGN STORM                          |

+-----------------------------------------------------------------------------------
-------------------------------+

   END OF FLOODSCx ROUTING ANALYSIS
```

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

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                         Analysis prepared by:




 ---------------------------------------------------------------------------
   FILE NAME: EXUH2245.DAT
   TIME/DATE OF STUDY: 08:32 07/24/2008


                        ** INPUT SUMMARY **


 ***************************************************************************
   FLOW PROCESS FROM NODE   2245.00 TO NODE   2245.00 IS CODE =   1
 ---------------------------------------------------------------------------
   >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS) ADDED TO STREAM #1<<<<<
 ===========================================================================
   WATERSHED AREA =     385.700 ACRES; BASEFLOW =   0.000 CFS/SQUARE-MILE
   *USER ENTERED "LAG" TIME =    0.360 HOURS
   VALLEY(UNDEVELOPED)/DESERT S-GRAPH SELECTED
   MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) =  0.240; LOW LOSS FRACTION = 0.150
   SPECIFIED PEAK RAINFALL DEPTHS(INCH):
   5-MINUTE =  0.30; 30-MINUTE =  0.97;  1-HOUR =  1.50
     3-HOUR =  3.10;    6-HOUR =  4.50; 24-HOUR = 12.00
   PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
   5-MINUTE = 0.983; 30-MINUTE = 0.983;  1-HOUR = 0.983
     3-HOUR = 0.997;    6-HOUR = 0.999; 24-HOUR = 0.999
 ===========================================================================


+-----------------------------------------------------------------------------------------
--------------------------------+
 |                                      * AES FLOODSCx PROGRAM RESULTS SUMMARY *
                                |
 |INPUT FILENAME: [EXUH2245.DAT  ]
                Page:   1 of    |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |UPSTREAM  DOWNSTREAM|                               | UPSTREAM   DOWNSTREAM|
TIME(2) TO | MAX. STORAGE|           |
 | NODE #     NODE #  | HYDROLOGIC/HYDRAULIC PROCESS   |PEAK (CFS)  PEAK (CFS)| PEAK
(HR)  | MODELED (AF)| FOOTNOTES |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |  2245.00    2245.00| Subarea (UH) Added to Stream #1|       0.0       593.2|
16.333 |             |           |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |Notes: 1 = BASIN MODEL VOLUME EXCEEDED; 2 = TIME IS AT END OF 5-MINUTE UNIT
```



```
INTERVAL                                |
 |       3 = RUNOFF ESTIMATES DO NOT EXTEND PAST 2 DAYS AFTER THE PEAK DAY OF THE
DESIGN STORM                            |

+-----------------------------------------------------------------------------------
-------------------------------+

   END OF FLOODSCx ROUTING ANALYSIS
```

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

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                         Analysis prepared by:



 ---------------------------------------------------------------------------
   FILE NAME: EXUH2255.DAT
   TIME/DATE OF STUDY: 08:33 07/24/2008


                        ** INPUT SUMMARY **


 ***************************************************************************
   FLOW PROCESS FROM NODE   2255.00 TO NODE   2255.00 IS CODE =   1
 ---------------------------------------------------------------------------
   >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS) ADDED TO STREAM #1<<<<<
 ===========================================================================
   WATERSHED AREA =     393.400 ACRES; BASEFLOW =   0.000 CFS/SQUARE-MILE
   *USER ENTERED "LAG" TIME =    0.390 HOURS
   VALLEY(UNDEVELOPED)/DESERT S-GRAPH SELECTED
   MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) =  0.250; LOW LOSS FRACTION = 0.150
   SPECIFIED PEAK RAINFALL DEPTHS(INCH):
   5-MINUTE =  0.30; 30-MINUTE =  0.97;  1-HOUR =  1.50
     3-HOUR =  3.10;    6-HOUR =  4.50; 24-HOUR = 12.00
   PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
   5-MINUTE = 0.982; 30-MINUTE = 0.982;  1-HOUR = 0.982
     3-HOUR = 0.997;    6-HOUR = 0.999; 24-HOUR = 0.999
 ===========================================================================


+-----------------------------------------------------------------------------------------
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 |                                      * AES FLOODSCx PROGRAM RESULTS SUMMARY *
                                |
 |INPUT FILENAME: [EXUH2255.DAT  ]
                Page:   1 of    |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |UPSTREAM  DOWNSTREAM|                               | UPSTREAM   DOWNSTREAM|
TIME(2) TO | MAX. STORAGE|           |
 | NODE #     NODE #  | HYDROLOGIC/HYDRAULIC PROCESS   |PEAK (CFS)  PEAK (CFS)| PEAK
(HR)  | MODELED (AF)| FOOTNOTES |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |  2255.00    2255.00| Subarea (UH) Added to Stream #1|       0.0       583.6|
16.333 |             |           |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |Notes: 1 = BASIN MODEL VOLUME EXCEEDED; 2 = TIME IS AT END OF 5-MINUTE UNIT
```



```
INTERVAL                                |
 |       3 = RUNOFF ESTIMATES DO NOT EXTEND PAST 2 DAYS AFTER THE PEAK DAY OF THE
DESIGN STORM                          |

+-----------------------------------------------------------------------------------
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   END OF FLOODSCx ROUTING ANALYSIS
```

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

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                         Analysis prepared by:




 ---------------------------------------------------------------------------
   FILE NAME: EXUH3070.DAT
   TIME/DATE OF STUDY: 08:34 07/24/2008


                        ** INPUT SUMMARY **


 ***************************************************************************
   FLOW PROCESS FROM NODE   3070.00 TO NODE   3070.00 IS CODE =   1
 ---------------------------------------------------------------------------
   >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS) ADDED TO STREAM #1<<<<<
 ===========================================================================
   WATERSHED AREA =      68.600 ACRES; BASEFLOW =   0.000 CFS/SQUARE-MILE
   *USER ENTERED "LAG" TIME =    0.300 HOURS
   VALLEY(UNDEVELOPED)/DESERT S-GRAPH SELECTED
   MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) =  0.260; LOW LOSS FRACTION = 0.150
   SPECIFIED PEAK RAINFALL DEPTHS(INCH):
   5-MINUTE =  0.30; 30-MINUTE =  0.97;  1-HOUR =  1.50
     3-HOUR =  3.10;    6-HOUR =  4.50; 24-HOUR = 12.00
   PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
   5-MINUTE = 0.997; 30-MINUTE = 0.997;  1-HOUR = 0.997
     3-HOUR = 1.000;    6-HOUR = 1.000; 24-HOUR = 1.000
 ===========================================================================


+-----------------------------------------------------------------------------------------
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 |                                      * AES FLOODSCx PROGRAM RESULTS SUMMARY *
                                |
 |INPUT FILENAME: [EXUH3070.DAT  ]
                Page:   1 of    |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |UPSTREAM  DOWNSTREAM|                               | UPSTREAM   DOWNSTREAM|
TIME(2) TO | MAX. STORAGE|           |
 | NODE #     NODE #  | HYDROLOGIC/HYDRAULIC PROCESS   |PEAK (CFS)  PEAK (CFS)| PEAK
(HR)  | MODELED (AF)| FOOTNOTES |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |  3070.00    3070.00| Subarea (UH) Added to Stream #1|       0.0       112.4|
16.333 |             |           |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |Notes: 1 = BASIN MODEL VOLUME EXCEEDED; 2 = TIME IS AT END OF 5-MINUTE UNIT
```



```
INTERVAL                                |
 |       3 = RUNOFF ESTIMATES DO NOT EXTEND PAST 2 DAYS AFTER THE PEAK DAY OF THE
DESIGN STORM                          |

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   END OF FLOODSCx ROUTING ANALYSIS
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                          Analysis prepared by:



 ---------------------------------------------------------------------------
   FILE NAME: EXUH4050.DAT
   TIME/DATE OF STUDY: 08:44 07/24/2008


                         ** INPUT SUMMARY **


 ***************************************************************************
   FLOW PROCESS FROM NODE   4050.00 TO NODE   4050.00 IS CODE =   1
 ---------------------------------------------------------------------------
   >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS) ADDED TO STREAM #1<<<<<
 ===========================================================================
   WATERSHED AREA =      51.700 ACRES; BASEFLOW =   0.000 CFS/SQUARE-MILE
   *USER ENTERED "LAG" TIME =    0.290 HOURS
   "S"-CURVE PERCENTAGE(DECIMAL NOTATION):
   VALLEY(DEVELOPED) =  0.200; FOOTHILL =  0.000; MOUNTAIN =  0.000
   VALLEY(UNDEVELOPED)/DESERT = 0.800; DESERT(UNDEVELOPED) =  0.000
   MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) =  0.200; LOW LOSS FRACTION = 0.110
   SPECIFIED PEAK RAINFALL DEPTHS(INCH):
   5-MINUTE =  0.30; 30-MINUTE =  0.97;  1-HOUR =  1.50
     3-HOUR =  3.10;    6-HOUR =  4.50; 24-HOUR = 12.00
   PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
   5-MINUTE = 0.998; 30-MINUTE = 0.998;  1-HOUR = 0.998
     3-HOUR = 1.000;    6-HOUR = 1.000; 24-HOUR = 1.000
 ===========================================================================


+-----------------------------------------------------------------------------------------
--------------------------------+
 |                                  * AES FLOODSCx PROGRAM RESULTS SUMMARY *
                                |
 |INPUT FILENAME: [EXUH4050.DAT   ]
                Page:   1 of    |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |UPSTREAM  DOWNSTREAM|                               | UPSTREAM   DOWNSTREAM|
TIME(2) TO | MAX. STORAGE|            |
 | NODE #     NODE #  | HYDROLOGIC/HYDRAULIC PROCESS   |PEAK (CFS)  PEAK (CFS)| PEAK
(HR)  | MODELED (AF)| FOOTNOTES |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |  4050.00    4050.00| Subarea (UH) Added to Stream #1|       0.0        90.1|
16.333 |             |           |

+--------------------+-------------------------------+----------------------+------
```



```
------+-------------+-----------+
 |Notes: 1 = BASIN MODEL VOLUME EXCEEDED; 2 = TIME IS AT END OF 5-MINUTE UNIT
INTERVAL                                |
 |       3 = RUNOFF ESTIMATES DO NOT EXTEND PAST 2 DAYS AFTER THE PEAK DAY OF THE
DESIGN STORM                        |

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--------------------------------+

   END OF FLOODSCx ROUTING ANALYSIS
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                         Analysis prepared by:




 ---------------------------------------------------------------------------
   FILE NAME: EXUH5020.DAT
   TIME/DATE OF STUDY: 09:17 07/24/2008


                        ** INPUT SUMMARY **


 ***************************************************************************
   FLOW PROCESS FROM NODE   5020.00 TO NODE   5020.00 IS CODE =   1
 ---------------------------------------------------------------------------
   >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS) ADDED TO STREAM #1<<<<<
 ===========================================================================
   WATERSHED AREA =     932.100 ACRES; BASEFLOW =   0.000 CFS/SQUARE-MILE
   *USER ENTERED "LAG" TIME =    0.380 HOURS
   VALLEY(UNDEVELOPED)/DESERT S-GRAPH SELECTED
   MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) =  0.310; LOW LOSS FRACTION = 0.190
   SPECIFIED PEAK RAINFALL DEPTHS(INCH):
   5-MINUTE =  0.30; 30-MINUTE =  0.97;  1-HOUR =  1.50
     3-HOUR =  3.10;    6-HOUR =  4.50; 24-HOUR = 12.00
   PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
   5-MINUTE = 0.958; 30-MINUTE = 0.958;  1-HOUR = 0.958
     3-HOUR = 0.994;    6-HOUR = 0.997; 24-HOUR = 0.998
 ===========================================================================


+-----------------------------------------------------------------------------------------
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 |                                      * AES FLOODSCx PROGRAM RESULTS SUMMARY *
                                |
 |INPUT FILENAME: [EXUH5020.DAT  ]
                Page:   1 of    |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |UPSTREAM  DOWNSTREAM|                               | UPSTREAM   DOWNSTREAM|
TIME(2) TO | MAX. STORAGE|           |
 | NODE #     NODE #  | HYDROLOGIC/HYDRAULIC PROCESS   |PEAK (CFS)  PEAK (CFS)| PEAK
(HR)  | MODELED (AF)| FOOTNOTES |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |  5020.00    5020.00| Subarea (UH) Added to Stream #1|       0.0      1317.5|
16.333 |             |           |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |Notes: 1 = BASIN MODEL VOLUME EXCEEDED; 2 = TIME IS AT END OF 5-MINUTE UNIT
```



```
INTERVAL                                |
 |       3 = RUNOFF ESTIMATES DO NOT EXTEND PAST 2 DAYS AFTER THE PEAK DAY OF THE
DESIGN STORM                            |

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   END OF FLOODSCx ROUTING ANALYSIS
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                         Analysis prepared by:




 ---------------------------------------------------------------------------
   FILE NAME: EXUH5035.DAT
   TIME/DATE OF STUDY: 08:46 07/24/2008


                        ** INPUT SUMMARY **


 ***************************************************************************
   FLOW PROCESS FROM NODE   5035.00 TO NODE   5035.00 IS CODE =   1
 ---------------------------------------------------------------------------
   >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS) ADDED TO STREAM #1<<<<<
 ===========================================================================
   WATERSHED AREA =    1339.200 ACRES; BASEFLOW =   0.000 CFS/SQUARE-MILE
   *USER ENTERED "LAG" TIME =    0.390 HOURS
   VALLEY(UNDEVELOPED)/DESERT S-GRAPH SELECTED
   MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) =  0.290; LOW LOSS FRACTION = 0.180
   SPECIFIED PEAK RAINFALL DEPTHS(INCH):
   5-MINUTE =  0.30; 30-MINUTE =  0.97;  1-HOUR =  1.50
     3-HOUR =  3.10;    6-HOUR =  4.50; 24-HOUR = 12.00
   PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
   5-MINUTE = 0.940; 30-MINUTE = 0.940;  1-HOUR = 0.940
     3-HOUR = 0.991;    6-HOUR = 0.996; 24-HOUR = 0.997
 ===========================================================================


+-----------------------------------------------------------------------------------------
--------------------------------+
 |                                      * AES FLOODSCx PROGRAM RESULTS SUMMARY *
                                |
 |INPUT FILENAME: [EXUH5035.DAT  ]
                Page:   1 of    |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |UPSTREAM  DOWNSTREAM|                               | UPSTREAM   DOWNSTREAM|
TIME(2) TO | MAX. STORAGE|           |
 | NODE #     NODE #  | HYDROLOGIC/HYDRAULIC PROCESS   |PEAK (CFS)  PEAK (CFS)| PEAK
(HR)  | MODELED (AF)| FOOTNOTES |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |  5035.00    5035.00| Subarea (UH) Added to Stream #1|       0.0      1856.9|
16.333 |             |           |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |Notes: 1 = BASIN MODEL VOLUME EXCEEDED; 2 = TIME IS AT END OF 5-MINUTE UNIT
```



```
INTERVAL                                |
 |       3 = RUNOFF ESTIMATES DO NOT EXTEND PAST 2 DAYS AFTER THE PEAK DAY OF THE
DESIGN STORM                            |

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   END OF FLOODSCx ROUTING ANALYSIS
```

```
****************************************************************************
              RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
          (c) Copyright 1983-2007 Advanced Engineering Software (aes)
              Ver. 13.5  Release Date: 02/06/2007  License ID 1527

                          Analysis prepared by:



----------------------------------------------------------------------------
  FILE NAME: PR_LYTLE.DAT
  TIME/DATE OF STUDY: 07:27 07/24/2008
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

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

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.4800

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 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   1005.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   934.98
  ELEVATION DATA: UPSTREAM(FEET) =   2585.59  DOWNSTREAM(FEET) =   2470.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   21.913
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.708
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
```



```
  "CHAPARRAL,BROADLEAF"      C        6.00      0.24     1.000    88   21.91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     13.35
  TOTAL AREA(ACRES) =      6.00   PEAK FLOW RATE(CFS) =     13.35

****************************************************************************
  FLOW PROCESS FROM NODE   1005.00 TO NODE   1015.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2470.00  DOWNSTREAM(FEET) =   2330.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   414.29   CHANNEL SLOPE =  0.3379
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      13.35
  FLOW VELOCITY(FEET/SEC) =   8.51 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.81   Tc(MIN.) =   22.72
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1015.00 =    1349.27 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1010.00 TO NODE   1015.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   22.72
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.650
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        7.47      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    7.47      SUBAREA RUNOFF(CFS) =   16.23
  EFFECTIVE AREA(ACRES) =     13.47   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       13.5       PEAK FLOW RATE(CFS) =      29.27

****************************************************************************
  FLOW PROCESS FROM NODE   1015.00 TO NODE   1025.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2330.00  DOWNSTREAM(FEET) =   2320.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   218.94   CHANNEL SLOPE =  0.0457
  CHANNEL FLOW THRU SUBAREA(CFS) =      29.27
  FLOW VELOCITY(FEET/SEC) =   7.11 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.51   Tc(MIN.) =   23.24
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1025.00 =    1568.21 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1020.00 TO NODE   1025.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   23.24
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.615
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
```

```
  "CHAPARRAL,BROADLEAF"      C       15.17      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   15.17      SUBAREA RUNOFF(CFS) =   32.48
  EFFECTIVE AREA(ACRES) =     28.64   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       28.6       PEAK FLOW RATE(CFS) =      61.32

****************************************************************************
  FLOW PROCESS FROM NODE   1025.00 TO NODE   1035.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2320.00  DOWNSTREAM(FEET) =   2270.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   910.57   CHANNEL SLOPE =  0.0549
  CHANNEL FLOW THRU SUBAREA(CFS) =      61.32
  FLOW VELOCITY(FEET/SEC) =   9.62 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.58   Tc(MIN.) =   24.81
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1035.00 =    2478.78 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1030.00 TO NODE   1035.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   24.81
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.514
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.32      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       28.01      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   28.33      SUBAREA RUNOFF(CFS) =   57.91
  EFFECTIVE AREA(ACRES) =     56.97   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       57.0       PEAK FLOW RATE(CFS) =     116.62

****************************************************************************
  FLOW PROCESS FROM NODE   1035.00 TO NODE   1045.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2270.00  DOWNSTREAM(FEET) =   2258.84
  CHANNEL LENGTH THRU SUBAREA(FEET) =    88.58   CHANNEL SLOPE =  0.1260
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =     116.62
  FLOW VELOCITY(FEET/SEC) =  15.72 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.09   Tc(MIN.) =   24.91
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1045.00 =    2567.36 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1040.00 TO NODE   1045.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   24.91
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.508
```



```
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.36      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       24.84      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   25.20      SUBAREA RUNOFF(CFS) =   51.35
  EFFECTIVE AREA(ACRES) =     82.17   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       82.2       PEAK FLOW RATE(CFS) =     167.68

****************************************************************************
  FLOW PROCESS FROM NODE   1045.00 TO NODE   1055.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2258.84  DOWNSTREAM(FEET) =   2185.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   996.38   CHANNEL SLOPE =  0.0737
  CHANNEL FLOW THRU SUBAREA(CFS) =     167.68
  FLOW VELOCITY(FEET/SEC) =  15.08 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.10   Tc(MIN.) =   26.01
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1055.00 =    3563.74 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1050.00 TO NODE   1055.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   26.01
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.444
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        7.96      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       30.56      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.35
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   38.52      SUBAREA RUNOFF(CFS) =   72.44
  EFFECTIVE AREA(ACRES) =    120.69   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      120.7       PEAK FLOW RATE(CFS) =     235.37

****************************************************************************
  FLOW PROCESS FROM NODE   1055.00 TO NODE   1100.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2185.40  DOWNSTREAM(FEET) =   2170.32
  CHANNEL LENGTH THRU SUBAREA(FEET) =   343.70   CHANNEL SLOPE =  0.0439
  CHANNEL FLOW THRU SUBAREA(CFS) =     235.37
  FLOW VELOCITY(FEET/SEC) =  12.92 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.44   Tc(MIN.) =   26.45
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1100.00 =    3907.44 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1090.00 TO NODE   1100.00 IS CODE =  81
```

```
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   26.45
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.419
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        3.36      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       38.76      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   42.12      SUBAREA RUNOFF(CFS) =   81.03
  EFFECTIVE AREA(ACRES) =    162.81   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      162.8       PEAK FLOW RATE(CFS) =     313.72

****************************************************************************
  FLOW PROCESS FROM NODE   1000.00 TO NODE   1100.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1060.00 TO NODE   1065.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1641.29
  ELEVATION DATA: UPSTREAM(FEET) =   3088.01  DOWNSTREAM(FEET) =   2760.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   24.931
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.507
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        8.24      0.24     1.000    88   24.93
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     16.84
  TOTAL AREA(ACRES) =      8.24   PEAK FLOW RATE(CFS) =     16.84

****************************************************************************
  FLOW PROCESS FROM NODE   1065.00 TO NODE   1075.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2760.00  DOWNSTREAM(FEET) =   2481.73
  CHANNEL LENGTH THRU SUBAREA(FEET) =   694.41   CHANNEL SLOPE =  0.4007
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      16.84
  FLOW VELOCITY(FEET/SEC) =   9.05 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.28   Tc(MIN.) =   26.21
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1075.00 =    2335.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1070.00 TO NODE   1075.00 IS CODE =  81
```



```
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   26.21
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.433
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        9.99      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    9.99      SUBAREA RUNOFF(CFS) =   19.75
  EFFECTIVE AREA(ACRES) =     18.23   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       18.2       PEAK FLOW RATE(CFS) =      36.04

****************************************************************************
  FLOW PROCESS FROM NODE   1075.00 TO NODE   1085.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2481.73  DOWNSTREAM(FEET) =   2370.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   468.39   CHANNEL SLOPE =  0.2385
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      36.04
  FLOW VELOCITY(FEET/SEC) =  11.15 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.70   Tc(MIN.) =   26.91
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1085.00 =    2804.09 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1080.00 TO NODE   1085.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   26.91
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.394
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       17.55      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   17.55      SUBAREA RUNOFF(CFS) =   34.09
  EFFECTIVE AREA(ACRES) =     35.78   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       35.8       PEAK FLOW RATE(CFS) =      69.51

****************************************************************************
  FLOW PROCESS FROM NODE   1085.00 TO NODE   1100.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2370.00  DOWNSTREAM(FEET) =   2170.32
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1501.84   CHANNEL SLOPE =  0.1330
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      69.51
  FLOW VELOCITY(FEET/SEC) =  13.47 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.86   Tc(MIN.) =   28.77
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1100.00 =    4305.93 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1095.00 TO NODE   1100.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   28.77
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.300
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       28.84      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   28.84      SUBAREA RUNOFF(CFS) =   53.58
  EFFECTIVE AREA(ACRES) =     64.62   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       64.6       PEAK FLOW RATE(CFS) =     120.06

****************************************************************************
  FLOW PROCESS FROM NODE   1100.00 TO NODE   1100.00 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      120.06   28.77    2.300  0.24( 0.24) 1.00      64.6    1060.00
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1100.00 =    4305.93 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      313.72   26.45    2.419  0.28( 0.28) 1.00     162.8    1000.00
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1100.00 =    3907.44 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      430.47   26.45    2.419  0.27( 0.27) 1.00     222.2    1000.00
      2      416.38   28.77    2.300  0.27( 0.27) 1.00     227.4    1060.00
    TOTAL AREA(ACRES) =       227.4

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      430.47  Tc(MIN.) =   26.453
  EFFECTIVE AREA(ACRES) =    222.23  AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      227.4
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1100.00 =    4305.93 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1100.00 TO NODE   1100.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1100.00 TO NODE   1110.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
```



```
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2170.32  DOWNSTREAM(FEET) =   2152.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   532.23   CHANNEL SLOPE =  0.0344
  CHANNEL FLOW THRU SUBAREA(CFS) =     430.47
  FLOW VELOCITY(FEET/SEC) =  13.85 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.64   Tc(MIN.) =   27.09
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1110.00 =    4838.16 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1105.00 TO NODE   1110.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.09
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.385
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        3.93      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       26.86      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.31
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   30.79      SUBAREA RUNOFF(CFS) =   57.52
  EFFECTIVE AREA(ACRES) =    253.02   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      258.2       PEAK FLOW RATE(CFS) =     481.09

****************************************************************************
  FLOW PROCESS FROM NODE   1110.00 TO NODE   1132.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2152.00  DOWNSTREAM(FEET) =   2120.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   833.20   CHANNEL SLOPE =  0.0378
  CHANNEL FLOW THRU SUBAREA(CFS) =     481.09
  FLOW VELOCITY(FEET/SEC) =  15.04 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.92   Tc(MIN.) =   28.02
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1132.00 =    5671.36 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1115.00 TO NODE   1132.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   28.02
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.337
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.64      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       39.10      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   39.74      SUBAREA RUNOFF(CFS) =   74.82
  EFFECTIVE AREA(ACRES) =    292.76   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      298.0       PEAK FLOW RATE(CFS) =     545.10
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1100.00 TO NODE   1132.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1125.00 TO NODE   1127.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1089.80
  ELEVATION DATA: UPSTREAM(FEET) =   2530.00  DOWNSTREAM(FEET) =   2155.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   18.985
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.952
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap     SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       11.08      0.24     1.000    88   18.99
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     27.08
  TOTAL AREA(ACRES) =     11.08   PEAK FLOW RATE(CFS) =     27.08

****************************************************************************
  FLOW PROCESS FROM NODE   1127.00 TO NODE   1132.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2155.00  DOWNSTREAM(FEET) =   2120.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   310.80   CHANNEL SLOPE =  0.1110
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      27.08
  FLOW VELOCITY(FEET/SEC.) =  12.50   FLOW DEPTH(FEET) =   0.25
  TRAVEL TIME(MIN.) =   0.41   Tc(MIN.) =   19.40
  LONGEST FLOWPATH FROM NODE   1125.00 TO NODE   1132.00 =    1400.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1132.00 TO NODE   1132.00 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       27.08   19.40    2.914  0.24( 0.24) 1.00      11.1    1125.00
  LONGEST FLOWPATH FROM NODE   1125.00 TO NODE   1132.00 =    1400.60 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      545.10   28.02    2.337  0.27( 0.27) 1.00     292.8    1000.00
      2      525.58   30.35    2.228  0.27( 0.27) 1.00     298.0    1060.00
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1132.00 =    5671.36 FEET.

  ** PEAK FLOW RATE TABLE **
```



```
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      509.73   19.40    2.914  0.27( 0.27) 1.00     213.8    1125.00
      2      566.35   28.02    2.337  0.27( 0.27) 1.00     303.8    1000.00
      3      545.72   30.35    2.228  0.27( 0.27) 1.00     309.0    1060.00
    TOTAL AREA(ACRES) =       309.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      566.35  Tc(MIN.) =   28.017
  EFFECTIVE AREA(ACRES) =    303.84  AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      309.0
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1132.00 =    5671.36 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1100.00 TO NODE   1132.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1132.00 TO NODE   1142.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2120.50  DOWNSTREAM(FEET) =   2116.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   140.50   CHANNEL SLOPE =  0.0263
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     566.35
  FLOW VELOCITY(FEET/SEC.) =  21.16   FLOW DEPTH(FEET) =   2.17
  TRAVEL TIME(MIN.) =   0.11   Tc(MIN.) =   28.13
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1142.00 =    5811.86 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1160.00 TO NODE   1142.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   28.13
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.332
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        1.94      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        2.74      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.47
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.68      SUBAREA RUNOFF(CFS) =    7.83
  EFFECTIVE AREA(ACRES) =    308.52   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      313.7       PEAK FLOW RATE(CFS) =     572.37

****************************************************************************
  FLOW PROCESS FROM NODE   1142.00 TO NODE   1150.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2116.80  DOWNSTREAM(FEET) =   2111.90
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   318.90   CHANNEL SLOPE =  0.0154
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     572.37
  FLOW VELOCITY(FEET/SEC.) =  17.49   FLOW DEPTH(FEET) =   2.51
  TRAVEL TIME(MIN.) =   0.30   Tc(MIN.) =   28.43
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1150.00 =    6130.76 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1132.00 TO NODE   1150.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1135.00 TO NODE   1140.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1273.60
  ELEVATION DATA: UPSTREAM(FEET) =   2459.80  DOWNSTREAM(FEET) =   2146.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   21.602
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.732
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        4.78      0.81     1.000    51   21.60
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        1.10      0.24     1.000    88   21.60
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.70
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     10.75
  TOTAL AREA(ACRES) =      5.88   PEAK FLOW RATE(CFS) =     10.75

****************************************************************************
  FLOW PROCESS FROM NODE   1140.00 TO NODE   1150.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2146.00  DOWNSTREAM(FEET) =   2111.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   712.20   CHANNEL SLOPE =  0.0479
  CHANNEL FLOW THRU SUBAREA(CFS) =      10.75
  FLOW VELOCITY(FEET/SEC) =   5.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.13   Tc(MIN.) =   23.73
  LONGEST FLOWPATH FROM NODE   1135.00 TO NODE   1150.00 =    1985.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1145.00 TO NODE   1150.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   23.73
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.582
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        6.54      0.81     1.000    51
```



```
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        5.53      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.55
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   12.07      SUBAREA RUNOFF(CFS) =   22.12
  EFFECTIVE AREA(ACRES) =     17.95   AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       18.0       PEAK FLOW RATE(CFS) =      32.07

****************************************************************************
  FLOW PROCESS FROM NODE   1150.00 TO NODE   1150.00 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       32.07   23.73    2.582  0.60( 0.60) 1.00      18.0    1135.00
  LONGEST FLOWPATH FROM NODE   1135.00 TO NODE   1150.00 =    1985.80 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      517.63   19.83    2.876  0.27( 0.27) 1.00     218.5    1125.00
      2      572.37   28.43    2.317  0.27( 0.27) 1.00     308.5    1000.00
      3      551.44   30.77    2.209  0.27( 0.27) 1.00     313.7    1060.00
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1150.00 =    6130.76 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      548.39   19.83    2.876  0.29( 0.29) 1.00     233.5    1125.00
      2      574.55   23.73    2.582  0.29( 0.29) 1.00     277.3    1135.00
      3      600.16   28.43    2.317  0.29( 0.29) 1.00     326.5    1000.00
      4      577.50   30.77    2.209  0.29( 0.29) 1.00     331.7    1060.00
    TOTAL AREA(ACRES) =       331.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      600.16  Tc(MIN.) =   28.432
  EFFECTIVE AREA(ACRES) =    326.47  AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      331.7
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1150.00 =    6130.76 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1132.00 TO NODE   1150.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1150.00 TO NODE   1127.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2111.90  DOWNSTREAM(FEET) =   2087.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   736.70   CHANNEL SLOPE =  0.0338
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     600.16
  FLOW VELOCITY(FEET/SEC.) =  23.53   FLOW DEPTH(FEET) =   2.09
```

```
  TRAVEL TIME(MIN.) =   0.52   Tc(MIN.) =   28.95
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1127.00 =    6867.46 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1155.00 TO NODE   1227.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   28.95
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.292
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        5.47      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        5.12      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.53
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   10.59      SUBAREA RUNOFF(CFS) =   16.78
  EFFECTIVE AREA(ACRES) =    337.06   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      342.3       PEAK FLOW RATE(CFS) =     605.38

****************************************************************************
  FLOW PROCESS FROM NODE   1227.00 TO NODE   1230.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2087.00  DOWNSTREAM(FEET) =   2052.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   491.50   CHANNEL SLOPE =  0.0712
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     605.38
  FLOW VELOCITY(FEET/SEC.) =  30.73   FLOW DEPTH(FEET) =   1.72
  TRAVEL TIME(MIN.) =   0.27   Tc(MIN.) =   29.22
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1230.00 =    7358.96 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1150.00 TO NODE   1230.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1195.00 TO NODE   1200.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   901.83
  ELEVATION DATA: UPSTREAM(FEET) =   2570.00  DOWNSTREAM(FEET) =   2274.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.770
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.071
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        8.51      0.24     1.000    88   17.77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
```



```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     21.72
  TOTAL AREA(ACRES) =      8.51   PEAK FLOW RATE(CFS) =     21.72

****************************************************************************
  FLOW PROCESS FROM NODE   1200.00 TO NODE   1210.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2274.20  DOWNSTREAM(FEET) =   2199.46
  CHANNEL LENGTH THRU SUBAREA(FEET) =   475.41   CHANNEL SLOPE =  0.1572
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      21.72
  FLOW VELOCITY(FEET/SEC) =   9.69 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.82   Tc(MIN.) =   18.59
  LONGEST FLOWPATH FROM NODE   1195.00 TO NODE   1210.00 =    1377.24 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1205.00 TO NODE   1210.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.59
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.990
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        5.31      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.31      SUBAREA RUNOFF(CFS) =   13.16
  EFFECTIVE AREA(ACRES) =     13.82   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       13.8       PEAK FLOW RATE(CFS) =      34.25

****************************************************************************
  FLOW PROCESS FROM NODE   1210.00 TO NODE   1220.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2199.46  DOWNSTREAM(FEET) =   2134.89
  CHANNEL LENGTH THRU SUBAREA(FEET) =   707.16   CHANNEL SLOPE =  0.0913
  CHANNEL FLOW THRU SUBAREA(CFS) =      34.25
  FLOW VELOCITY(FEET/SEC) =  10.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.12   Tc(MIN.) =   19.71
  LONGEST FLOWPATH FROM NODE   1195.00 TO NODE   1220.00 =    2084.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1215.00 TO NODE   1220.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.71
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.886
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        1.89      0.81     1.000    51
  NATURAL GOOD COVER
```

```
  "CHAPARRAL,BROADLEAF"      C        9.85      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   11.74      SUBAREA RUNOFF(CFS) =   27.03
  EFFECTIVE AREA(ACRES) =     25.56   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       25.6       PEAK FLOW RATE(CFS) =      59.99

****************************************************************************
  FLOW PROCESS FROM NODE   1220.00 TO NODE   1230.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2134.89  DOWNSTREAM(FEET) =   2052.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   926.61   CHANNEL SLOPE =  0.0895
  CHANNEL FLOW THRU SUBAREA(CFS) =      59.99
  FLOW VELOCITY(FEET/SEC) =  12.20 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.27   Tc(MIN.) =   20.98
  LONGEST FLOWPATH FROM NODE   1195.00 TO NODE   1230.00 =    3011.01 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1225.00 TO NODE   1230.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.98
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.781
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        2.50      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        1.56      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.59
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.06      SUBAREA RUNOFF(CFS) =    8.01
  EFFECTIVE AREA(ACRES) =     29.62   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.32  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       29.6       PEAK FLOW RATE(CFS) =      65.57

****************************************************************************
  FLOW PROCESS FROM NODE   1230.00 TO NODE   1230.00 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      65.57   20.98    2.781  0.32( 0.32) 1.00      29.6    1195.00
  LONGEST FLOWPATH FROM NODE   1195.00 TO NODE   1230.00 =    3011.01 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      555.30   20.63    2.808  0.30( 0.30) 1.00     244.1    1125.00
      2      582.32   24.53    2.531  0.30( 0.30) 1.00     287.9    1135.00
      3      605.38   29.22    2.279  0.30( 0.30) 1.00     337.1    1000.00
      4      582.83   31.56    2.176  0.29( 0.29) 1.00     342.3    1060.00
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1230.00 =    7358.96 FEET.
```



```
  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      620.53   20.63    2.808  0.30( 0.30) 1.00     273.2    1125.00
      2      623.24   20.98    2.781  0.30( 0.30) 1.00     277.5    1195.00
      3      641.24   24.53    2.531  0.30( 0.30) 1.00     317.5    1135.00
      4      657.59   29.22    2.279  0.30( 0.30) 1.00     366.7    1000.00
      5      632.28   31.56    2.176  0.30( 0.30) 1.00     371.9    1060.00
    TOTAL AREA(ACRES) =       371.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      657.59  Tc(MIN.) =   29.220
  EFFECTIVE AREA(ACRES) =    366.68  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       371.9
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1230.00 =    7358.96 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1150.00 TO NODE   1230.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1230.00 TO NODE   1237.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2052.00  DOWNSTREAM(FEET) =   2050.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   385.30   CHANNEL SLOPE =  0.0052
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     657.59
  FLOW VELOCITY(FEET/SEC.) =  12.25   FLOW DEPTH(FEET) =   3.55
  TRAVEL TIME(MIN.) =   0.52   Tc(MIN.) =   29.74
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1237.00 =    7744.26 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1235.00 TO NODE   1237.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   29.74
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.255
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.80      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       18.34      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   19.14      SUBAREA RUNOFF(CFS) =   34.36
  EFFECTIVE AREA(ACRES) =    385.82   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      391.0       PEAK FLOW RATE(CFS) =     680.16

****************************************************************************
  FLOW PROCESS FROM NODE   1237.00 TO NODE   1245.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2050.00  DOWNSTREAM(FEET) =   2021.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   760.70   CHANNEL SLOPE =  0.0381
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     680.16
  FLOW VELOCITY(FEET/SEC.) =  25.50   FLOW DEPTH(FEET) =   2.16
  TRAVEL TIME(MIN.) =   0.50   Tc(MIN.) =   30.24
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1245.00 =    8504.96 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1240.00 TO NODE   1245.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   30.24
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.232
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        1.32      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        9.67      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   10.99      SUBAREA RUNOFF(CFS) =   19.07
  EFFECTIVE AREA(ACRES) =    396.81   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      402.0       PEAK FLOW RATE(CFS) =     691.48

****************************************************************************
  FLOW PROCESS FROM NODE   1245.00 TO NODE   1257.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2021.00  DOWNSTREAM(FEET) =   1991.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =   445.80   CHANNEL SLOPE =  0.0659
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     691.48
  FLOW VELOCITY(FEET/SEC.) =  31.12   FLOW DEPTH(FEET) =   1.89
  TRAVEL TIME(MIN.) =   0.24   Tc(MIN.) =   30.48
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1257.00 =    8950.76 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1230.00 TO NODE   1257.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
==============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1400.00 TO NODE   1405.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1206.20
  ELEVATION DATA: UPSTREAM(FEET) =   2080.40  DOWNSTREAM(FEET) =   2038.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
```



```
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.749
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.583
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       A        5.45      0.80     0.600    52   13.75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =     15.23
  TOTAL AREA(ACRES) =      5.45   PEAK FLOW RATE(CFS) =     15.23

****************************************************************************
  FLOW PROCESS FROM NODE   1405.00 TO NODE   1257.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2038.00  DOWNSTREAM(FEET) =  1991.60
  FLOW LENGTH(FEET) =   849.10   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.35
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.23
  PIPE TRAVEL TIME(MIN.) =   0.99    Tc(MIN.) =   14.74
  LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1257.00 =    2055.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1407.00 TO NODE   1257.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   14.74
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.437
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       A        6.61      0.80     0.600    52
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.12      0.27     0.600    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.79
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    6.73      SUBAREA RUNOFF(CFS) =   17.96
  EFFECTIVE AREA(ACRES) =     12.18   AREA-AVERAGED Fm(INCH/HR) =  0.47
  AREA-AVERAGED Fp(INCH/HR) =  0.79  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =       12.2       PEAK FLOW RATE(CFS) =      32.47

****************************************************************************
  FLOW PROCESS FROM NODE   1257.00 TO NODE   1257.00 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       32.47   14.74    3.437  0.79( 0.47) 0.60      12.2    1400.00
  LONGEST FLOWPATH FROM NODE   1400.00 TO NODE   1257.00 =    2055.30 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      662.00   21.91    2.708  0.30( 0.30) 1.00     303.3    1125.00
     2      664.42   22.25    2.684  0.30( 0.30) 1.00     307.6    1195.00
     3      678.75   25.80    2.456  0.30( 0.30) 1.00     347.6    1135.00
     4      691.48   30.48    2.222  0.30( 0.30) 1.00     396.8    1000.00
     5      665.27   32.84    2.125  0.30( 0.30) 1.00     402.0    1060.00
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1257.00 =    8950.76 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      612.30   14.74    3.437  0.32( 0.31) 0.98     216.1    1400.00
     2      686.49   21.91    2.708  0.31( 0.31) 0.98     315.5    1125.00
     3      688.64   22.25    2.684  0.31( 0.31) 0.98     319.8    1195.00
     4      700.47   25.80    2.456  0.31( 0.31) 0.99     359.8    1135.00
     5      710.63   30.48    2.222  0.31( 0.30) 0.99     409.0    1000.00
     6      683.36   32.84    2.125  0.30( 0.30) 0.99     414.2    1060.00
    TOTAL AREA(ACRES) =       414.2

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      710.63  Tc(MIN.) =   30.480
  EFFECTIVE AREA(ACRES) =    408.99  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.31  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =      414.2
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1257.00 =    8950.76 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1230.00 TO NODE   1257.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1257.00 TO NODE   1270.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1991.60  DOWNSTREAM(FEET) =   1989.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   225.30   CHANNEL SLOPE =  0.0115
  CHANNEL FLOW THRU SUBAREA(CFS) =     710.63
  FLOW VELOCITY(FEET/SEC) =   9.42 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.40   Tc(MIN.) =   30.88
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1270.00 =    9176.06 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1260.00 TO NODE   1270.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   30.88
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.205
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 A       0.05      0.80     0.200    52
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       0.79      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       1.30      0.43     1.000    77
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       0.14      0.24     1.000    88
  COMMERCIAL                 A       5.15      0.80     0.100    52
  RESIDENTIAL
```



```
  "3-4 DWELLINGS/ACRE"       A       0.37      0.80     0.600    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.61
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.382
  SUBAREA AREA(ACRES) =    7.80      SUBAREA RUNOFF(CFS) =   13.83
  EFFECTIVE AREA(ACRES) =    416.79   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.31  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      422.0       PEAK FLOW RATE(CFS) =     714.36

****************************************************************************
  FLOW PROCESS FROM NODE   1300.00 TO NODE   1270.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   30.88
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.205
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 A       3.14      0.80     0.200    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    3.14      SUBAREA RUNOFF(CFS) =    5.78
  EFFECTIVE AREA(ACRES) =    419.93   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.31  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =      425.1       PEAK FLOW RATE(CFS) =     720.14

****************************************************************************
  FLOW PROCESS FROM NODE   1270.00 TO NODE   1285.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1989.00  DOWNSTREAM(FEET) =   1969.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   618.60   CHANNEL SLOPE =  0.0315
  CHANNEL FLOW THRU SUBAREA(CFS) =     720.14
  FLOW VELOCITY(FEET/SEC) =  15.64 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.66   Tc(MIN.) =   31.54
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1285.00 =    9794.66 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1275.00 TO NODE   1285.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   31.54
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.177
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       1.07      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       4.74      0.43     1.000    77
  APARTMENTS                 A       0.24      0.80     0.200    52
  COMMERCIAL                 A       0.99      0.80     0.100    52
  COMMERCIAL                 B       0.49      0.45     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.51
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.798
  SUBAREA AREA(ACRES) =    7.53      SUBAREA RUNOFF(CFS) =   12.00
  EFFECTIVE AREA(ACRES) =    427.46   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.31  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =      432.7       PEAK FLOW RATE(CFS) =     721.64
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   1280.00 TO NODE   1285.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   31.54
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.177
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 A        0.02      0.80     0.200    52
  COMMERCIAL                 A        0.09      0.80     0.100    52
  COMMERCIAL                 B        0.18      0.45     0.100    76
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.16      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        5.55      0.43     1.000    77
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        3.45      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.37
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.973
  SUBAREA AREA(ACRES) =    9.45      SUBAREA RUNOFF(CFS) =   15.48
  EFFECTIVE AREA(ACRES) =    436.91   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.31  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =      442.1       PEAK FLOW RATE(CFS) =     737.13

****************************************************************************
  FLOW PROCESS FROM NODE   1285.00 TO NODE   1295.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1969.50  DOWNSTREAM(FEET) =   1944.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =   237.10   CHANNEL SLOPE =  0.1050
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =     737.13
  FLOW VELOCITY(FEET/SEC) =  28.06 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.14   Tc(MIN.) =   31.68
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   1295.00 =   10031.76 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1290.00 TO NODE   1295.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   31.68
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.171
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        7.61      0.81     1.000    51
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    7.61      SUBAREA RUNOFF(CFS) =    9.34
  EFFECTIVE AREA(ACRES) =    444.52   AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.32  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =      449.7       PEAK FLOW RATE(CFS) =     744.18

****************************************************************************
  FLOW PROCESS FROM NODE   1295.00 TO NODE   5015.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
```



```
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1944.60  DOWNSTREAM(FEET) =   1915.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   741.50   CHANNEL SLOPE =  0.0398
  CHANNEL FLOW THRU SUBAREA(CFS) =     744.18
  FLOW VELOCITY(FEET/SEC) =  17.76 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.70   Tc(MIN.) =   32.38
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   5015.00 =   10773.26 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5005.00 TO NODE   5015.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   32.38
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.143
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS               A        0.48      0.80     0.350    52
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        4.80      0.81     1.000    51
  COMMERCIAL                 A        0.04      0.80     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.935
  SUBAREA AREA(ACRES) =    5.32      SUBAREA RUNOFF(CFS) =    6.65
  EFFECTIVE AREA(ACRES) =    449.84   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.33  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =      455.0       PEAK FLOW RATE(CFS) =     744.18
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1257.00 TO NODE   5015.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1130.00 TO NODE   1137.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   290.20
  ELEVATION DATA: UPSTREAM(FEET) =   2252.80  DOWNSTREAM(FEET) =   2138.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.881
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.122
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.06      0.81     1.000    51   10.88
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        0.59      0.24     1.000    88   10.88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.24
  TOTAL AREA(ACRES) =      0.65   PEAK FLOW RATE(CFS) =      2.24

****************************************************************************
  FLOW PROCESS FROM NODE   1137.00 TO NODE   1175.00 IS CODE =  51
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2138.30  DOWNSTREAM(FEET) =   2123.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   121.60   CHANNEL SLOPE =  0.1234
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.24
  FLOW VELOCITY(FEET/SEC.) =   4.91   FLOW DEPTH(FEET) =   0.06
  TRAVEL TIME(MIN.) =   0.41   Tc(MIN.) =   11.29
  LONGEST FLOWPATH FROM NODE   1130.00 TO NODE   1175.00 =     411.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1175.00 TO NODE   1177.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2123.30  DOWNSTREAM(FEET) =   2101.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =   664.00   CHANNEL SLOPE =  0.0331
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.24
  FLOW VELOCITY(FEET/SEC.) =   3.39   FLOW DEPTH(FEET) =   0.08
  TRAVEL TIME(MIN.) =   3.26   Tc(MIN.) =   14.56
  LONGEST FLOWPATH FROM NODE   1130.00 TO NODE   1177.00 =    1075.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1185.00 TO NODE   1177.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.56
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.462
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        1.93      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        0.57      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.68
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.50      SUBAREA RUNOFF(CFS) =    6.26
  EFFECTIVE AREA(ACRES) =      3.15   AREA-AVERAGED Fm(INCH/HR) =  0.60
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        3.2       PEAK FLOW RATE(CFS) =       8.12

****************************************************************************
  FLOW PROCESS FROM NODE   1170.00 TO NODE   1177.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.56
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.462
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.11      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        4.96      0.24     1.000    88
```



```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.07      SUBAREA RUNOFF(CFS) =   14.66
  EFFECTIVE AREA(ACRES) =      8.22   AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        8.2       PEAK FLOW RATE(CFS) =      22.78

****************************************************************************
  FLOW PROCESS FROM NODE   1177.00 TO NODE   3035.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2101.30  DOWNSTREAM(FEET) =   2101.29
  CHANNEL LENGTH THRU SUBAREA(FEET) =   292.50   CHANNEL SLOPE =  0.0000
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      22.78
  FLOW VELOCITY(FEET/SEC.) =   0.79   FLOW DEPTH(FEET) =   2.30
  TRAVEL TIME(MIN.) =   6.20   Tc(MIN.) =   20.76
  LONGEST FLOWPATH FROM NODE   1130.00 TO NODE   3035.00 =    1368.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1182.00 TO NODE   3035.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.76
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.798
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.40      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        0.17      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.64
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.57      SUBAREA RUNOFF(CFS) =    1.11
  EFFECTIVE AREA(ACRES) =      8.79   AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        8.8       PEAK FLOW RATE(CFS) =      22.78
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   3035.00 TO NODE   3037.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2112.60  DOWNSTREAM(FEET) =   2106.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   165.90   CHANNEL SLOPE =  0.0356
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      22.78
  FLOW VELOCITY(FEET/SEC.) =   8.31   FLOW DEPTH(FEET) =   0.32
  TRAVEL TIME(MIN.) =   0.33   Tc(MIN.) =   21.09
  LONGEST FLOWPATH FROM NODE   1130.00 TO NODE   3037.00 =    1534.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3045.00 TO NODE   3037.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==============================================================================
  MAINLINE Tc(MIN.) =   21.09
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.771
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.02      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        1.72      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.74      SUBAREA RUNOFF(CFS) =    3.96
  EFFECTIVE AREA(ACRES) =     10.53   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       10.5       PEAK FLOW RATE(CFS) =      22.78
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   1130.00 TO NODE   3037.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   21.09
  RAINFALL INTENSITY(INCH/HR) =   2.77
  AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.37
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      10.53
  TOTAL STREAM AREA(ACRES) =      10.53
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      22.78

****************************************************************************
  FLOW PROCESS FROM NODE   3020.00 TO NODE   3025.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1362.00
  ELEVATION DATA: UPSTREAM(FEET) =   2570.00  DOWNSTREAM(FEET) =   2200.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   21.764
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.720
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        9.29      0.24     1.000    88   21.76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     20.77
  TOTAL AREA(ACRES) =      9.29   PEAK FLOW RATE(CFS) =     20.77

****************************************************************************
  FLOW PROCESS FROM NODE   3025.00 TO NODE   3037.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2200.30  DOWNSTREAM(FEET) =   2106.70
```



```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   489.90   CHANNEL SLOPE =  0.1911
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      20.77
  FLOW VELOCITY(FEET/SEC) =   9.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.85   Tc(MIN.) =   22.62
  LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   3037.00 =    1851.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3030.00 TO NODE   3037.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   22.62
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.658
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        6.56      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    6.56      SUBAREA RUNOFF(CFS) =   14.30
  EFFECTIVE AREA(ACRES) =     15.85   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       15.9       PEAK FLOW RATE(CFS) =      34.54

****************************************************************************
  FLOW PROCESS FROM NODE   3020.00 TO NODE   3037.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   22.62
  RAINFALL INTENSITY(INCH/HR) =   2.66
  AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      15.85
  TOTAL STREAM AREA(ACRES) =      15.85
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      34.54

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       22.78   21.09    2.771  0.37( 0.37) 1.00      10.5    1130.00
      2       34.54   22.62    2.658  0.24( 0.24) 1.00      15.9    3020.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       56.51   21.09    2.771  0.29( 0.29) 1.00      25.3    1130.00
      2       56.24   22.62    2.658  0.29( 0.29) 1.00      26.4    3020.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      56.51    Tc(MIN.) =    21.09
  EFFECTIVE AREA(ACRES) =      25.31   AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       26.4
```

```
  LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   3037.00 =    1851.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3040.00 TO NODE   3012.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2101.80  DOWNSTREAM(FEET) =   2091.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =   909.70   CHANNEL SLOPE =  0.0112
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      56.51
  FLOW VELOCITY(FEET/SEC.) =   7.74   FLOW DEPTH(FEET) =   0.77
  TRAVEL TIME(MIN.) =   1.96   Tc(MIN.) =   23.05
  LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   3012.00 =    2761.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3042.00 TO NODE   3012.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   23.05
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.628
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        1.32      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        1.64      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.49
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.96      SUBAREA RUNOFF(CFS) =    5.69
  EFFECTIVE AREA(ACRES) =     28.27   AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.31  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       29.3       PEAK FLOW RATE(CFS) =      58.87

****************************************************************************
  FLOW PROCESS FROM NODE   3012.00 TO NODE   3015.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2091.60  DOWNSTREAM(FEET) =   2087.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =    28.60   CHANNEL SLOPE =  0.1329
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      58.87
  FLOW VELOCITY(FEET/SEC.) =  17.76   FLOW DEPTH(FEET) =   0.38
  TRAVEL TIME(MIN.) =   0.03   Tc(MIN.) =   23.08
  LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   3015.00 =    2790.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3010.00 TO NODE   3015.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   23.08
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.626
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```



```
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       11.32      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   11.32      SUBAREA RUNOFF(CFS) =   24.35
  EFFECTIVE AREA(ACRES) =     39.59   AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       40.7       PEAK FLOW RATE(CFS) =      83.17

****************************************************************************
  FLOW PROCESS FROM NODE   3015.00 TO NODE   3050.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2087.80  DOWNSTREAM(FEET) =   2028.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1088.60   CHANNEL SLOPE =  0.0548
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      83.17
  FLOW VELOCITY(FEET/SEC.) =  14.91   FLOW DEPTH(FEET) =   0.61
  TRAVEL TIME(MIN.) =   1.22   Tc(MIN.) =   24.29
  LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   3050.00 =    3878.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3017.00 TO NODE   3050.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   24.29
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.546
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        6.09      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    6.09      SUBAREA RUNOFF(CFS) =   12.66
  EFFECTIVE AREA(ACRES) =     45.68   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       46.8       PEAK FLOW RATE(CFS) =      92.99

****************************************************************************
  FLOW PROCESS FROM NODE   3037.00 TO NODE   3050.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   24.29
  RAINFALL INTENSITY(INCH/HR) =   2.55
  AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.28
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      45.68
  TOTAL STREAM AREA(ACRES) =      46.75
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      92.99

****************************************************************************
  FLOW PROCESS FROM NODE   3300.00 TO NODE   3305.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   851.10
  ELEVATION DATA: UPSTREAM(FEET) =   2155.90  DOWNSTREAM(FEET) =   2094.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.341
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.250
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       A        5.62      0.80     0.600    52   10.34
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        1.59      0.27     0.600    86   10.34
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.68
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =     24.93
  TOTAL AREA(ACRES) =      7.21   PEAK FLOW RATE(CFS) =     24.93

****************************************************************************
  FLOW PROCESS FROM NODE   3305.00 TO NODE   3310.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2094.00  DOWNSTREAM(FEET) =  2050.00
  FLOW LENGTH(FEET) =  1258.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.51
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      24.93
  PIPE TRAVEL TIME(MIN.) =   1.55    Tc(MIN.) =   11.89
  LONGEST FLOWPATH FROM NODE   3300.00 TO NODE   3310.00 =    2109.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3303.00 TO NODE   3310.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   11.89
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.908
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       A       12.04      0.80     0.600    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =   12.04      SUBAREA RUNOFF(CFS) =   37.17
  EFFECTIVE AREA(ACRES) =     19.25   AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =       19.2       PEAK FLOW RATE(CFS) =      59.89

****************************************************************************
  FLOW PROCESS FROM NODE   3310.00 TO NODE   3315.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2050.00  DOWNSTREAM(FEET) =  2048.00
  FLOW LENGTH(FEET) =   148.60   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.2 INCHES
```



```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.84
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      59.89
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   12.10
  LONGEST FLOWPATH FROM NODE   3300.00 TO NODE   3315.00 =    2257.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3312.00 TO NODE   3315.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   12.10
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.868
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       A        7.52      0.80     0.600    52
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        0.18      0.27     0.600    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.78
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    7.70      SUBAREA RUNOFF(CFS) =   23.54
  EFFECTIVE AREA(ACRES) =     26.95   AREA-AVERAGED Fm(INCH/HR) =  0.46
  AREA-AVERAGED Fp(INCH/HR) =  0.76  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =       27.0       PEAK FLOW RATE(CFS) =      82.73

****************************************************************************
  FLOW PROCESS FROM NODE   3315.00 TO NODE   3320.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2048.00  DOWNSTREAM(FEET) =  2043.10
  FLOW LENGTH(FEET) =   201.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.98
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      82.73
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   12.31
  LONGEST FLOWPATH FROM NODE   3300.00 TO NODE   3320.00 =    2459.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3317.00 TO NODE   3320.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   12.31
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.828
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       A        4.99      0.80     0.600    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    4.99      SUBAREA RUNOFF(CFS) =   15.05
  EFFECTIVE AREA(ACRES) =     31.94   AREA-AVERAGED Fm(INCH/HR) =  0.46
  AREA-AVERAGED Fp(INCH/HR) =  0.77  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =       31.9       PEAK FLOW RATE(CFS) =      96.81

****************************************************************************
  FLOW PROCESS FROM NODE   3320.00 TO NODE   3050.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2043.10  DOWNSTREAM(FEET) =  2028.10
  FLOW LENGTH(FEET) =   334.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.75
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      96.81
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   12.58
  LONGEST FLOWPATH FROM NODE   3300.00 TO NODE   3050.00 =    2794.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3322.00 TO NODE   3050.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.58
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.779
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       A        3.21      0.80     0.600    52
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       C        2.03      0.27     0.600    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.59
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    5.24      SUBAREA RUNOFF(CFS) =   16.14
  EFFECTIVE AREA(ACRES) =     37.18   AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =       37.2       PEAK FLOW RATE(CFS) =     111.53

****************************************************************************
  FLOW PROCESS FROM NODE   3300.00 TO NODE   3050.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.58
  RAINFALL INTENSITY(INCH/HR) =   3.78
  AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =      37.18
  TOTAL STREAM AREA(ACRES) =      37.18
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     111.53

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       92.99   24.29    2.546  0.28( 0.28) 1.00      45.7    1130.00
      1       91.39   25.81    2.455  0.28( 0.28) 1.00      46.8    3020.00
      2      111.53   12.58    3.779  0.74( 0.45) 0.60      37.2    3300.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
```



```
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      185.93   12.58    3.779  0.51( 0.38) 0.76      60.8    3300.00
      2      163.29   24.29    2.546  0.43( 0.36) 0.82      82.9    1130.00
      3      158.63   25.81    2.455  0.43( 0.35) 0.82      83.9    3020.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     185.93    Tc(MIN.) =    12.58
  EFFECTIVE AREA(ACRES) =      60.84   AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.51  AREA-AVERAGED Ap =  0.76
  TOTAL AREA(ACRES) =       83.9
  LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   3050.00 =    3878.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3050.00 TO NODE   3060.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2028.10  DOWNSTREAM(FEET) =   2020.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   127.40   CHANNEL SLOPE =  0.0581
  CHANNEL FLOW THRU SUBAREA(CFS) =     185.93
  FLOW VELOCITY(FEET/SEC) =  13.82 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.15   Tc(MIN.) =   12.73
  LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   3060.00 =    4006.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3055.00 TO NODE   3060.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.73
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.751
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.42      0.81     1.000    51
  COMMERCIAL                 A        1.75      0.80     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.274
  SUBAREA AREA(ACRES) =    2.17      SUBAREA RUNOFF(CFS) =    6.90
  EFFECTIVE AREA(ACRES) =     63.01   AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.51  AREA-AVERAGED Ap =  0.74
  TOTAL AREA(ACRES) =       86.1       PEAK FLOW RATE(CFS) =     191.33

****************************************************************************
  FLOW PROCESS FROM NODE   3050.00 TO NODE   3060.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.73
  RAINFALL INTENSITY(INCH/HR) =   3.75
  AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.51
  AREA-AVERAGED Ap =  0.74
  EFFECTIVE STREAM AREA(ACRES) =      63.01
  TOTAL STREAM AREA(ACRES) =      86.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     191.33

****************************************************************************
  FLOW PROCESS FROM NODE   3350.00 TO NODE   3355.00 IS CODE =  21
```

```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   939.60
  ELEVATION DATA: UPSTREAM(FEET) =   2030.10  DOWNSTREAM(FEET) =   2021.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.866
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.728
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  APARTMENTS                 A       5.73      0.80     0.200    52   12.87
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =     18.40
  TOTAL AREA(ACRES) =      5.73   PEAK FLOW RATE(CFS) =     18.40

****************************************************************************
  FLOW PROCESS FROM NODE   3355.00 TO NODE   3357.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2021.70  DOWNSTREAM(FEET) =  2021.40
  FLOW LENGTH(FEET) =   482.20   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  29.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.74
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.40
  PIPE TRAVEL TIME(MIN.) =   2.93    Tc(MIN.) =   15.80
  LONGEST FLOWPATH FROM NODE   3350.00 TO NODE   3357.00 =    1421.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3355.00 TO NODE   3357.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.80
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.296
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 A       3.11      0.80     0.200    52
  COMMERCIAL                 A       0.04      0.80     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.199
  SUBAREA AREA(ACRES) =    3.15      SUBAREA RUNOFF(CFS) =    8.90
  EFFECTIVE AREA(ACRES) =      8.88   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        8.9       PEAK FLOW RATE(CFS) =      25.08

****************************************************************************
  FLOW PROCESS FROM NODE   3357.00 TO NODE   3060.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2021.40  DOWNSTREAM(FEET) =  2020.70
  FLOW LENGTH(FEET) =   150.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.31
```



```
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.08
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   16.19
  LONGEST FLOWPATH FROM NODE   3350.00 TO NODE   3060.00 =    1571.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3350.00 TO NODE   3060.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.19
  RAINFALL INTENSITY(INCH/HR) =   3.25
  AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.80
  AREA-AVERAGED Ap =  0.20
  EFFECTIVE STREAM AREA(ACRES) =       8.88
  TOTAL STREAM AREA(ACRES) =        8.88
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      25.08

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      191.33   12.73    3.751  0.51( 0.38) 0.74      63.0    3300.00
      1      167.06   24.45    2.536  0.44( 0.35) 0.81      85.0    1130.00
      1      162.28   25.98    2.446  0.43( 0.35) 0.81      86.1    3020.00
      2       25.08   16.19    3.248  0.80( 0.16) 0.20       8.9    3350.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      214.26   12.73    3.751  0.52( 0.36) 0.69      70.0    3300.00
      2      209.24   16.19    3.248  0.50( 0.35) 0.70      78.4    3350.00
      3      186.36   24.45    2.536  0.45( 0.33) 0.75      93.9    1130.00
      4      180.85   25.98    2.446  0.44( 0.33) 0.75      95.0    3020.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     214.26    Tc(MIN.) =    12.73
  EFFECTIVE AREA(ACRES) =      69.99   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.52  AREA-AVERAGED Ap =  0.69
  TOTAL AREA(ACRES) =       95.0
  LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   3060.00 =    4006.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3060.00 TO NODE   3070.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2020.70  DOWNSTREAM(FEET) =   1997.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   351.10   CHANNEL SLOPE =  0.0672
  CHANNEL FLOW THRU SUBAREA(CFS) =     214.26
  FLOW VELOCITY(FEET/SEC) =  15.53 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.38   Tc(MIN.) =   13.11
  LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   3070.00 =    4357.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3065.00 TO NODE   3070.00 IS CODE =  81
```

```
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.11
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.686
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        2.16      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       13.71      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.31
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   15.87      SUBAREA RUNOFF(CFS) =   48.17
  EFFECTIVE AREA(ACRES) =     85.86   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.47  AREA-AVERAGED Ap =  0.74
  TOTAL AREA(ACRES) =      110.8       PEAK FLOW RATE(CFS) =     257.98

****************************************************************************
  FLOW PROCESS FROM NODE   3070.00 TO NODE   3080.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1997.10  DOWNSTREAM(FEET) =   1971.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   732.10   CHANNEL SLOPE =  0.0357
  CHANNEL FLOW THRU SUBAREA(CFS) =     257.98
  FLOW VELOCITY(FEET/SEC) =  11.99 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.02   Tc(MIN.) =   14.13
  LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   3080.00 =    5089.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3075.00 TO NODE   3080.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.13
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.524
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       23.86      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        2.86      0.43     1.000    77
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       13.68      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.59
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   40.40      SUBAREA RUNOFF(CFS) =  106.77
  EFFECTIVE AREA(ACRES) =    126.26   AREA-AVERAGED Fm(INCH/HR) =  0.42
  AREA-AVERAGED Fp(INCH/HR) =  0.51  AREA-AVERAGED Ap =  0.83
  TOTAL AREA(ACRES) =      151.2       PEAK FLOW RATE(CFS) =     352.25

****************************************************************************
  FLOW PROCESS FROM NODE   3080.00 TO NODE   3155.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1971.00  DOWNSTREAM(FEET) =   1940.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1490.80   CHANNEL SLOPE =  0.0207
```



```
  CHANNEL FLOW THRU SUBAREA(CFS) =     352.25
  FLOW VELOCITY(FEET/SEC) =  10.08 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.46   Tc(MIN.) =   16.59
  LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   3155.00 =    6580.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3150.00 TO NODE   3155.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.59
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.200
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       15.78      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        0.38      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   16.16      SUBAREA RUNOFF(CFS) =   34.92
  EFFECTIVE AREA(ACRES) =    142.42   AREA-AVERAGED Fm(INCH/HR) =  0.47
  AREA-AVERAGED Fp(INCH/HR) =  0.55  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =      167.4       PEAK FLOW RATE(CFS) =     352.25
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   3060.00 TO NODE   3155.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3210.00 TO NODE   3700.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   264.50
  ELEVATION DATA: UPSTREAM(FEET) =   2027.00  DOWNSTREAM(FEET) =   2026.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   26.562
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.413
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        0.51      0.43     1.000    77   26.56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.91
  TOTAL AREA(ACRES) =      0.51   PEAK FLOW RATE(CFS) =      0.91

****************************************************************************
  FLOW PROCESS FROM NODE   3700.00 TO NODE   3705.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2026.00  DOWNSTREAM(FEET) =  2002.00
  FLOW LENGTH(FEET) =   878.90   MANNING'S N =  0.013
```

```
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.10
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.91
  PIPE TRAVEL TIME(MIN.) =   2.87    Tc(MIN.) =   29.44
  LONGEST FLOWPATH FROM NODE   3210.00 TO NODE   3705.00 =    1143.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3210.00 TO NODE   3705.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   29.44
  RAINFALL INTENSITY(INCH/HR) =   2.27
  AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       0.51
  TOTAL STREAM AREA(ACRES) =       0.51
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.91

****************************************************************************
  FLOW PROCESS FROM NODE   3195.00 TO NODE   3200.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   942.90
  ELEVATION DATA: UPSTREAM(FEET) =   2293.30  DOWNSTREAM(FEET) =   2110.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   20.089
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.854
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        7.82      0.43     1.000    77   20.09
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     17.03
  TOTAL AREA(ACRES) =      7.82   PEAK FLOW RATE(CFS) =     17.03

****************************************************************************
  FLOW PROCESS FROM NODE   3200.00 TO NODE   3210.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2110.20  DOWNSTREAM(FEET) =   2039.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   669.60   CHANNEL SLOPE =  0.1056
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      17.03
  FLOW VELOCITY(FEET/SEC) =   9.08 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.23   Tc(MIN.) =   21.32
  LONGEST FLOWPATH FROM NODE   3195.00 TO NODE   3210.00 =    1612.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3205.00 TO NODE   3217.00 IS CODE =  81
----------------------------------------------------------------------------
```



```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.32
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.754
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       10.91      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   10.91      SUBAREA RUNOFF(CFS) =   22.78
  EFFECTIVE AREA(ACRES) =     18.73   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       18.7       PEAK FLOW RATE(CFS) =      39.10

****************************************************************************
  FLOW PROCESS FROM NODE   3215.00 TO NODE   3217.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.32
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.754
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        6.57      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    6.57      SUBAREA RUNOFF(CFS) =   13.72
  EFFECTIVE AREA(ACRES) =     25.30   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       25.3       PEAK FLOW RATE(CFS) =      52.82

****************************************************************************
  FLOW PROCESS FROM NODE   3217.00 TO NODE   3705.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2026.00  DOWNSTREAM(FEET) =  2002.00
  FLOW LENGTH(FEET) =   272.60   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.17
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      52.82
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   21.51
  LONGEST FLOWPATH FROM NODE   3195.00 TO NODE   3705.00 =    1885.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3195.00 TO NODE   3705.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   21.51
  RAINFALL INTENSITY(INCH/HR) =   2.74
  AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43
  AREA-AVERAGED Ap =  1.00
```

```
  EFFECTIVE STREAM AREA(ACRES) =      25.30
  TOTAL STREAM AREA(ACRES) =      25.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      52.82

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
      1        0.91   29.44    2.269  0.43( 0.43) 1.00       0.5    3210.00
      2       52.82   21.51    2.739  0.43( 0.43) 1.00      25.3    3195.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
      1       53.65   21.51    2.739  0.43( 0.43) 1.00      25.7    3195.00
      2       42.96   29.44    2.269  0.43( 0.43) 1.00      25.8    3210.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      53.65    Tc(MIN.) =    21.51
  EFFECTIVE AREA(ACRES) =      25.67   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       25.8
  LONGEST FLOWPATH FROM NODE   3195.00 TO NODE   3705.00 =    1885.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3705.00 TO NODE   3507.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2024.40  DOWNSTREAM(FEET) =  2018.00
  FLOW LENGTH(FEET) =   257.30   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.42
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      53.65
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   21.81
  LONGEST FLOWPATH FROM NODE   3195.00 TO NODE   3507.00 =    2142.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3220.00 TO NODE   3223.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.81
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.716
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        4.66      0.43     1.000    77
  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) =    9.57
  EFFECTIVE AREA(ACRES) =     30.33   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       30.5       PEAK FLOW RATE(CFS) =      62.30

****************************************************************************
  FLOW PROCESS FROM NODE   3223.00 TO NODE   3507.00 IS CODE =  31
----------------------------------------------------------------------------
```



```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2024.50  DOWNSTREAM(FEET) =  2018.00
  FLOW LENGTH(FEET) =   117.80   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.12
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      62.30
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   21.91
  LONGEST FLOWPATH FROM NODE   3195.00 TO NODE   3507.00 =    2260.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3507.00 TO NODE   3709.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2018.00  DOWNSTREAM(FEET) =  2017.00
  FLOW LENGTH(FEET) =   422.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.15
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      62.30
  PIPE TRAVEL TIME(MIN.) =   1.15    Tc(MIN.) =   23.06
  LONGEST FLOWPATH FROM NODE   3195.00 TO NODE   3709.00 =    2682.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3185.00 TO NODE   3187.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   23.06
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.627
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        1.97      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.97      SUBAREA RUNOFF(CFS) =    3.89
  EFFECTIVE AREA(ACRES) =     32.30   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       32.4       PEAK FLOW RATE(CFS) =      63.76

****************************************************************************
  FLOW PROCESS FROM NODE   3187.00 TO NODE   3709.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2061.50  DOWNSTREAM(FEET) =  2017.00
  FLOW LENGTH(FEET) =   197.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  34.32
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      63.76
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   23.15
  LONGEST FLOWPATH FROM NODE   3195.00 TO NODE   3709.00 =    2880.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3709.00 TO NODE   3711.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2017.00  DOWNSTREAM(FEET) =  2011.80
  FLOW LENGTH(FEET) =   337.30   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  26.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.28
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      63.76
  PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   23.61
  LONGEST FLOWPATH FROM NODE   3195.00 TO NODE   3711.00 =    3217.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3705.00 TO NODE   3711.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   23.61
  RAINFALL INTENSITY(INCH/HR) =   2.59
  AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      32.30
  TOTAL STREAM AREA(ACRES) =      32.44
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      63.76

****************************************************************************
  FLOW PROCESS FROM NODE   3165.00 TO NODE   3170.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1040.70
  ELEVATION DATA: UPSTREAM(FEET) =   2290.70  DOWNSTREAM(FEET) =   2089.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   20.906
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.786
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        9.37      0.43     1.000    77   20.91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     19.84
  TOTAL AREA(ACRES) =      9.37   PEAK FLOW RATE(CFS) =     19.84

****************************************************************************
  FLOW PROCESS FROM NODE   3170.00 TO NODE   3173.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2089.00  DOWNSTREAM(FEET) =   2013.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   373.60   CHANNEL SLOPE =  0.2013
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      19.84
  FLOW VELOCITY(FEET/SEC) =   9.45 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.66   Tc(MIN.) =   21.56
```



```
  LONGEST FLOWPATH FROM NODE   3165.00 TO NODE   3173.00 =    1414.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3175.00 TO NODE   3173.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.56
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.735
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        4.34      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.34      SUBAREA RUNOFF(CFS) =    8.99
  EFFECTIVE AREA(ACRES) =     13.71   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       13.7       PEAK FLOW RATE(CFS) =      28.39

****************************************************************************
  FLOW PROCESS FROM NODE   3165.00 TO NODE   3173.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   21.56
  RAINFALL INTENSITY(INCH/HR) =   2.73
  AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      13.71
  TOTAL STREAM AREA(ACRES) =      13.71
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      28.39

****************************************************************************
  FLOW PROCESS FROM NODE   3120.00 TO NODE   3190.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   379.90
  ELEVATION DATA: UPSTREAM(FEET) =   2217.00  DOWNSTREAM(FEET) =   2084.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.418
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.808
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        0.32      0.43     1.000    77   12.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.97
  TOTAL AREA(ACRES) =      0.32   PEAK FLOW RATE(CFS) =      0.97

****************************************************************************
  FLOW PROCESS FROM NODE   3190.00 TO NODE   3193.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2084.30  DOWNSTREAM(FEET) =   2051.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   683.80   CHANNEL SLOPE =  0.0481
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.97
  FLOW VELOCITY(FEET/SEC.) =   2.80   FLOW DEPTH(FEET) =   0.04
  TRAVEL TIME(MIN.) =   4.07   Tc(MIN.) =   16.49
  LONGEST FLOWPATH FROM NODE   3120.00 TO NODE   3193.00 =    1063.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3190.00 TO NODE   3193.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   16.49
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.213
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        2.16      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.16      SUBAREA RUNOFF(CFS) =    5.40
  EFFECTIVE AREA(ACRES) =      2.48   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        2.5       PEAK FLOW RATE(CFS) =       6.20

****************************************************************************
  FLOW PROCESS FROM NODE   3193.00 TO NODE   3173.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2051.40  DOWNSTREAM(FEET) =   2013.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   116.30   CHANNEL SLOPE =  0.3233
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   4.00
  CHANNEL FLOW THRU SUBAREA(CFS) =       6.20
  FLOW VELOCITY(FEET/SEC.) =  10.37   FLOW DEPTH(FEET) =   0.07
  TRAVEL TIME(MIN.) =   0.19   Tc(MIN.) =   16.67
  LONGEST FLOWPATH FROM NODE   3120.00 TO NODE   3173.00 =    1180.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3190.00 TO NODE   3173.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.67
  RAINFALL INTENSITY(INCH/HR) =   3.19
  AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       2.48
  TOTAL STREAM AREA(ACRES) =       2.48
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.20

  ** CONFLUENCE DATA **
```



```
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       63.76   23.61    2.590  0.43( 0.43) 1.00      32.3    3195.00
     1       51.47   31.63    2.173  0.43( 0.43) 1.00      32.4    3210.00
     2       28.39   21.56    2.735  0.43( 0.43) 1.00      13.7    3165.00
     3        6.20   16.67    3.191  0.43( 0.43) 1.00       2.5    3120.00

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

  ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       90.09   16.67    3.191  0.43( 0.43) 1.00      35.9    3120.00
     2       95.71   21.56    2.735  0.43( 0.43) 1.00      45.7    3165.00
     3       95.21   23.61    2.590  0.43( 0.43) 1.00      48.5    3195.00
     4       76.84   31.63    2.173  0.43( 0.43) 1.00      48.6    3210.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      95.71    Tc(MIN.) =    21.56
  EFFECTIVE AREA(ACRES) =      45.70   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       48.6
  LONGEST FLOWPATH FROM NODE   3195.00 TO NODE   3173.00 =    3217.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3173.00 TO NODE   3711.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2013.80  DOWNSTREAM(FEET) =  2011.80
  FLOW LENGTH(FEET) =   114.30   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.52
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      95.71
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   21.70
  LONGEST FLOWPATH FROM NODE   3195.00 TO NODE   3711.00 =    3332.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3711.00 TO NODE   3723.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2002.00  DOWNSTREAM(FEET) =  1997.00
  FLOW LENGTH(FEET) =   681.60   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  34.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.40
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      95.71
  PIPE TRAVEL TIME(MIN.) =   1.09    Tc(MIN.) =   22.79
  LONGEST FLOWPATH FROM NODE   3195.00 TO NODE   3723.00 =    4013.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3723.00 TO NODE   3723.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   22.79
```

```
  RAINFALL INTENSITY(INCH/HR) =   2.65
  AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      45.70
  TOTAL STREAM AREA(ACRES) =      48.63
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      95.71

****************************************************************************
  FLOW PROCESS FROM NODE   3095.00 TO NODE   3100.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   890.00
  ELEVATION DATA: UPSTREAM(FEET) =   2300.00  DOWNSTREAM(FEET) =   2083.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   18.757
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.973
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        7.54      0.43     1.000    77   18.76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     17.23
  TOTAL AREA(ACRES) =      7.54   PEAK FLOW RATE(CFS) =     17.23

****************************************************************************
  FLOW PROCESS FROM NODE   3100.00 TO NODE   3725.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2068.00  DOWNSTREAM(FEET) =   2039.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    91.60   CHANNEL SLOPE =  0.3166
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      17.23
  FLOW VELOCITY(FEET/SEC) =   9.10 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.17   Tc(MIN.) =   18.92
  LONGEST FLOWPATH FROM NODE   3095.00 TO NODE   3725.00 =     981.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3105.00 TO NODE   3725.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.92
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.958
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        4.70      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.70      SUBAREA RUNOFF(CFS) =   10.67
  EFFECTIVE AREA(ACRES) =     12.24   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       12.2       PEAK FLOW RATE(CFS) =      27.80
```



```
****************************************************************************
  FLOW PROCESS FROM NODE   3110.00 TO NODE   3725.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.92
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.958
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        9.20      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    9.20      SUBAREA RUNOFF(CFS) =   20.90
  EFFECTIVE AREA(ACRES) =     21.44   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       21.4       PEAK FLOW RATE(CFS) =      48.70

****************************************************************************
  FLOW PROCESS FROM NODE   3725.00 TO NODE   3723.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2007.00  DOWNSTREAM(FEET) =  1997.00
  FLOW LENGTH(FEET) =   225.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.63
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      48.70
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   19.14
  LONGEST FLOWPATH FROM NODE   3095.00 TO NODE   3723.00 =    1206.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3723.00 TO NODE   3723.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   19.14
  RAINFALL INTENSITY(INCH/HR) =   2.94
  AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      21.44
  TOTAL STREAM AREA(ACRES) =      21.44
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      48.70

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       90.09   17.91    3.057  0.43( 0.43) 1.00      35.9    3120.00
      1       95.71   22.79    2.646  0.43( 0.43) 1.00      45.7    3165.00
      1       95.21   24.83    2.513  0.43( 0.43) 1.00      48.5    3195.00
      1       76.84   32.92    2.122  0.43( 0.43) 1.00      48.6    3210.00
      2       48.70   19.14    2.938  0.43( 0.43) 1.00      21.4    3095.00

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

```
** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
    1      137.83   17.91    3.057  0.43( 0.43) 1.00      56.0    3120.00
    2      140.20   19.14    2.938  0.43( 0.43) 1.00      59.8    3095.00
    3      138.72   22.79    2.646  0.43( 0.43) 1.00      67.1    3165.00
    4      135.64   24.83    2.513  0.43( 0.43) 1.00      69.9    3195.00
    5      109.67   32.92    2.122  0.43( 0.43) 1.00      70.1    3210.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     140.20    Tc(MIN.) =    19.14
EFFECTIVE AREA(ACRES) =      59.81   AREA-AVERAGED Fm(INCH/HR) =  0.43
AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
TOTAL AREA(ACRES) =       70.1
LONGEST FLOWPATH FROM NODE   3195.00 TO NODE   3723.00 =    4013.60 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   3723.00 TO NODE   3117.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  1997.00  DOWNSTREAM(FEET) =  1996.00
FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  21.86
ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     140.20
PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   19.16
LONGEST FLOWPATH FROM NODE   3195.00 TO NODE   3117.00 =    4038.60 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   3117.00 TO NODE   3117.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =   19.16
RAINFALL INTENSITY(INCH/HR) =   2.94
AREA-AVERAGED Fm(INCH/HR) =  0.43
AREA-AVERAGED Fp(INCH/HR) =  0.43
AREA-AVERAGED Ap =  1.00
EFFECTIVE STREAM AREA(ACRES) =      59.81
TOTAL STREAM AREA(ACRES) =      70.07
PEAK FLOW RATE(CFS) AT CONFLUENCE =     140.20

****************************************************************************
FLOW PROCESS FROM NODE   3712.00 TO NODE   3705.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   939.00
ELEVATION DATA: UPSTREAM(FEET) =   2030.00  DOWNSTREAM(FEET) =   2020.80

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   16.060
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.264
SUBAREA Tc AND LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
RESIDENTIAL
```



```
"3-4 DWELLINGS/ACRE"       A        0.82      0.80     0.600    52   16.06
RESIDENTIAL
"3-4 DWELLINGS/ACRE"       B        6.40      0.45     0.600    76   16.06
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.49
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
SUBAREA RUNOFF(CFS) =     19.29
TOTAL AREA(ACRES) =      7.22   PEAK FLOW RATE(CFS) =     19.29

****************************************************************************
FLOW PROCESS FROM NODE   3705.00 TO NODE   3117.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  2020.00  DOWNSTREAM(FEET) =  1977.00
FLOW LENGTH(FEET) =  1371.40   MANNING'S N =  0.013
DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  12.32
ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =       19.29
PIPE TRAVEL TIME(MIN.) =   1.86    Tc(MIN.) =   17.91
LONGEST FLOWPATH FROM NODE   3712.00 TO NODE   3117.00 =    2310.40 FEET.

****************************************************************************
FLOW PROCESS FROM NODE   3705.00 TO NODE   3117.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   17.91
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.056
SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"3-4 DWELLINGS/ACRE"       A        3.53      0.80     0.600    52
RESIDENTIAL
"3-4 DWELLINGS/ACRE"       B        6.32      0.45     0.600    76
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.58
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
SUBAREA AREA(ACRES) =    9.85      SUBAREA RUNOFF(CFS) =   24.04
EFFECTIVE AREA(ACRES) =     17.07   AREA-AVERAGED Fm(INCH/HR) =  0.32
AREA-AVERAGED Fp(INCH/HR) =  0.54  AREA-AVERAGED Ap =  0.60
TOTAL AREA(ACRES) =       17.1       PEAK FLOW RATE(CFS) =      41.98

****************************************************************************
FLOW PROCESS FROM NODE   3112.00 TO NODE   3117.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   17.91
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.056
SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"3-4 DWELLINGS/ACRE"       A        4.24      0.80     0.600    52
RESIDENTIAL
"3-4 DWELLINGS/ACRE"       B        4.30      0.45     0.600    76
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.62
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
SUBAREA AREA(ACRES) =    8.54      SUBAREA RUNOFF(CFS) =   20.62
EFFECTIVE AREA(ACRES) =     25.61   AREA-AVERAGED Fm(INCH/HR) =  0.34
AREA-AVERAGED Fp(INCH/HR) =  0.57  AREA-AVERAGED Ap =  0.60
```

```
  TOTAL AREA(ACRES) =       25.6       PEAK FLOW RATE(CFS) =      62.60

****************************************************************************
  FLOW PROCESS FROM NODE   3720.00 TO NODE   3117.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.91
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.056
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       A        1.66      0.80     0.600    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    1.66      SUBAREA RUNOFF(CFS) =    3.85
  EFFECTIVE AREA(ACRES) =     27.27   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.58  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =       27.3       PEAK FLOW RATE(CFS) =      66.46

****************************************************************************
  FLOW PROCESS FROM NODE   3117.00 TO NODE   3117.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   17.91
  RAINFALL INTENSITY(INCH/HR) =   3.06
  AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.58
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =      27.27
  TOTAL STREAM AREA(ACRES) =      27.27
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      66.46

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      137.83   17.93    3.055  0.43( 0.43) 1.00      56.0    3120.00
      1      140.20   19.16    2.936  0.43( 0.43) 1.00      59.8    3095.00
      1      138.72   22.81    2.644  0.43( 0.43) 1.00      67.1    3165.00
      1      135.64   24.85    2.512  0.43( 0.43) 1.00      69.9    3195.00
      1      109.67   32.94    2.121  0.43( 0.43) 1.00      70.1    3210.00
      2       66.46   17.91    3.056  0.58( 0.35) 0.60      27.3    3712.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      204.26   17.91    3.056  0.47( 0.41) 0.87      83.2    3712.00
      2      204.26   17.93    3.055  0.47( 0.41) 0.87      83.2    3120.00
      3      203.70   19.16    2.936  0.47( 0.41) 0.87      87.1    3095.00
      4      195.06   22.81    2.644  0.46( 0.41) 0.88      94.4    3165.00
      5      188.72   24.85    2.512  0.46( 0.41) 0.89      97.2    3195.00
      6      153.16   32.94    2.121  0.46( 0.41) 0.89      97.3    3210.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     204.26    Tc(MIN.) =    17.91
```



```
  EFFECTIVE AREA(ACRES) =      83.19   AREA-AVERAGED Fm(INCH/HR) =  0.41
  AREA-AVERAGED Fp(INCH/HR) =  0.47  AREA-AVERAGED Ap =  0.87
  TOTAL AREA(ACRES) =       97.3
  LONGEST FLOWPATH FROM NODE   3195.00 TO NODE   3117.00 =    4038.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3117.00 TO NODE   3125.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1977.00  DOWNSTREAM(FEET) =   1967.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =   170.60   CHANNEL SLOPE =  0.0551
  CHANNEL FLOW THRU SUBAREA(CFS) =     204.26
  FLOW VELOCITY(FEET/SEC) =  13.86 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.21   Tc(MIN.) =   18.12
  LONGEST FLOWPATH FROM NODE   3195.00 TO NODE   3125.00 =    4209.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3115.00 TO NODE   3125.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.12
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.036
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        2.92      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.92      SUBAREA RUNOFF(CFS) =    6.84
  EFFECTIVE AREA(ACRES) =     86.11   AREA-AVERAGED Fm(INCH/HR) =  0.41
  AREA-AVERAGED Fp(INCH/HR) =  0.47  AREA-AVERAGED Ap =  0.87
  TOTAL AREA(ACRES) =      100.3       PEAK FLOW RATE(CFS) =     204.26
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   3123.00 TO NODE   3125.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.12
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.036
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        1.75      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        0.07      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.79
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.82      SUBAREA RUNOFF(CFS) =    3.67
  EFFECTIVE AREA(ACRES) =     87.93   AREA-AVERAGED Fm(INCH/HR) =  0.42
  AREA-AVERAGED Fp(INCH/HR) =  0.47  AREA-AVERAGED Ap =  0.88
  TOTAL AREA(ACRES) =      102.1       PEAK FLOW RATE(CFS) =     207.40

****************************************************************************
  FLOW PROCESS FROM NODE   3125.00 TO NODE   3140.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
```

```
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1967.60  DOWNSTREAM(FEET) =   1943.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   867.00   CHANNEL SLOPE =  0.0284
  CHANNEL FLOW THRU SUBAREA(CFS) =     207.40
  FLOW VELOCITY(FEET/SEC) =   9.99 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.45   Tc(MIN.) =   19.57
  LONGEST FLOWPATH FROM NODE   3195.00 TO NODE   3140.00 =    5076.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3130.00 TO NODE   3140.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   19.57
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.899
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        4.99      0.81     1.000    51
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.99      SUBAREA RUNOFF(CFS) =    9.39
  EFFECTIVE AREA(ACRES) =     92.92   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.49  AREA-AVERAGED Ap =  0.88
  TOTAL AREA(ACRES) =      107.1       PEAK FLOW RATE(CFS) =     207.40
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   3140.00 TO NODE   3140.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   19.57
  RAINFALL INTENSITY(INCH/HR) =   2.90
  AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.49
  AREA-AVERAGED Ap =  0.88
  EFFECTIVE STREAM AREA(ACRES) =      92.92
  TOTAL STREAM AREA(ACRES) =     107.07
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     207.40

****************************************************************************
  FLOW PROCESS FROM NODE   3085.00 TO NODE   3090.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1933.00
  ELEVATION DATA: UPSTREAM(FEET) =   2160.00  DOWNSTREAM(FEET) =   1966.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   30.549
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.219
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        8.47      0.81     1.000    51   30.55
  NATURAL GOOD COVER
```



```
  "CHAPARRAL,BROADLEAF"      B       13.50      0.43     1.000    77   30.55
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.58
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     32.44
  TOTAL AREA(ACRES) =     21.97   PEAK FLOW RATE(CFS) =     32.44

****************************************************************************
  FLOW PROCESS FROM NODE   3090.00 TO NODE   3140.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1966.00  DOWNSTREAM(FEET) =   1943.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1169.00   CHANNEL SLOPE =  0.0197
  CHANNEL FLOW THRU SUBAREA(CFS) =      32.44
  FLOW VELOCITY(FEET/SEC) =   4.80 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.06   Tc(MIN.) =   34.61
  LONGEST FLOWPATH FROM NODE   3085.00 TO NODE   3140.00 =    3102.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3135.00 TO NODE   3140.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   34.61
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.059
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        7.54      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        4.37      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.67
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   11.91      SUBAREA RUNOFF(CFS) =   14.88
  EFFECTIVE AREA(ACRES) =     33.88   AREA-AVERAGED Fm(INCH/HR) =  0.61
  AREA-AVERAGED Fp(INCH/HR) =  0.61  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       33.9       PEAK FLOW RATE(CFS) =      44.16

****************************************************************************
  FLOW PROCESS FROM NODE   3140.00 TO NODE   3140.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   34.61
  RAINFALL INTENSITY(INCH/HR) =   2.06
  AREA-AVERAGED Fm(INCH/HR) =  0.61
  AREA-AVERAGED Fp(INCH/HR) =  0.61
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      33.88
  TOTAL STREAM AREA(ACRES) =      33.88
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      44.16

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      207.40   19.57    2.899  0.49( 0.44) 0.88      92.9    3712.00
      1      207.40   19.58    2.898  0.49( 0.44) 0.88      93.0    3120.00
      1      206.71   20.81    2.794  0.49( 0.44) 0.89      96.8    3095.00
```

```
      1      197.45   24.48    2.534  0.49( 0.44) 0.90     104.1    3165.00
      1      190.95   26.55    2.414  0.49( 0.44) 0.90     106.9    3195.00
      1      155.95   34.74    2.054  0.49( 0.44) 0.90     107.1    3210.00
      2       44.16   34.61    2.059  0.61( 0.61) 1.00      33.9    3085.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM        Q       Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
      1      246.85   19.57    2.899  0.52( 0.47) 0.90     112.1    3712.00
      2      246.85   19.58    2.898  0.52( 0.47) 0.90     112.1    3120.00
      3      246.74   20.81    2.794  0.51( 0.47) 0.91     117.2    3095.00
      4      238.94   24.48    2.534  0.51( 0.47) 0.91     128.1    3165.00
      5      233.13   26.55    2.414  0.51( 0.47) 0.92     132.9    3195.00
      6      200.69   34.61    2.059  0.52( 0.48) 0.92     140.9    3085.00
      7      199.97   34.74    2.054  0.52( 0.48) 0.92     140.9    3210.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     246.85    Tc(MIN.) =    19.57
  EFFECTIVE AREA(ACRES) =     112.08   AREA-AVERAGED Fm(INCH/HR) =  0.47
  AREA-AVERAGED Fp(INCH/HR) =  0.52  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      140.9
  LONGEST FLOWPATH FROM NODE   3195.00 TO NODE   3140.00 =    5076.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3140.00 TO NODE   3155.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1943.00  DOWNSTREAM(FEET) =   1940.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    81.00   CHANNEL SLOPE =  0.0370
  CHANNEL FLOW THRU SUBAREA(CFS) =     246.85
  FLOW VELOCITY(FEET/SEC) =  12.05 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.11   Tc(MIN.) =   19.68
  LONGEST FLOWPATH FROM NODE   3195.00 TO NODE   3155.00 =    5157.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3155.00 TO NODE   3155.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.68
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.889
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.07      0.81     1.000    51
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.07      SUBAREA RUNOFF(CFS) =    0.13
  EFFECTIVE AREA(ACRES) =    112.15   AREA-AVERAGED Fm(INCH/HR) =  0.47
  AREA-AVERAGED Fp(INCH/HR) =  0.52  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      141.0       PEAK FLOW RATE(CFS) =     246.85
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   3155.00 TO NODE   3155.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
```



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============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM        Q       Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
      1      246.85   19.68    2.889  0.52( 0.47) 0.90     112.2    3712.00
      2      246.85   19.69    2.888  0.52( 0.47) 0.90     112.2    3120.00
      3      246.74   20.92    2.785  0.51( 0.47) 0.91     117.2    3095.00
      4      238.94   24.60    2.527  0.51( 0.47) 0.91     128.2    3165.00
      5      233.13   26.66    2.408  0.51( 0.47) 0.92     133.0    3195.00
      6      200.69   34.73    2.055  0.52( 0.48) 0.92     141.0    3085.00
      7      199.97   34.86    2.050  0.52( 0.48) 0.92     141.0    3210.00
  LONGEST FLOWPATH FROM NODE   3195.00 TO NODE   3155.00 =    5157.20 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      352.25   16.59    3.200  0.55( 0.47) 0.85     142.4    3300.00
      2      324.78   20.14    2.849  0.54( 0.46) 0.84     150.8    3350.00
      3      279.97   28.58    2.309  0.51( 0.44) 0.86     166.3    1130.00
      4      271.01   30.15    2.237  0.51( 0.44) 0.86     167.4    3020.00
  LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   3155.00 =    6580.20 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM        Q       Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
      1      587.14   16.59    3.200  0.54( 0.47) 0.87     237.0    3300.00
      2      575.20   19.68    2.889  0.53( 0.46) 0.87     261.9    3712.00
      3      575.12   19.69    2.888  0.53( 0.46) 0.87     261.9    3120.00
      4      571.59   20.14    2.849  0.53( 0.46) 0.87     264.9    3350.00
      5      567.37   20.92    2.785  0.53( 0.46) 0.87     269.5    3095.00
      6      540.06   24.60    2.527  0.52( 0.46) 0.88     287.2    3165.00
      7      523.29   26.66    2.408  0.52( 0.46) 0.88     295.8    3195.00
      8      505.37   28.58    2.309  0.51( 0.45) 0.89     301.2    1130.00
      9      490.12   30.15    2.237  0.51( 0.45) 0.89     303.9    3020.00
     10      444.28   34.73    2.055  0.51( 0.46) 0.89     308.4    3085.00
     11      442.84   34.86    2.050  0.51( 0.46) 0.89     308.4    3210.00
    TOTAL AREA(ACRES) =       308.4

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     587.14  Tc(MIN.) =   16.593
  EFFECTIVE AREA(ACRES) =    236.99  AREA-AVERAGED Fm(INCH/HR) =  0.47
  AREA-AVERAGED Fp(INCH/HR) =  0.51  AREA-AVERAGED Ap =  0.89
  TOTAL AREA(ACRES) =      308.4
  LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   3155.00 =    6580.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3155.00 TO NODE   3155.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3155.00 TO NODE   3285.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1940.00  DOWNSTREAM(FEET) =   1920.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1270.00   CHANNEL SLOPE =  0.0152
  CHANNEL FLOW THRU SUBAREA(CFS) =     587.14
  FLOW VELOCITY(FEET/SEC) =  10.16 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.08   Tc(MIN.) =   18.68
```

```
  LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   3285.00 =    7850.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3285.00 TO NODE   3285.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   18.68
  RAINFALL INTENSITY(INCH/HR) =   2.98
  AREA-AVERAGED Fm(INCH/HR) =  0.47
  AREA-AVERAGED Fp(INCH/HR) =  0.54
  AREA-AVERAGED Ap =  0.87
  EFFECTIVE STREAM AREA(ACRES) =     236.99
  TOTAL STREAM AREA(ACRES) =     308.43
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     587.14

****************************************************************************
  FLOW PROCESS FROM NODE   3000.00 TO NODE   3005.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1429.00
  ELEVATION DATA: UPSTREAM(FEET) =   2033.00  DOWNSTREAM(FEET) =   2000.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.808
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.925
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        9.00      0.80     0.100    52   11.81
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =     31.15
  TOTAL AREA(ACRES) =      9.00   PEAK FLOW RATE(CFS) =     31.15

****************************************************************************
  FLOW PROCESS FROM NODE   3005.00 TO NODE   3285.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2000.00  DOWNSTREAM(FEET) =   1920.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2019.00   CHANNEL SLOPE =  0.0393
  CHANNEL FLOW THRU SUBAREA(CFS) =      31.15
  FLOW VELOCITY(FEET/SEC) =   6.71 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.02   Tc(MIN.) =   16.83
  LONGEST FLOWPATH FROM NODE   3000.00 TO NODE   3285.00 =    3448.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3005.00 TO NODE   3285.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.83
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.174
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.04      0.80     0.100    52
```



```
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       30.28      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        3.12      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.77
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.999
  SUBAREA AREA(ACRES) =   33.44      SUBAREA RUNOFF(CFS) =   72.27
  EFFECTIVE AREA(ACRES) =     42.44   AREA-AVERAGED Fm(INCH/HR) =  0.63
  AREA-AVERAGED Fp(INCH/HR) =  0.77  AREA-AVERAGED Ap =  0.81
  TOTAL AREA(ACRES) =       42.4       PEAK FLOW RATE(CFS) =      97.34

****************************************************************************
  FLOW PROCESS FROM NODE   3285.00 TO NODE   3285.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.83
  RAINFALL INTENSITY(INCH/HR) =   3.17
  AREA-AVERAGED Fm(INCH/HR) =  0.63
  AREA-AVERAGED Fp(INCH/HR) =  0.77
  AREA-AVERAGED Ap =  0.81
  EFFECTIVE STREAM AREA(ACRES) =      42.44
  TOTAL STREAM AREA(ACRES) =      42.44
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      97.34

  ** CONFLUENCE DATA **
   STREAM        Q       Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
      1       587.14   18.68    2.981  0.54( 0.47) 0.87     237.0    3300.00
      1       575.20   21.77    2.719  0.53( 0.46) 0.87     261.9    3712.00
      1       575.12   21.78    2.718  0.53( 0.46) 0.87     261.9    3120.00
      1       571.59   22.24    2.685  0.53( 0.46) 0.87     264.9    3350.00
      1       567.37   23.03    2.629  0.53( 0.46) 0.87     269.5    3095.00
      1       540.06   26.74    2.404  0.52( 0.46) 0.88     287.2    3165.00
      1       523.29   28.82    2.298  0.52( 0.46) 0.88     295.8    3195.00
      1       505.37   30.77    2.210  0.51( 0.45) 0.89     301.2    1130.00
      1       490.12   32.35    2.144  0.51( 0.45) 0.89     303.9    3020.00
      1       444.28   37.00    1.978  0.51( 0.46) 0.89     308.4    3085.00
      1       442.84   37.14    1.974  0.51( 0.46) 0.89     308.4    3210.00
      2        97.34   16.83    3.174  0.77( 0.63) 0.81      42.4    3000.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM        Q       Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
      1       666.83   16.83    3.174  0.57( 0.49) 0.86     256.0    3000.00
      2       677.13   18.68    2.981  0.57( 0.49) 0.86     279.4    3300.00
      3       655.16   21.77    2.719  0.56( 0.48) 0.86     304.3    3712.00
      4       655.05   21.78    2.718  0.56( 0.48) 0.86     304.4    3120.00
      5       650.25   22.24    2.685  0.56( 0.48) 0.86     307.3    3350.00
      6       643.91   23.03    2.629  0.56( 0.48) 0.86     311.9    3095.00
      7       607.99   26.74    2.404  0.55( 0.48) 0.87     329.6    3165.00
      8       587.18   28.82    2.298  0.55( 0.48) 0.87     338.2    3195.00
      9       565.89   30.77    2.210  0.54( 0.48) 0.88     343.7    1130.00
     10       548.12   32.35    2.144  0.54( 0.47) 0.88     346.3    3020.00
     11       495.94   37.00    1.978  0.54( 0.48) 0.88     350.9    3085.00
     12       494.34   37.14    1.974  0.54( 0.48) 0.88     350.9    3210.00
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     677.13    Tc(MIN.) =    18.68
  EFFECTIVE AREA(ACRES) =     279.43   AREA-AVERAGED Fm(INCH/HR) =  0.49
  AREA-AVERAGED Fp(INCH/HR) =  0.57  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =       350.9
  LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   3285.00 =    7850.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3285.00 TO NODE   3285.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3535.00 TO NODE   3540.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   804.00
  ELEVATION DATA: UPSTREAM(FEET) =   2030.00  DOWNSTREAM(FEET) =   2018.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.874
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.563
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       A        2.49      0.80     0.600    52   13.87
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        2.85      0.45     0.600    76   13.87
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.61
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =     15.36
  TOTAL AREA(ACRES) =      5.34   PEAK FLOW RATE(CFS) =     15.36

****************************************************************************
  FLOW PROCESS FROM NODE   3030.00 TO NODE   3540.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.87
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.563
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       A        3.28      0.80     0.600    52
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        0.70      0.45     0.600    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    3.98      SUBAREA RUNOFF(CFS) =   11.18
  EFFECTIVE AREA(ACRES) =      9.32   AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.66  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        9.3       PEAK FLOW RATE(CFS) =      26.54

****************************************************************************
  FLOW PROCESS FROM NODE   3540.00 TO NODE   3545.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```



```
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2018.00  DOWNSTREAM(FEET) =  1995.50
  FLOW LENGTH(FEET) =   656.60   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.50
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.54
  PIPE TRAVEL TIME(MIN.) =   0.81    Tc(MIN.) =   14.69
  LONGEST FLOWPATH FROM NODE   3535.00 TO NODE   3545.00 =    1460.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3542.00 TO NODE   3545.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.444
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       A        0.20      0.80     0.600    52
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        4.93      0.45     0.600    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.47
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    5.13      SUBAREA RUNOFF(CFS) =   14.61
  EFFECTIVE AREA(ACRES) =     14.45   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.59  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =       14.4       PEAK FLOW RATE(CFS) =      40.15

****************************************************************************
  FLOW PROCESS FROM NODE   3545.00 TO NODE   3542.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.69
  RAINFALL INTENSITY(INCH/HR) =   3.44
  AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.59
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =      14.45
  TOTAL STREAM AREA(ACRES) =      14.45
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      40.15

****************************************************************************
  FLOW PROCESS FROM NODE   3520.00 TO NODE   3525.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   636.30
  ELEVATION DATA: UPSTREAM(FEET) =   2018.50  DOWNSTREAM(FEET) =   1999.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.942
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.109
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
```

```
  "3-4 DWELLINGS/ACRE"       A        4.33      0.80     0.600    52   10.94
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        2.92      0.45     0.600    76   10.94
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.66
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =     24.24
  TOTAL AREA(ACRES) =      7.25   PEAK FLOW RATE(CFS) =     24.24

****************************************************************************
  FLOW PROCESS FROM NODE   3525.00 TO NODE   3545.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1999.00  DOWNSTREAM(FEET) =  1995.00
  FLOW LENGTH(FEET) =   180.30   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.43
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      24.24
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =   11.20
  LONGEST FLOWPATH FROM NODE   3520.00 TO NODE   3545.00 =     816.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3525.00 TO NODE   3545.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.20
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.051
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        1.92      0.45     0.600    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    1.92      SUBAREA RUNOFF(CFS) =    6.53
  EFFECTIVE AREA(ACRES) =      9.17   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.61  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =        9.2       PEAK FLOW RATE(CFS) =      30.39

****************************************************************************
  FLOW PROCESS FROM NODE   3545.00 TO NODE   3545.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.20
  RAINFALL INTENSITY(INCH/HR) =   4.05
  AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.61
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =       9.17
  TOTAL STREAM AREA(ACRES) =       9.17
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      30.39

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       40.15   14.69    3.444  0.59( 0.36) 0.60      14.4    3535.00
```



```
      2       30.39   11.20    4.051  0.61( 0.37) 0.60       9.2    3520.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       67.04   11.20    4.051  0.60( 0.36) 0.60      20.2    3520.00
      2       65.53   14.69    3.444  0.60( 0.36) 0.60      23.6    3535.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      67.04    Tc(MIN.) =    11.20
  EFFECTIVE AREA(ACRES) =      20.20   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =       23.6
  LONGEST FLOWPATH FROM NODE   3535.00 TO NODE   3545.00 =    1460.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3545.00 TO NODE   3550.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1995.50  DOWNSTREAM(FEET) =  1973.00
  FLOW LENGTH(FEET) =   626.70   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.42
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      67.04
  PIPE TRAVEL TIME(MIN.) =   0.60    Tc(MIN.) =   11.80
  LONGEST FLOWPATH FROM NODE   3550.00 TO NODE   3550.00 =    2087.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3550.00 TO NODE   3550.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.80
  RAINFALL INTENSITY(INCH/HR) =   3.93
  AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.60
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =      20.20
  TOTAL STREAM AREA(ACRES) =      23.62
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      67.04

****************************************************************************
  FLOW PROCESS FROM NODE   3510.00 TO NODE   3515.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   891.60
  ELEVATION DATA: UPSTREAM(FEET) =   1997.00  DOWNSTREAM(FEET) =   1996.10

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   24.783
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.516
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       A        5.08      0.80     0.600    52   24.78
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        1.60      0.45     0.600    76   24.78
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.71
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =     12.55
  TOTAL AREA(ACRES) =      6.68   PEAK FLOW RATE(CFS) =     12.55

****************************************************************************
  FLOW PROCESS FROM NODE   3515.00 TO NODE   3550.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1996.00  DOWNSTREAM(FEET) =  1973.00
  FLOW LENGTH(FEET) =   790.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.75
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.55
  PIPE TRAVEL TIME(MIN.) =   1.23    Tc(MIN.) =   26.01
  LONGEST FLOWPATH FROM NODE   3510.00 TO NODE   3550.00 =    1682.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3517.00 TO NODE   3550.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   26.01
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.444
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        5.42      0.45     0.600    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    5.42      SUBAREA RUNOFF(CFS) =   10.60
  EFFECTIVE AREA(ACRES) =     12.10   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =       12.1       PEAK FLOW RATE(CFS) =      22.72

****************************************************************************
  FLOW PROCESS FROM NODE   3550.00 TO NODE   3550.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   26.01
  RAINFALL INTENSITY(INCH/HR) =   2.44
  AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.60
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =      12.10
  TOTAL STREAM AREA(ACRES) =      12.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      22.72

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



```
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       67.04   11.80    3.926  0.60( 0.36) 0.60      20.2    3520.00
      1       65.53   15.29    3.362  0.60( 0.36) 0.60      23.6    3535.00
      2       22.72   26.01    2.444  0.60( 0.36) 0.60      12.1    3510.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       84.68   11.80    3.926  0.60( 0.36) 0.60      25.7    3520.00
      2       84.76   15.29    3.362  0.60( 0.36) 0.60      30.7    3535.00
      3       68.20   26.01    2.444  0.60( 0.36) 0.60      35.7    3510.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      84.76    Tc(MIN.) =    15.29
  EFFECTIVE AREA(ACRES) =      30.73   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =      35.7
  LONGEST FLOWPATH FROM NODE   3535.00 TO NODE   3550.00 =    2087.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3547.00 TO NODE   3550.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.29
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.362
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        4.56      0.45     0.600    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    4.56      SUBAREA RUNOFF(CFS) =   12.68
  EFFECTIVE AREA(ACRES) =     35.29   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.58  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =       40.3       PEAK FLOW RATE(CFS) =      95.70

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       97.41   11.80    3.926  0.58( 0.35) 0.60      30.2    3520.00
      2       95.70   15.29    3.362  0.58( 0.35) 0.60      35.3    3535.00
      3       75.91   26.01    2.444  0.58( 0.35) 0.60      40.3    3510.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      97.41  Tc(MIN.) =   11.80
  AREA-AVERAGED Fm(INCH/HR) =  0.35  AREA-AVERAGED Fp(INCH/HR) =  0.58
  AREA-AVERAGED Ap =  0.60  EFFECTIVE AREA(ACRES) =      30.25

****************************************************************************
  FLOW PROCESS FROM NODE   3552.00 TO NODE   3555.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.80
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.926
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
```

```
  "3-4 DWELLINGS/ACRE"       B        5.08      0.45     0.600    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    5.08      SUBAREA RUNOFF(CFS) =   16.71
  EFFECTIVE AREA(ACRES) =     35.33   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.56  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =       45.4       PEAK FLOW RATE(CFS) =     114.12

****************************************************************************
  FLOW PROCESS FROM NODE   3550.00 TO NODE   3555.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1973.00  DOWNSTREAM(FEET) =  1952.00
  FLOW LENGTH(FEET) =   447.90   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.18
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      114.12
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   12.14
  LONGEST FLOWPATH FROM NODE   3535.00 TO NODE   3555.00 =    2535.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3555.00 TO NODE   3555.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.14
  RAINFALL INTENSITY(INCH/HR) =   3.86
  AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.56
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =      35.33
  TOTAL STREAM AREA(ACRES) =      45.36
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     114.12

****************************************************************************
  FLOW PROCESS FROM NODE   3500.00 TO NODE   3505.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1114.00
  ELEVATION DATA: UPSTREAM(FEET) =   1980.70  DOWNSTREAM(FEET) =   1958.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.853
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.420
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       A        7.18      0.80     0.600    52   14.85
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =     19.02
  TOTAL AREA(ACRES) =      7.18   PEAK FLOW RATE(CFS) =     19.02

****************************************************************************
  FLOW PROCESS FROM NODE   3505.00 TO NODE   3555.00 IS CODE =  31
```



```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1958.00  DOWNSTREAM(FEET) =  1952.00
  FLOW LENGTH(FEET) =   797.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.94
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.02
  PIPE TRAVEL TIME(MIN.) =   1.91    Tc(MIN.) =   16.77
  LONGEST FLOWPATH FROM NODE   3500.00 TO NODE   3555.00 =    1911.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3505.00 TO NODE   3555.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.77
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.180
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       A        1.56      0.80     0.600    52
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        4.33      0.45     0.600    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.54
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    5.89      SUBAREA RUNOFF(CFS) =   15.13
  EFFECTIVE AREA(ACRES) =     13.07   AREA-AVERAGED Fm(INCH/HR) =  0.41
  AREA-AVERAGED Fp(INCH/HR) =  0.68  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =       13.1       PEAK FLOW RATE(CFS) =      32.60

****************************************************************************
  FLOW PROCESS FROM NODE   3555.00 TO NODE   3555.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.77
  RAINFALL INTENSITY(INCH/HR) =   3.18
  AREA-AVERAGED Fm(INCH/HR) =  0.41
  AREA-AVERAGED Fp(INCH/HR) =  0.68
  AREA-AVERAGED Ap =  0.60
  EFFECTIVE STREAM AREA(ACRES) =      13.07
  TOTAL STREAM AREA(ACRES) =      13.07
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      32.60

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      114.12   12.14    3.860  0.56( 0.34) 0.60      35.3    3520.00
      1      109.83   15.63    3.317  0.57( 0.34) 0.60      40.4    3535.00
      1       85.84   26.38    2.423  0.57( 0.34) 0.60      45.4    3510.00
      2       32.60   16.77    3.180  0.68( 0.41) 0.60      13.1    3500.00

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

  ** PEAK FLOW RATE TABLE **
```

```
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      143.51   12.14    3.860  0.59( 0.35) 0.60      44.8    3520.00
     2      141.72   15.63    3.317  0.59( 0.36) 0.60      52.6    3535.00
     3      139.90   16.77    3.180  0.59( 0.36) 0.60      54.0    3500.00
     4      109.53   26.38    2.423  0.59( 0.36) 0.60      58.4    3510.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     143.51    Tc(MIN.) =    12.14
  EFFECTIVE AREA(ACRES) =      44.79   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.59  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =       58.4
  LONGEST FLOWPATH FROM NODE   3535.00 TO NODE   3555.00 =    2535.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3555.00 TO NODE   3245.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1952.00  DOWNSTREAM(FEET) =  1944.00
  FLOW LENGTH(FEET) =   173.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.32
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     143.51
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   12.26
  LONGEST FLOWPATH FROM NODE   3535.00 TO NODE   3245.00 =    2708.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3245.00 TO NODE   3245.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.26
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.837
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        0.76      0.45     0.600    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    0.76      SUBAREA RUNOFF(CFS) =    2.44
  EFFECTIVE AREA(ACRES) =     45.55   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.58  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =       59.2       PEAK FLOW RATE(CFS) =     143.51
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   3245.00 TO NODE   3245.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.26
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.837
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.65      0.80     0.100    52
  COMMERCIAL                 B        0.05      0.45     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.79
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
```



```
  SUBAREA AREA(ACRES) =    1.70      SUBAREA RUNOFF(CFS) =    5.75
  EFFECTIVE AREA(ACRES) =     47.25   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.59  AREA-AVERAGED Ap =  0.58
  TOTAL AREA(ACRES) =       60.9       PEAK FLOW RATE(CFS) =     148.67

****************************************************************************
  FLOW PROCESS FROM NODE   3245.00 TO NODE   3270.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1937.10  DOWNSTREAM(FEET) =   1925.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =   300.00   CHANNEL SLOPE =  0.0390
  CHANNEL FLOW THRU SUBAREA(CFS) =     148.67
  FLOW VELOCITY(FEET/SEC) =  10.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.47   Tc(MIN.) =   12.74
  LONGEST FLOWPATH FROM NODE   3535.00 TO NODE   3270.00 =    3008.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3270.00 TO NODE   3270.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.74
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.751
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.06      0.80     0.100    52
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.68      0.81     1.000    51
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.927
  SUBAREA AREA(ACRES) =    0.74      SUBAREA RUNOFF(CFS) =    2.00
  EFFECTIVE AREA(ACRES) =     47.99   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.59  AREA-AVERAGED Ap =  0.59
  TOTAL AREA(ACRES) =       61.6       PEAK FLOW RATE(CFS) =     148.67
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   3270.00 TO NODE   3270.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.74
  RAINFALL INTENSITY(INCH/HR) =   3.75
  AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.59
  AREA-AVERAGED Ap =  0.59
  EFFECTIVE STREAM AREA(ACRES) =      47.99
  TOTAL STREAM AREA(ACRES) =      61.63
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     148.67

****************************************************************************
  FLOW PROCESS FROM NODE   3197.00 TO NODE   3235.00 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) =   1982.40  DOWNSTREAM(FEET) =   1948.80
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.679
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.422
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.40      0.81     1.000    51   29.77
  COMMERCIAL                 A        1.45      0.80     0.100    52    9.68
  COMMERCIAL                 B        0.22      0.45     0.100    76    9.68
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.79
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.274
  SUBAREA RUNOFF(CFS) =      7.84
  TOTAL AREA(ACRES) =      2.07   PEAK FLOW RATE(CFS) =      7.84

****************************************************************************
  FLOW PROCESS FROM NODE   3235.00 TO NODE   3270.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1948.80  DOWNSTREAM(FEET) =   1925.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1342.40   CHANNEL SLOPE =  0.0174
  CHANNEL FLOW THRU SUBAREA(CFS) =       7.84
  FLOW VELOCITY(FEET/SEC) =   3.10 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.21   Tc(MIN.) =   16.89
  LONGEST FLOWPATH FROM NODE   3197.00 TO NODE   3270.00 =    2374.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3270.00 TO NODE   3270.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.89
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.167
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        2.78      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        4.01      0.43     1.000    77
  COMMERCIAL                 A        0.21      0.80     0.100    52
  COMMERCIAL                 B        0.14      0.45     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.59
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.956
  SUBAREA AREA(ACRES) =    7.14      SUBAREA RUNOFF(CFS) =   16.74
  EFFECTIVE AREA(ACRES) =      9.21   AREA-AVERAGED Fm(INCH/HR) =  0.48
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.80
  TOTAL AREA(ACRES) =        9.2       PEAK FLOW RATE(CFS) =      22.24

****************************************************************************
  FLOW PROCESS FROM NODE   3270.00 TO NODE   3270.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.89
  RAINFALL INTENSITY(INCH/HR) =   3.17
  AREA-AVERAGED Fm(INCH/HR) =  0.48
```



```
  AREA-AVERAGED Fp(INCH/HR) =  0.60
  AREA-AVERAGED Ap =  0.80
  EFFECTIVE STREAM AREA(ACRES) =       9.21
  TOTAL STREAM AREA(ACRES) =      9.21
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      22.24

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      148.67   12.74    3.751  0.59( 0.35) 0.59      48.0    3520.00
      1      146.34   16.23    3.243  0.60( 0.35) 0.59      55.8    3535.00
      1      143.19   17.37    3.114  0.60( 0.35) 0.59      57.2    3500.00
      1      113.34   27.03    2.388  0.60( 0.35) 0.59      61.6    3510.00
      2       22.24   16.89    3.167  0.60( 0.48) 0.80       9.2    3197.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      169.09   12.74    3.751  0.59( 0.36) 0.61      54.9    3520.00
      2      168.32   16.23    3.243  0.60( 0.37) 0.62      64.6    3535.00
      3      166.77   16.89    3.167  0.60( 0.37) 0.62      65.8    3197.00
      4      164.99   17.37    3.114  0.60( 0.37) 0.62      66.4    3500.00
      5      129.12   27.03    2.388  0.60( 0.37) 0.62      70.8    3510.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     169.09    Tc(MIN.) =    12.74
  EFFECTIVE AREA(ACRES) =      54.94   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.59  AREA-AVERAGED Ap =  0.61
  TOTAL AREA(ACRES) =       70.8
  LONGEST FLOWPATH FROM NODE   3535.00 TO NODE   3270.00 =    3008.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3270.00 TO NODE   3285.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1925.40  DOWNSTREAM(FEET) =   1920.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =   311.70   CHANNEL SLOPE =  0.0151
  CHANNEL FLOW THRU SUBAREA(CFS) =     169.09
  FLOW VELOCITY(FEET/SEC) =   6.84 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.76   Tc(MIN.) =   13.50
  LONGEST FLOWPATH FROM NODE   3535.00 TO NODE   3285.00 =    3319.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3270.00 TO NODE   3285.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.623
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        1.11      0.81     1.000    51
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.11      SUBAREA RUNOFF(CFS) =    2.81
  EFFECTIVE AREA(ACRES) =     56.05   AREA-AVERAGED Fm(INCH/HR) =  0.37
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  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.62
  TOTAL AREA(ACRES) =       72.0       PEAK FLOW RATE(CFS) =     169.09
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   3285.00 TO NODE   3285.00 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      169.09   13.50    3.623  0.60( 0.37) 0.62      56.0    3520.00
      2      168.32   16.99    3.155  0.60( 0.38) 0.62      65.7    3535.00
      3      166.77   17.65    3.084  0.60( 0.38) 0.63      66.9    3197.00
      4      164.99   18.13    3.034  0.60( 0.38) 0.63      67.5    3500.00
      5      129.12   27.85    2.345  0.60( 0.38) 0.62      72.0    3510.00
  LONGEST FLOWPATH FROM NODE   3535.00 TO NODE   3285.00 =    3319.90 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      666.83   16.83    3.174  0.57( 0.49) 0.86     256.0    3000.00
      2      677.13   18.68    2.981  0.57( 0.49) 0.86     279.4    3300.00
      3      655.16   21.77    2.719  0.56( 0.48) 0.86     304.3    3712.00
      4      655.05   21.78    2.718  0.56( 0.48) 0.86     304.4    3120.00
      5      650.25   22.24    2.685  0.56( 0.48) 0.86     307.3    3350.00
      6      643.91   23.03    2.629  0.56( 0.48) 0.86     311.9    3095.00
      7      607.99   26.74    2.404  0.55( 0.48) 0.87     329.6    3165.00
      8      587.18   28.82    2.298  0.55( 0.48) 0.87     338.2    3195.00
      9      565.89   30.77    2.210  0.54( 0.48) 0.88     343.7    1130.00
     10      548.12   32.35    2.144  0.54( 0.47) 0.88     346.3    3020.00
     11      495.94   37.00    1.978  0.54( 0.48) 0.88     350.9    3085.00
     12      494.34   37.14    1.974  0.54( 0.48) 0.88     350.9    3210.00
  LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   3285.00 =    7850.20 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      793.55   13.50    3.623  0.58( 0.47) 0.81     261.4    3520.00
      2      835.19   16.83    3.174  0.58( 0.47) 0.81     321.2    3000.00
      3      836.09   16.99    3.155  0.58( 0.47) 0.81     323.8    3535.00
      4      838.18   17.65    3.084  0.58( 0.47) 0.81     333.3    3197.00
      5      839.11   18.13    3.034  0.58( 0.47) 0.81     340.0    3500.00
      6      840.12   18.68    2.981  0.58( 0.47) 0.81     347.2    3300.00
      7      806.72   21.77    2.719  0.57( 0.46) 0.82     373.5    3712.00
      8      806.57   21.78    2.718  0.57( 0.46) 0.82     373.5    3120.00
      9      800.09   22.24    2.685  0.57( 0.46) 0.82     376.7    3350.00
     10      790.84   23.03    2.629  0.57( 0.46) 0.82     381.7    3095.00
     11      741.23   26.74    2.404  0.56( 0.46) 0.83     401.1    3165.00
     12      725.95   27.85    2.345  0.56( 0.46) 0.83     406.2    3510.00
     13      713.18   28.82    2.298  0.55( 0.46) 0.83     410.2    3195.00
     14      686.10   30.77    2.210  0.55( 0.46) 0.83     415.6    1130.00
     15      664.03   32.35    2.144  0.55( 0.46) 0.83     418.3    3020.00
     16      600.97   37.00    1.978  0.55( 0.46) 0.84     422.8    3085.00
     17      599.07   37.14    1.974  0.55( 0.46) 0.84     422.8    3210.00
    TOTAL AREA(ACRES) =       422.8

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      840.12  Tc(MIN.) =   18.676
  EFFECTIVE AREA(ACRES) =    347.17  AREA-AVERAGED Fm(INCH/HR) =  0.47
  AREA-AVERAGED Fp(INCH/HR) =  0.57  AREA-AVERAGED Ap =  0.82
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  TOTAL AREA(ACRES) =      422.8
  LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   3285.00 =    7850.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3285.00 TO NODE   3285.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   3285.00 TO NODE   5015.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1920.70  DOWNSTREAM(FEET) =   1915.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   166.50   CHANNEL SLOPE =  0.0336
  CHANNEL FLOW THRU SUBAREA(CFS) =     840.12
  FLOW VELOCITY(FEET/SEC) =  16.98 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.16   Tc(MIN.) =   18.84
  LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   5015.00 =    8016.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   3285.00 TO NODE   5015.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.84
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.966
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        1.35      0.81     1.000    51
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.35      SUBAREA RUNOFF(CFS) =    2.62
  EFFECTIVE AREA(ACRES) =    348.52   AREA-AVERAGED Fm(INCH/HR) =  0.47
  AREA-AVERAGED Fp(INCH/HR) =  0.58  AREA-AVERAGED Ap =  0.81
  TOTAL AREA(ACRES) =      424.2       PEAK FLOW RATE(CFS) =     840.12
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5015.00 TO NODE   5015.00 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      793.55   13.66    3.596  0.58( 0.47) 0.81     262.7    3520.00
      2      835.19   16.99    3.155  0.58( 0.47) 0.81     322.6    3000.00
      3      836.09   17.16    3.137  0.58( 0.47) 0.81     325.2    3535.00
      4      838.18   17.81    3.067  0.58( 0.47) 0.81     334.6    3197.00
      5      839.11   18.30    3.018  0.58( 0.47) 0.81     341.4    3500.00
      6      840.12   18.84    2.966  0.58( 0.47) 0.81     348.5    3300.00
      7      806.72   21.94    2.706  0.57( 0.47) 0.82     374.8    3712.00
      8      806.57   21.95    2.706  0.57( 0.47) 0.82     374.9    3120.00
      9      800.09   22.41    2.673  0.57( 0.47) 0.82     378.0    3350.00
     10      790.84   23.19    2.618  0.57( 0.46) 0.82     383.0    3095.00
     11      741.23   26.91    2.395  0.56( 0.46) 0.83     402.4    3165.00
     12      725.95   28.03    2.337  0.56( 0.46) 0.83     407.5    3510.00
```

```
   13      713.18   28.99    2.290  0.55( 0.46) 0.83     411.5    3195.00
   14      686.10   30.94    2.202  0.55( 0.46) 0.83     417.0    1130.00
   15      664.03   32.53    2.137  0.55( 0.46) 0.83     419.6    3020.00
   16      600.97   37.19    1.972  0.55( 0.46) 0.84     424.2    3085.00
   17      599.07   37.32    1.968  0.55( 0.46) 0.84     424.2    3210.00
 LONGEST FLOWPATH FROM NODE   3020.00 TO NODE   5015.00 =    8016.70 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      667.23   16.71    3.187  0.36( 0.34) 0.94     257.0    1400.00
     2      727.56   23.83    2.576  0.34( 0.33) 0.96     356.4    1125.00
     3      729.31   24.16    2.554  0.34( 0.33) 0.96     360.7    1195.00
     4      737.68   27.70    2.353  0.33( 0.32) 0.96     400.7    1135.00
     5      744.18   32.38    2.143  0.33( 0.32) 0.97     449.8    1000.00
     6      715.94   34.76    2.054  0.33( 0.32) 0.97     455.0    1060.00
 LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   5015.00 =   10773.26 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
     1     1417.40   13.66    3.596  0.47( 0.41) 0.87     472.9    3520.00
     2     1498.92   16.71    3.187  0.47( 0.41) 0.87     574.5    1400.00
     3     1504.78   16.99    3.155  0.47( 0.41) 0.87     583.5    3000.00
     4     1507.12   17.16    3.137  0.47( 0.41) 0.87     588.4    3535.00
     5     1514.75   17.81    3.067  0.47( 0.41) 0.87     607.0    3197.00
     6     1519.79   18.30    3.018  0.47( 0.41) 0.87     620.6    3500.00
     7     1525.40   18.84    2.966  0.47( 0.41) 0.87     635.2    3300.00
     8     1518.29   21.94    2.706  0.46( 0.40) 0.88     704.8    3712.00
     9     1518.23   21.95    2.706  0.46( 0.40) 0.88     705.1    3120.00
    10     1515.60   22.41    2.673  0.45( 0.40) 0.88     714.5    3350.00
    11     1513.03   23.19    2.618  0.45( 0.40) 0.89     730.5    3095.00
    12     1509.94   23.83    2.576  0.45( 0.40) 0.89     742.7    1125.00
    13     1507.17   24.16    2.554  0.45( 0.40) 0.89     748.8    1195.00
    14     1477.03   26.91    2.395  0.44( 0.39) 0.89     794.1    3165.00
    15     1468.07   27.70    2.353  0.44( 0.39) 0.90     806.7    1135.00
    16     1464.08   28.03    2.337  0.44( 0.39) 0.90     811.6    3510.00
    17     1452.65   28.99    2.290  0.43( 0.39) 0.90     825.8    3195.00
    18     1428.28   30.94    2.202  0.43( 0.39) 0.90     851.7    1130.00
    19     1410.35   32.38    2.143  0.43( 0.39) 0.90     869.2    1000.00
    20     1406.37   32.53    2.137  0.43( 0.39) 0.90     869.8    3020.00
    21     1349.79   34.76    2.054  0.43( 0.38) 0.90     876.8    1060.00
    22     1283.34   37.19    1.972  0.43( 0.39) 0.90     879.2    3085.00
    23     1279.65   37.32    1.968  0.43( 0.39) 0.90     879.2    3210.00
  TOTAL AREA(ACRES) =       879.2

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     1525.40  Tc(MIN.) =   18.839
 EFFECTIVE AREA(ACRES) =    635.24  AREA-AVERAGED Fm(INCH/HR) =  0.41
 AREA-AVERAGED Fp(INCH/HR) =  0.47  AREA-AVERAGED Ap =  0.87
 TOTAL AREA(ACRES) =       879.2
 LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   5015.00 =   10773.26 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   5015.00 TO NODE   5015.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE   5015.00 TO NODE   5015.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```



```
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   18.84
 RAINFALL INTENSITY(INCH/HR) =   2.97
 AREA-AVERAGED Fm(INCH/HR) =  0.41
 AREA-AVERAGED Fp(INCH/HR) =  0.47
 AREA-AVERAGED Ap =  0.87
 EFFECTIVE STREAM AREA(ACRES) =     635.24
 TOTAL STREAM AREA(ACRES) =     879.21
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    1525.40

****************************************************************************
 FLOW PROCESS FROM NODE   4000.00 TO NODE   4005.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   987.00
 ELEVATION DATA: UPSTREAM(FEET) =   2425.00  DOWNSTREAM(FEET) =   2084.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   18.233
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.024
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL GOOD COVER
 "CHAPARRAL,BROADLEAF"      C        6.66      0.24     1.000    88   18.23
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =     16.71
 TOTAL AREA(ACRES) =      6.66   PEAK FLOW RATE(CFS) =     16.71

****************************************************************************
 FLOW PROCESS FROM NODE   4005.00 TO NODE   4015.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   2084.00  DOWNSTREAM(FEET) =   2037.70
 CHANNEL LENGTH THRU SUBAREA(FEET) =   317.50   CHANNEL SLOPE =  0.1458
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =      16.71
 FLOW VELOCITY(FEET/SEC) =   9.03 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.59   Tc(MIN.) =   18.82
 LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4015.00 =    1304.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   4010.00 TO NODE   4015.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.82
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.968
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "CHAPARRAL,BROADLEAF"      C        8.61      0.24     1.000    88
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    8.61      SUBAREA RUNOFF(CFS) =   21.17
```

```
  EFFECTIVE AREA(ACRES) =     15.27   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       15.3       PEAK FLOW RATE(CFS) =      37.54

****************************************************************************
  FLOW PROCESS FROM NODE   4015.00 TO NODE   4030.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2038.00  DOWNSTREAM(FEET) =   1965.22
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1038.96   CHANNEL SLOPE =  0.0701
  CHANNEL FLOW THRU SUBAREA(CFS) =      37.54
  FLOW VELOCITY(FEET/SEC) =   9.44 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.83   Tc(MIN.) =   20.65
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4030.00 =    2343.46 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4025.00 TO NODE   4030.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.65
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.806
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        1.77      0.43     1.000    77
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        6.03      0.24     1.000    88
  COMMERCIAL                 C        0.02      0.27     0.100    86
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        1.76      0.81     1.000    51
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.38
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.998
  SUBAREA AREA(ACRES) =    9.58      SUBAREA RUNOFF(CFS) =   20.94
  EFFECTIVE AREA(ACRES) =     24.85   AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       24.8       PEAK FLOW RATE(CFS) =      56.27

****************************************************************************
  FLOW PROCESS FROM NODE   4020.00 TO NODE   4030.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.65
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.806
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.05      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       10.49      0.24     1.000    88
  COMMERCIAL                 C        0.01      0.27     0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.999
  SUBAREA AREA(ACRES) =   10.55      SUBAREA RUNOFF(CFS) =   24.38
  EFFECTIVE AREA(ACRES) =     35.40   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       35.4       PEAK FLOW RATE(CFS) =      80.65
```



```
****************************************************************************
  FLOW PROCESS FROM NODE   4030.00 TO NODE   4040.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1965.22  DOWNSTREAM(FEET) =   1932.31
  CHANNEL LENGTH THRU SUBAREA(FEET) =   117.00   CHANNEL SLOPE =  0.2813
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      80.65
  FLOW VELOCITY(FEET/SEC) =  14.08 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.14   Tc(MIN.) =   20.79
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4040.00 =    2460.46 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4035.00 TO NODE   4040.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.79
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.795
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.12      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        0.07      0.24     1.000    88
  COMMERCIAL                 A        3.77      0.80     0.100    52
  COMMERCIAL                 B        0.02      0.45     0.100    76
  COMMERCIAL                 C        0.66      0.27     0.100    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.68
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.137
  SUBAREA AREA(ACRES) =    4.64      SUBAREA RUNOFF(CFS) =   11.28
  EFFECTIVE AREA(ACRES) =     40.04   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       40.0       PEAK FLOW RATE(CFS) =      91.58

****************************************************************************
  FLOW PROCESS FROM NODE   4040.00 TO NODE   4050.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1962.31  DOWNSTREAM(FEET) =   1954.45
  CHANNEL LENGTH THRU SUBAREA(FEET) =   169.60   CHANNEL SLOPE =  0.0463
  CHANNEL FLOW THRU SUBAREA(CFS) =      91.58
  FLOW VELOCITY(FEET/SEC) =   9.95 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.28   Tc(MIN.) =   21.08
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4050.00 =    2630.06 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4045.00 TO NODE   4050.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.08
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.773
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        5.37      0.81     1.000    51
```

```
  COMMERCIAL                  A        6.24      0.80     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.516
  SUBAREA AREA(ACRES) =   11.61      SUBAREA RUNOFF(CFS) =   24.62
  EFFECTIVE AREA(ACRES) =     51.65   AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  0.81
  TOTAL AREA(ACRES) =       51.6       PEAK FLOW RATE(CFS) =     115.38

****************************************************************************
  FLOW PROCESS FROM NODE   4050.00 TO NODE   5015.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1954.45  DOWNSTREAM(FEET) =   1915.12
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1231.49   CHANNEL SLOPE =  0.0319
  CHANNEL FLOW THRU SUBAREA(CFS) =     115.38
  FLOW VELOCITY(FEET/SEC) =   8.86 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.32   Tc(MIN.) =   23.39
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   5015.00 =    3861.55 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5000.00 TO NODE   5015.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   23.39
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.604
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  A       13.81      0.80     0.100    52
  COMMERCIAL                  A        1.59      0.80     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   15.40      SUBAREA RUNOFF(CFS) =   34.99
  EFFECTIVE AREA(ACRES) =     67.05   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.65
  TOTAL AREA(ACRES) =       67.0       PEAK FLOW RATE(CFS) =     142.55

****************************************************************************
  FLOW PROCESS FROM NODE   5015.00 TO NODE   5015.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   23.39
  RAINFALL INTENSITY(INCH/HR) =   2.60
  AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.37
  AREA-AVERAGED Ap =  0.65
  EFFECTIVE STREAM AREA(ACRES) =      67.05
  TOTAL STREAM AREA(ACRES) =      67.05
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     142.55

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1417.40   13.66    3.596  0.47( 0.41) 0.87     472.9    3520.00
      1     1498.92   16.71    3.187  0.47( 0.41) 0.87     574.5    1400.00
      1     1504.78   16.99    3.155  0.47( 0.41) 0.87     583.5    3000.00
```



```
      1     1507.12   17.16    3.137  0.47( 0.41) 0.87     588.4    3535.00
      1     1514.75   17.81    3.067  0.47( 0.41) 0.87     607.0    3197.00
      1     1519.79   18.30    3.018  0.47( 0.41) 0.87     620.6    3500.00
      1     1525.40   18.84    2.966  0.47( 0.41) 0.87     635.2    3300.00
      1     1518.29   21.94    2.706  0.46( 0.40) 0.88     704.8    3712.00
      1     1518.23   21.95    2.706  0.46( 0.40) 0.88     705.1    3120.00
      1     1515.60   22.41    2.673  0.45( 0.40) 0.88     714.5    3350.00
      1     1513.03   23.19    2.618  0.45( 0.40) 0.89     730.5    3095.00
      1     1509.94   23.83    2.576  0.45( 0.40) 0.89     742.7    1125.00
      1     1507.17   24.16    2.554  0.45( 0.40) 0.89     748.8    1195.00
      1     1477.03   26.91    2.395  0.44( 0.39) 0.89     794.1    3165.00
      1     1468.07   27.70    2.353  0.44( 0.39) 0.90     806.7    1135.00
      1     1464.08   28.03    2.337  0.44( 0.39) 0.90     811.6    3510.00
      1     1452.65   28.99    2.290  0.43( 0.39) 0.90     825.8    3195.00
      1     1428.28   30.94    2.202  0.43( 0.39) 0.90     851.7    1130.00
      1     1410.35   32.38    2.143  0.43( 0.39) 0.90     869.2    1000.00
      1     1406.37   32.53    2.137  0.43( 0.39) 0.90     869.8    3020.00
      1     1349.79   34.76    2.054  0.43( 0.38) 0.90     876.8    1060.00
      1     1283.34   37.19    1.972  0.43( 0.39) 0.90     879.2    3085.00
      1     1279.65   37.32    1.968  0.43( 0.39) 0.90     879.2    3210.00
      2      142.55   23.39    2.604  0.37( 0.24) 0.65      67.0    4000.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1535.61   13.66    3.596  0.47( 0.40) 0.85     512.0    3520.00
      2     1625.86   16.71    3.187  0.47( 0.40) 0.85     622.4    1400.00
      3     1632.46   16.99    3.155  0.47( 0.40) 0.85     632.2    3000.00
      4     1635.24   17.16    3.137  0.46( 0.40) 0.85     637.6    3535.00
      5     1644.56   17.81    3.067  0.46( 0.40) 0.86     658.1    3197.00
      6     1650.82   18.30    3.018  0.46( 0.40) 0.86     673.0    3500.00
      7     1657.76   18.84    2.966  0.46( 0.40) 0.86     689.2    3300.00
      8     1657.77   21.94    2.706  0.45( 0.39) 0.86     767.7    3712.00
      9     1657.73   21.95    2.706  0.45( 0.39) 0.86     768.0    3120.00
     10     1656.08   22.41    2.673  0.45( 0.39) 0.86     778.7    3350.00
     11     1655.17   23.19    2.618  0.45( 0.39) 0.87     797.0    3095.00
     12     1654.61   23.39    2.604  0.44( 0.39) 0.87     801.4    4000.00
     13     1650.78   23.83    2.576  0.44( 0.38) 0.87     809.7    1125.00
     14     1646.70   24.16    2.554  0.44( 0.38) 0.87     815.8    1195.00
     15     1606.93   26.91    2.395  0.44( 0.38) 0.88     861.2    3165.00
     16     1595.47   27.70    2.353  0.43( 0.38) 0.88     873.8    1135.00
     17     1590.49   28.03    2.337  0.43( 0.38) 0.88     878.7    3510.00
     18     1576.22   28.99    2.290  0.43( 0.38) 0.88     892.9    3195.00
     19     1546.56   30.94    2.202  0.43( 0.38) 0.88     918.8    1130.00
     20     1525.06   32.38    2.143  0.42( 0.37) 0.89     936.2    1000.00
     21     1520.72   32.53    2.137  0.42( 0.37) 0.89     936.8    3020.00
     22     1459.11   34.76    2.054  0.42( 0.37) 0.89     943.9    1060.00
     23     1387.74   37.19    1.972  0.42( 0.38) 0.89     946.3    3085.00
     24     1383.79   37.32    1.968  0.42( 0.38) 0.89     946.3    3210.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    1657.77    Tc(MIN.) =    21.94
  EFFECTIVE AREA(ACRES) =     767.73   AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =      946.3
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   5015.00 =   10773.26 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5015.00 TO NODE   5020.00 IS CODE =  52
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1915.10  DOWNSTREAM(FEET) =   1907.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   247.50   CHANNEL SLOPE =  0.0327
  CHANNEL FLOW THRU SUBAREA(CFS) =    1657.77
  FLOW VELOCITY(FEET/SEC) =  20.94 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.20   Tc(MIN.) =   22.14
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   5020.00 =   11020.76 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5015.00 TO NODE   5020.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   22.14
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.692
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.20      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        0.05      0.43     1.000    77
  COMMERCIAL                 A        1.05      0.80     0.100    52
  COMMERCIAL                 B        0.26      0.45     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.73
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.244
  SUBAREA AREA(ACRES) =    1.56      SUBAREA RUNOFF(CFS) =    3.53
  EFFECTIVE AREA(ACRES) =    769.29   AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =      947.8       PEAK FLOW RATE(CFS) =    1657.77
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5020.00 TO NODE   5035.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1907.00  DOWNSTREAM(FEET) =   1901.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   357.00   CHANNEL SLOPE =  0.0168
  CHANNEL FLOW THRU SUBAREA(CFS) =    1657.77
  FLOW VELOCITY(FEET/SEC) =  15.00 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.40   Tc(MIN.) =   22.53
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   5035.00 =   11377.76 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5020.00 TO NODE   5035.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   22.53
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.663
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.73      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        0.91      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
```



```
  SUBAREA AREA(ACRES) =    1.64      SUBAREA RUNOFF(CFS) =    3.05
  EFFECTIVE AREA(ACRES) =    770.93   AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =      949.5       PEAK FLOW RATE(CFS) =    1657.77
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5035.00 TO NODE   5035.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
==============================================================================

+----------------------------------------------------------------------------+
| line                                                                       |
|                                                                            |
|                                                                            |
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+----------------------------------------------------------------------------+
| new                                                                        |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE   2000.00 TO NODE   2005.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   881.73
  ELEVATION DATA: UPSTREAM(FEET) =   2570.00  DOWNSTREAM(FEET) =   2320.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   18.131
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.035
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        6.17      0.24     1.000    88   18.13
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     15.54
  TOTAL AREA(ACRES) =      6.17   PEAK FLOW RATE(CFS) =     15.54

****************************************************************************
  FLOW PROCESS FROM NODE   2005.00 TO NODE   2015.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2320.00  DOWNSTREAM(FEET) =   2270.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   235.73   CHANNEL SLOPE =  0.2121
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      15.54
  FLOW VELOCITY(FEET/SEC) =   8.86 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.44   Tc(MIN.) =   18.57
  LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   2015.00 =    1117.46 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2010.00 TO NODE   2015.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   18.57
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.991
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        9.01      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    9.01      SUBAREA RUNOFF(CFS) =   22.34
  EFFECTIVE AREA(ACRES) =     15.18   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       15.2       PEAK FLOW RATE(CFS) =      37.64

****************************************************************************
  FLOW PROCESS FROM NODE   2015.00 TO NODE   2025.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2270.00  DOWNSTREAM(FEET) =   2124.09
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1009.79   CHANNEL SLOPE =  0.1445
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      37.64
  FLOW VELOCITY(FEET/SEC) =  11.29 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.49   Tc(MIN.) =   20.07
  LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   2025.00 =    2127.25 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2020.00 TO NODE   2025.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   20.07
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.855
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       14.98      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   14.98      SUBAREA RUNOFF(CFS) =   35.32
  EFFECTIVE AREA(ACRES) =     30.16   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       30.2       PEAK FLOW RATE(CFS) =      71.10

****************************************************************************
  FLOW PROCESS FROM NODE   2025.00 TO NODE   2100.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2124.09  DOWNSTREAM(FEET) =   2040.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   994.58   CHANNEL SLOPE =  0.0845
  CHANNEL FLOW THRU SUBAREA(CFS) =      71.10
  FLOW VELOCITY(FEET/SEC) =  12.47 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.33   Tc(MIN.) =   21.40
  LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   2100.00 =    3121.83 FEET.

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



```
  FLOW PROCESS FROM NODE   2090.00 TO NODE   2100.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   21.40
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.748
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       26.65      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   26.65      SUBAREA RUNOFF(CFS) =   60.24
  EFFECTIVE AREA(ACRES) =     56.81   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       56.8       PEAK FLOW RATE(CFS) =     128.42

****************************************************************************
  FLOW PROCESS FROM NODE   2000.00 TO NODE   2100.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
==============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   2030.00 TO NODE   2035.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1295.16
  ELEVATION DATA: UPSTREAM(FEET) =   2650.00  DOWNSTREAM(FEET) =   2480.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   24.667
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.523
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        8.96      0.24     1.000    88   24.67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     18.44
  TOTAL AREA(ACRES) =      8.96   PEAK FLOW RATE(CFS) =     18.44

****************************************************************************
  FLOW PROCESS FROM NODE   2035.00 TO NODE   2045.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2480.00  DOWNSTREAM(FEET) =   2479.99
  CHANNEL LENGTH THRU SUBAREA(FEET) =   139.83   CHANNEL SLOPE =  0.0001
  NOTE: CHANNEL SLOPE OF .001 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      18.44
  FLOW VELOCITY(FEET/SEC) =   0.93 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.51   Tc(MIN.) =   27.18
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2045.00 =    1434.99 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2040.00 TO NODE   2045.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   27.18
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.380
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        9.97      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    9.97      SUBAREA RUNOFF(CFS) =   19.24
  EFFECTIVE AREA(ACRES) =     18.93   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       18.9       PEAK FLOW RATE(CFS) =      36.53

****************************************************************************
  FLOW PROCESS FROM NODE   2045.00 TO NODE   2055.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2480.00  DOWNSTREAM(FEET) =   2437.17
  CHANNEL LENGTH THRU SUBAREA(FEET) =   418.80   CHANNEL SLOPE =  0.1023
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      36.53
  FLOW VELOCITY(FEET/SEC) =  11.19 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.62   Tc(MIN.) =   27.80
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2055.00 =    1853.79 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2050.00 TO NODE   2055.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   27.80
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.348
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       18.71      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   18.71      SUBAREA RUNOFF(CFS) =   35.56
  EFFECTIVE AREA(ACRES) =     37.64   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       37.6       PEAK FLOW RATE(CFS) =      71.54

****************************************************************************
  FLOW PROCESS FROM NODE   2055.00 TO NODE   2065.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2437.17  DOWNSTREAM(FEET) =   2400.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   383.83   CHANNEL SLOPE =  0.0968
  CHANNEL FLOW THRU SUBAREA(CFS) =      71.54
  FLOW VELOCITY(FEET/SEC) =  13.37 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.48   Tc(MIN.) =   28.28
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2065.00 =    2237.62 FEET.

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



```
  FLOW PROCESS FROM NODE   2060.00 TO NODE   2065.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   28.28
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.324
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       19.84      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   19.84      SUBAREA RUNOFF(CFS) =   37.28
  EFFECTIVE AREA(ACRES) =     57.48   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       57.5       PEAK FLOW RATE(CFS) =     108.02

****************************************************************************
  FLOW PROCESS FROM NODE   2065.00 TO NODE   2075.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2400.00  DOWNSTREAM(FEET) =   2360.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   929.03   CHANNEL SLOPE =  0.0431
  CHANNEL FLOW THRU SUBAREA(CFS) =     108.02
  FLOW VELOCITY(FEET/SEC) =  10.08 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.54   Tc(MIN.) =   29.82
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2075.00 =    3166.65 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2070.00 TO NODE   2075.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   29.82
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.251
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       39.28      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   39.28      SUBAREA RUNOFF(CFS) =   71.25
  EFFECTIVE AREA(ACRES) =     96.76   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       96.8       PEAK FLOW RATE(CFS) =     175.51

****************************************************************************
  FLOW PROCESS FROM NODE   2075.00 TO NODE   2085.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2360.00  DOWNSTREAM(FEET) =   2100.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2087.32   CHANNEL SLOPE =  0.1246
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =     175.51
  FLOW VELOCITY(FEET/SEC) =  17.81 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.95   Tc(MIN.) =   31.77
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2085.00 =    5253.97 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   2080.00 TO NODE   2085.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   31.77
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.167
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       24.41      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   24.41      SUBAREA RUNOFF(CFS) =   42.43
  EFFECTIVE AREA(ACRES) =    121.17   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      121.2       PEAK FLOW RATE(CFS) =     210.62

****************************************************************************
  FLOW PROCESS FROM NODE   2085.00 TO NODE   2100.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2100.00  DOWNSTREAM(FEET) =   2040.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   802.26   CHANNEL SLOPE =  0.0748
  CHANNEL FLOW THRU SUBAREA(CFS) =     210.62
  FLOW VELOCITY(FEET/SEC) =  16.30 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.82   Tc(MIN.) =   32.59
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2100.00 =    6056.23 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2086.00 TO NODE   2100.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   32.59
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.134
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       39.06      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   39.06      SUBAREA RUNOFF(CFS) =   66.74
  EFFECTIVE AREA(ACRES) =    160.23   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      160.2       PEAK FLOW RATE(CFS) =     273.77

****************************************************************************
  FLOW PROCESS FROM NODE   2100.00 TO NODE   2100.00 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      273.77   32.59    2.134  0.24( 0.24) 1.00     160.2    2030.00
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2100.00 =    6056.23 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      128.42   21.40    2.748  0.24( 0.24) 1.00      56.8    2000.00
  LONGEST FLOWPATH FROM NODE   2000.00 TO NODE   2100.00 =    3121.83 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      366.18   21.40    2.748  0.24( 0.24) 1.00     162.0    2000.00
      2      370.83   32.59    2.134  0.24( 0.24) 1.00     217.0    2030.00
    TOTAL AREA(ACRES) =       217.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      370.83  Tc(MIN.) =   32.592
  EFFECTIVE AREA(ACRES) =    217.04  AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      217.0
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2100.00 =    6056.23 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2100.00 TO NODE   2100.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   2100.00 TO NODE   2145.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2040.00  DOWNSTREAM(FEET) =   2023.15
  CHANNEL LENGTH THRU SUBAREA(FEET) =   345.39   CHANNEL SLOPE =  0.0488
  CHANNEL FLOW THRU SUBAREA(CFS) =     370.83
  FLOW VELOCITY(FEET/SEC) =  15.72 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.37   Tc(MIN.) =   32.96
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2145.00 =    6401.62 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2135.00 TO NODE   2145.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   32.96
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.120
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       C        2.59      0.27     0.500    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.59      SUBAREA RUNOFF(CFS) =    4.63
  EFFECTIVE AREA(ACRES) =    219.63   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =      219.6       PEAK FLOW RATE(CFS) =     372.67

****************************************************************************
  FLOW PROCESS FROM NODE   2100.00 TO NODE   2145.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
```

```
==============================================================================

******************************************************************************
  FLOW PROCESS FROM NODE   2105.00 TO NODE   2110.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1421.19
  ELEVATION DATA: UPSTREAM(FEET) =   2657.32  DOWNSTREAM(FEET) =   2285.88

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   22.306
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.680
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        8.91      0.24     1.000    88   22.31
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     19.60
  TOTAL AREA(ACRES) =      8.91   PEAK FLOW RATE(CFS) =     19.60

******************************************************************************
  FLOW PROCESS FROM NODE   2110.00 TO NODE   2120.00 IS CODE =  52
------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2285.88  DOWNSTREAM(FEET) =   2198.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   442.60   CHANNEL SLOPE =  0.1986
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      19.60
  FLOW VELOCITY(FEET/SEC) =   9.42 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.78   Tc(MIN.) =   23.09
  LONGEST FLOWPATH FROM NODE   2105.00 TO NODE   2120.00 =    1863.79 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE   2115.00 TO NODE   2120.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   23.09
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.625
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        8.11      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    8.11      SUBAREA RUNOFF(CFS) =   17.44
  EFFECTIVE AREA(ACRES) =     17.02   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       17.0       PEAK FLOW RATE(CFS) =      36.59

******************************************************************************
  FLOW PROCESS FROM NODE   2120.00 TO NODE   2130.00 IS CODE =  52
------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
```



```
  ELEVATION DATA: UPSTREAM(FEET) =   2198.00  DOWNSTREAM(FEET) =   2116.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1192.21   CHANNEL SLOPE =  0.0688
  CHANNEL FLOW THRU SUBAREA(CFS) =      36.59
  FLOW VELOCITY(FEET/SEC) =   9.29 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.14   Tc(MIN.) =   25.23
  LONGEST FLOWPATH FROM NODE   2105.00 TO NODE   2130.00 =    3056.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE   2125.00 TO NODE   2130.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   25.23
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.489
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       15.16      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   15.16      SUBAREA RUNOFF(CFS) =   30.74
  EFFECTIVE AREA(ACRES) =     32.18   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       32.2       PEAK FLOW RATE(CFS) =      65.25

******************************************************************************
  FLOW PROCESS FROM NODE   2130.00 TO NODE   2145.00 IS CODE =  52
------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2116.00  DOWNSTREAM(FEET) =   2023.15
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1492.80   CHANNEL SLOPE =  0.0622
  CHANNEL FLOW THRU SUBAREA(CFS) =      65.25
  FLOW VELOCITY(FEET/SEC) =  10.43 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.39   Tc(MIN.) =   27.61
  LONGEST FLOWPATH FROM NODE   2105.00 TO NODE   2145.00 =    4548.80 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE   2140.00 TO NODE   2145.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   27.61
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.358
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       19.27      0.24     1.000    88
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      D        0.87      0.14     1.000    93
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   20.14      SUBAREA RUNOFF(CFS) =   38.53
  EFFECTIVE AREA(ACRES) =     52.32   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       52.3       PEAK FLOW RATE(CFS) =      99.98

******************************************************************************
  FLOW PROCESS FROM NODE   2145.00 TO NODE   2145.00 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       99.98   27.61    2.358  0.23( 0.23) 1.00      52.3    2105.00
  LONGEST FLOWPATH FROM NODE   2105.00 TO NODE   2145.00 =    4548.80 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      368.13   21.76    2.720  0.24( 0.23) 0.99     164.6    2000.00
      2      372.67   32.96    2.120  0.24( 0.23) 0.99     219.6    2030.00
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2145.00 =    6401.62 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM        Q       Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      460.36   21.76    2.720  0.24( 0.23) 0.99     205.8    2000.00
      2      470.48   27.61    2.358  0.24( 0.23) 0.99     245.7    2105.00
      3      461.47   32.96    2.120  0.24( 0.23) 1.00     271.9    2030.00
    TOTAL AREA(ACRES) =       271.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      470.48  Tc(MIN.) =   27.614
  EFFECTIVE AREA(ACRES) =    245.67  AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =      271.9
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2145.00 =    6401.62 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2145.00 TO NODE   2145.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
==============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   2145.00 TO NODE   2160.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2023.15  DOWNSTREAM(FEET) =   2002.49
  CHANNEL LENGTH THRU SUBAREA(FEET) =   797.93   CHANNEL SLOPE =  0.0259
  CHANNEL FLOW THRU SUBAREA(CFS) =     470.48
  FLOW VELOCITY(FEET/SEC) =  12.36 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.08   Tc(MIN.) =   28.69
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2160.00 =    7199.55 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2150.00 TO NODE   2160.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   28.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.304
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        3.24      0.24     1.000    88
  NATURAL GOOD COVER
```



```
  "CHAPARRAL,BROADLEAF"      D        3.04      0.14     1.000    93
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.19
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    6.28      SUBAREA RUNOFF(CFS) =   11.95
  EFFECTIVE AREA(ACRES) =    251.95   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =      278.2       PEAK FLOW RATE(CFS) =     470.48
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   2155.00 TO NODE   2160.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   28.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.304
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        6.21      0.24     1.000    88
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      D        8.51      0.14     1.000    93
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   14.72      SUBAREA RUNOFF(CFS) =   28.13
  EFFECTIVE AREA(ACRES) =    266.67   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      292.9       PEAK FLOW RATE(CFS) =     497.68

****************************************************************************
  FLOW PROCESS FROM NODE   2160.00 TO NODE   2170.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2002.49  DOWNSTREAM(FEET) =   1994.85
  CHANNEL LENGTH THRU SUBAREA(FEET) =   305.65   CHANNEL SLOPE =  0.0250
  CHANNEL FLOW THRU SUBAREA(CFS) =     497.68
  FLOW VELOCITY(FEET/SEC) =  12.36 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.41   Tc(MIN.) =   29.10
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2170.00 =    7505.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2165.00 TO NODE   2170.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   29.10
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.285
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        3.53      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      D        0.16      0.14     1.000    93
  COMMERCIAL                 A        4.88      0.80     0.100    52
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        8.92      0.80     0.200    52
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       D        0.16      0.18     0.200    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.78
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.340
  SUBAREA AREA(ACRES) =   17.65      SUBAREA RUNOFF(CFS) =   32.07
  EFFECTIVE AREA(ACRES) =    284.32   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =      310.6       PEAK FLOW RATE(CFS) =     525.04

****************************************************************************
  FLOW PROCESS FROM NODE   2170.00 TO NODE   2235.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1994.85  DOWNSTREAM(FEET) =   1980.54
  CHANNEL LENGTH THRU SUBAREA(FEET) =   630.31   CHANNEL SLOPE =  0.0227
  CHANNEL FLOW THRU SUBAREA(CFS) =      525.04
  FLOW VELOCITY(FEET/SEC) =  11.99 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.88   Tc(MIN.) =   29.98
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2235.00 =    8135.51 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2145.00 TO NODE   2235.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   2175.00 TO NODE   2180.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1624.95
  ELEVATION DATA: UPSTREAM(FEET) =   2360.47  DOWNSTREAM(FEET) =   1995.03

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   24.252
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.549
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       21.07      0.24     1.000    88   24.25
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     43.85
  TOTAL AREA(ACRES) =     21.07   PEAK FLOW RATE(CFS) =     43.85

****************************************************************************
  FLOW PROCESS FROM NODE   2180.00 TO NODE   2185.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1995.03  DOWNSTREAM(FEET) =   1988.53
  CHANNEL LENGTH THRU SUBAREA(FEET) =   158.18   CHANNEL SLOPE =  0.0411
  CHANNEL FLOW THRU SUBAREA(CFS) =       43.85
  FLOW VELOCITY(FEET/SEC) =   7.56 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.35   Tc(MIN.) =   24.60
  LONGEST FLOWPATH FROM NODE   2175.00 TO NODE   2185.00 =    1783.13 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2183.00 TO NODE   2185.00 IS CODE =  81
----------------------------------------------------------------------------
```



```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   24.60
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.527
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.41      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        0.07      0.24     1.000    88
  COMMERCIAL                 A        0.96      0.80     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA AREA(ACRES) =    1.44      SUBAREA RUNOFF(CFS) =    2.89
  EFFECTIVE AREA(ACRES) =     22.51   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.96
  TOTAL AREA(ACRES) =       22.5       PEAK FLOW RATE(CFS) =      46.33

****************************************************************************
  FLOW PROCESS FROM NODE   2185.00 TO NODE   2235.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1988.53  DOWNSTREAM(FEET) =   1980.54
  CHANNEL LENGTH THRU SUBAREA(FEET) =   318.51   CHANNEL SLOPE =  0.0251
  CHANNEL FLOW THRU SUBAREA(CFS) =      46.33
  FLOW VELOCITY(FEET/SEC) =   6.00 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.89   Tc(MIN.) =   25.49
  LONGEST FLOWPATH FROM NODE   2175.00 TO NODE   2235.00 =    2101.64 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2175.00 TO NODE   2235.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   2195.00 TO NODE   2200.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   675.26
  ELEVATION DATA: UPSTREAM(FEET) =   2049.00  DOWNSTREAM(FEET) =   2042.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.269
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.268
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.16      0.81     1.000    51   31.58
  COMMERCIAL                 A        0.04      0.80     0.100    52   10.27
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        3.39      0.80     0.200    52   10.94
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.235
  SUBAREA RUNOFF(CFS) =     13.19
  TOTAL AREA(ACRES) =      3.59   PEAK FLOW RATE(CFS) =     13.19
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   2200.00 TO NODE   2210.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2042.00  DOWNSTREAM(FEET) =   2025.88
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1100.24   CHANNEL SLOPE =  0.0147
  CHANNEL FLOW THRU SUBAREA(CFS) =      13.19
  FLOW VELOCITY(FEET/SEC) =   3.25 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.65   Tc(MIN.) =   15.92
  LONGEST FLOWPATH FROM NODE   2195.00 TO NODE   2210.00 =    1775.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2205.00 TO NODE   2210.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.92
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.281
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.30      0.81     1.000    51
  COMMERCIAL                 A        0.04      0.80     0.100    52
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        0.02      0.43     1.000    77
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        9.30      0.80     0.200    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.79
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.226
  SUBAREA AREA(ACRES) =    9.66      SUBAREA RUNOFF(CFS) =   26.97
  EFFECTIVE AREA(ACRES) =     13.25   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =       13.2       PEAK FLOW RATE(CFS) =      36.96

****************************************************************************
  FLOW PROCESS FROM NODE   2210.00 TO NODE   2220.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2025.88  DOWNSTREAM(FEET) =  2013.62
  FLOW LENGTH(FEET) =   598.68   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.21
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      36.96
  PIPE TRAVEL TIME(MIN.) =   0.82    Tc(MIN.) =   16.73
  LONGEST FLOWPATH FROM NODE   2195.00 TO NODE   2220.00 =    2374.18 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2215.00 TO NODE   2220.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.73
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.184
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
```



```
  "11+ DWELLINGS/ACRE"       A        9.06      0.80     0.200    52
  COMMERCIAL                 A        0.05      0.80     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.199
  SUBAREA AREA(ACRES) =    9.11      SUBAREA RUNOFF(CFS) =   24.81
  EFFECTIVE AREA(ACRES) =     22.36   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.22
  TOTAL AREA(ACRES) =       22.4       PEAK FLOW RATE(CFS) =      60.61

****************************************************************************
  FLOW PROCESS FROM NODE   2220.00 TO NODE   2235.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2013.62  DOWNSTREAM(FEET) =  1980.54
  FLOW LENGTH(FEET) =  1111.83   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.85
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      60.61
  PIPE TRAVEL TIME(MIN.) =   1.17    Tc(MIN.) =   17.90
  LONGEST FLOWPATH FROM NODE   2195.00 TO NODE   2235.00 =    3486.01 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2230.00 TO NODE   2235.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.90
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.058
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        3.19      0.81     1.000    51
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        9.72      0.80     0.200    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.398
  SUBAREA AREA(ACRES) =   12.91      SUBAREA RUNOFF(CFS) =   31.82
  EFFECTIVE AREA(ACRES) =     35.27   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.28
  TOTAL AREA(ACRES) =       35.3       PEAK FLOW RATE(CFS) =      89.88

****************************************************************************
  FLOW PROCESS FROM NODE   2145.00 TO NODE   2235.00 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       89.88   17.90    3.058  0.80( 0.23) 0.28      35.3    2195.00
  LONGEST FLOWPATH FROM NODE   2195.00 TO NODE   2235.00 =    3486.01 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      523.87   24.14    2.556  0.25( 0.23) 0.95     244.5    2000.00
      2      525.04   29.98    2.244  0.24( 0.23) 0.95     284.3    2105.00
      3      511.94   35.34    2.033  0.24( 0.23) 0.96     310.6    2030.00
```

```
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2235.00 =    8135.51 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      562.36   17.90    3.058  0.28( 0.23) 0.84     216.6    2195.00
      2      597.82   24.14    2.556  0.27( 0.23) 0.86     279.7    2000.00
      3      589.09   29.98    2.244  0.26( 0.23) 0.88     319.6    2105.00
      4      569.30   35.34    2.033  0.26( 0.23) 0.89     345.9    2030.00
    TOTAL AREA(ACRES) =       345.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      597.82  Tc(MIN.) =   24.137
  EFFECTIVE AREA(ACRES) =    279.74  AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =      345.9
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2235.00 =    8135.51 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2145.00 TO NODE   2235.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   2175.00 TO NODE   2235.00 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      562.36   17.90    3.058  0.28( 0.23) 0.84     216.6    2195.00
      2      597.82   24.14    2.556  0.27( 0.23) 0.86     279.7    2000.00
      3      589.09   29.98    2.244  0.26( 0.23) 0.88     319.6    2105.00
      4      569.30   35.34    2.033  0.26( 0.23) 0.89     345.9    2030.00
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2235.00 =    8135.51 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       46.33   25.49    2.474  0.25( 0.24) 0.96      22.5    2175.00
  LONGEST FLOWPATH FROM NODE   2175.00 TO NODE   2235.00 =    2101.64 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      603.41   17.90    3.058  0.27( 0.23) 0.85     232.4    2195.00
      2      643.31   24.14    2.556  0.27( 0.23) 0.87     301.1    2000.00
      3      642.14   25.49    2.474  0.27( 0.23) 0.87     311.5    2175.00
      4      630.66   29.98    2.244  0.26( 0.23) 0.89     342.1    2105.00
      5      606.50   35.34    2.033  0.26( 0.23) 0.89     368.4    2030.00
    TOTAL AREA(ACRES) =       368.4

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      643.31  Tc(MIN.) =   24.137
  EFFECTIVE AREA(ACRES) =    301.05  AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.87
  TOTAL AREA(ACRES) =      368.4
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2235.00 =    8135.51 FEET.

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



```
  FLOW PROCESS FROM NODE   2175.00 TO NODE   2235.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   2235.00 TO NODE   2245.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1980.54  DOWNSTREAM(FEET) =   1980.53
  CHANNEL LENGTH THRU SUBAREA(FEET) =   291.29   CHANNEL SLOPE =  0.0000
  NOTE: CHANNEL SLOPE OF .001 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      643.31
  FLOW VELOCITY(FEET/SEC) =   2.69 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.81   Tc(MIN.) =   25.94
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2245.00 =    8426.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2240.00 TO NODE   2245.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   25.94
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.447
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A       17.03      0.80     0.100    52
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        0.25      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.113
  SUBAREA AREA(ACRES) =   17.28      SUBAREA RUNOFF(CFS) =   36.75
  EFFECTIVE AREA(ACRES) =    318.33   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.83
  TOTAL AREA(ACRES) =      385.7       PEAK FLOW RATE(CFS) =     643.31
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   2245.00 TO NODE   2255.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1981.09  DOWNSTREAM(FEET) =   1910.32
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1818.04   CHANNEL SLOPE =  0.0389
  CHANNEL FLOW THRU SUBAREA(CFS) =      643.31
  FLOW VELOCITY(FEET/SEC) =  16.75 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.81   Tc(MIN.) =   27.75
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   2255.00 =   10244.84 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2250.00 TO NODE   2255.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.75
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.351
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        7.20      0.81     1.000    51
  COMMERCIAL                 A        0.51      0.80     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.940
  SUBAREA AREA(ACRES) =    7.71      SUBAREA RUNOFF(CFS) =   11.04
  EFFECTIVE AREA(ACRES) =    326.04   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.83
  TOTAL AREA(ACRES) =      393.4       PEAK FLOW RATE(CFS) =     643.31
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   2255.00 TO NODE   5035.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1910.32  DOWNSTREAM(FEET) =   1901.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   482.15   CHANNEL SLOPE =  0.0193
  CHANNEL FLOW THRU SUBAREA(CFS) =      643.31
  FLOW VELOCITY(FEET/SEC) =  11.81 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.68   Tc(MIN.) =   28.43
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   5035.00 =   10726.99 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5025.00 TO NODE   5035.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   28.43
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.317
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        3.69      0.81     1.000    51
  COMMERCIAL                 A        0.61      0.80     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.872
  SUBAREA AREA(ACRES) =    4.30      SUBAREA RUNOFF(CFS) =    6.24
  EFFECTIVE AREA(ACRES) =    330.34   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.83
  TOTAL AREA(ACRES) =      397.7       PEAK FLOW RATE(CFS) =     643.31
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   2255.00 TO NODE   5035.00 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      603.41   22.29    2.681  0.31( 0.25) 0.80     261.7    2195.00
      2      643.31   28.43    2.317  0.29( 0.24) 0.83     330.3    2000.00
      3      642.14   29.79    2.253  0.29( 0.24) 0.84     340.7    2175.00
      4      630.66   34.30    2.070  0.28( 0.24) 0.85     371.4    2105.00
      5      606.50   39.72    1.896  0.28( 0.24) 0.86     397.7    2030.00
  LONGEST FLOWPATH FROM NODE   2030.00 TO NODE   5035.00 =   10726.99 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     1535.61   14.27    3.503  0.47( 0.40) 0.85     515.2    3520.00
      2     1625.86   17.31    3.120  0.47( 0.40) 0.85     625.6    1400.00
      3     1632.46   17.59    3.091  0.47( 0.40) 0.85     635.4    3000.00
      4     1635.24   17.75    3.073  0.47( 0.40) 0.85     640.8    3535.00
      5     1644.56   18.41    3.007  0.46( 0.40) 0.85     661.3    3197.00
      6     1650.82   18.89    2.961  0.46( 0.40) 0.86     676.2    3500.00
      7     1657.76   19.43    2.911  0.46( 0.40) 0.86     692.4    3300.00
      8     1657.77   22.53    2.663  0.45( 0.39) 0.86     770.9    3712.00
      9     1657.73   22.54    2.663  0.45( 0.39) 0.86     771.2    3120.00
     10     1656.08   23.00    2.631  0.45( 0.39) 0.86     781.9    3350.00
     11     1655.17   23.79    2.578  0.45( 0.39) 0.86     800.2    3095.00
     12     1654.61   23.99    2.565  0.45( 0.39) 0.87     804.6    4000.00
     13     1650.78   24.42    2.538  0.44( 0.38) 0.87     812.9    1125.00
     14     1646.70   24.76    2.517  0.44( 0.38) 0.87     819.0    1195.00
     15     1606.93   27.51    2.363  0.44( 0.38) 0.87     864.4    3165.00
     16     1595.47   28.30    2.323  0.43( 0.38) 0.88     877.0    1135.00
     17     1590.49   28.63    2.307  0.43( 0.38) 0.88     881.9    3510.00
     18     1576.22   29.60    2.262  0.43( 0.38) 0.88     896.1    3195.00
     19     1546.56   31.55    2.177  0.43( 0.38) 0.88     922.0    1130.00
     20     1525.06   32.99    2.119  0.42( 0.38) 0.88     939.4    1000.00
     21     1520.72   33.14    2.113  0.42( 0.37) 0.88     940.0    3020.00
     22     1459.11   35.38    2.032  0.42( 0.37) 0.89     947.1    1060.00
     23     1387.74   37.81    1.952  0.42( 0.38) 0.89     949.5    3085.00
     24     1383.79   37.95    1.948  0.42( 0.38) 0.89     949.5    3210.00
LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   5035.00 =   11377.76 FEET.

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1     2052.42   14.27    3.503  0.43( 0.36) 0.84     682.8    3520.00
    2     2178.94   17.31    3.120  0.43( 0.36) 0.84     828.8    1400.00
    3     2188.63   17.59    3.091  0.43( 0.36) 0.84     841.8    3000.00
    4     2193.26   17.75    3.073  0.43( 0.36) 0.84     849.3    3535.00
    5     2209.62   18.41    3.007  0.43( 0.36) 0.84     877.4    3197.00
    6     2221.00   18.89    2.961  0.43( 0.36) 0.84     898.0    3500.00
    7     2233.51   19.43    2.911  0.42( 0.36) 0.84     920.6    3300.00
    8     2261.17   22.29    2.681  0.42( 0.35) 0.85    1026.4    2195.00
    9     2262.77   22.53    2.663  0.42( 0.35) 0.85    1035.4    3712.00
   10     2262.80   22.54    2.663  0.42( 0.35) 0.85    1035.7    3120.00
   11     2264.10   23.00    2.631  0.41( 0.35) 0.85    1051.6    3350.00
   12     2268.31   23.79    2.578  0.41( 0.35) 0.85    1078.6    3095.00
   13     2269.05   23.99    2.565  0.41( 0.35) 0.85    1085.3    4000.00
   14     2268.03   24.42    2.538  0.41( 0.35) 0.85    1098.4    1125.00
   15     2266.15   24.76    2.517  0.41( 0.35) 0.85    1108.3    1195.00
   16     2244.21   27.51    2.363  0.40( 0.34) 0.86    1184.3    3165.00
   17     2237.92   28.30    2.323  0.40( 0.34) 0.86    1205.8    1135.00
   18     2236.75   28.43    2.317  0.40( 0.34) 0.86    1209.3    2000.00
   19     2233.64   28.63    2.307  0.40( 0.34) 0.86    1213.7    3510.00
   20     2218.52   29.60    2.262  0.39( 0.34) 0.87    1235.4    3195.00
   21     2215.49   29.79    2.253  0.39( 0.34) 0.87    1239.3    2175.00
   22     2184.22   31.55    2.177  0.39( 0.34) 0.87    1274.7    1130.00
   23     2159.08   32.99    2.119  0.39( 0.34) 0.87    1301.9    1000.00
   24     2154.34   33.14    2.113  0.39( 0.34) 0.87    1303.5    3020.00
   25     2119.34   34.30    2.070  0.39( 0.34) 0.88    1315.1    2105.00
   26     2084.98   35.38    2.032  0.38( 0.34) 0.88    1323.7    1060.00
   27     2002.73   37.81    1.952  0.38( 0.34) 0.88    1337.9    3085.00
   28     1998.17   37.95    1.948  0.38( 0.34) 0.88    1338.6    3210.00
   29     1944.13   39.72    1.896  0.38( 0.34) 0.88    1347.1    2030.00
 TOTAL AREA(ACRES) =      1347.1

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     2269.05  Tc(MIN.) =   23.987
```

```
  EFFECTIVE AREA(ACRES) =   1085.30  AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =     1347.1
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   5035.00 =   11377.76 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5035.00 TO NODE   5035.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5035.00 TO NODE   5045.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1901.00  DOWNSTREAM(FEET) =   1865.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1632.04   CHANNEL SLOPE =  0.0221
  CHANNEL FLOW THRU SUBAREA(CFS) =    2269.05
  FLOW VELOCITY(FEET/SEC) =  19.08 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.43   Tc(MIN.) =   25.41
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   5045.00 =   13009.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5040.00 TO NODE   5045.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   25.41
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.478
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        7.84      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       17.54      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.55
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   25.38      SUBAREA RUNOFF(CFS) =   44.05
  EFFECTIVE AREA(ACRES) =   1110.68   AREA-AVERAGED Fm(INCH/HR) =  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.41  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =     1372.5       PEAK FLOW RATE(CFS) =    2269.05
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5045.00 TO NODE   5060.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1865.00  DOWNSTREAM(FEET) =   1812.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2107.09   CHANNEL SLOPE =  0.0252
  CHANNEL FLOW THRU SUBAREA(CFS) =    2269.05
  FLOW VELOCITY(FEET/SEC) =  20.37 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.72   Tc(MIN.) =   27.14
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   5060.00 =   15116.89 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5055.00 TO NODE   5060.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```



```
============================================================================
  MAINLINE Tc(MIN.) =   27.14
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.382
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        7.38      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       16.99      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.55
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   24.37      SUBAREA RUNOFF(CFS) =   40.25
  EFFECTIVE AREA(ACRES) =   1135.05   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =     1396.9       PEAK FLOW RATE(CFS) =    2269.05
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5050.00 TO NODE   5060.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.14
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.382
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       12.33      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   12.33      SUBAREA RUNOFF(CFS) =   21.62
  EFFECTIVE AREA(ACRES) =   1147.38   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =     1409.2       PEAK FLOW RATE(CFS) =    2269.05
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5060.00 TO NODE   5075.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1812.00  DOWNSTREAM(FEET) =   1806.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   363.97   CHANNEL SLOPE =  0.0165
  CHANNEL FLOW THRU SUBAREA(CFS) =    2269.05
  FLOW VELOCITY(FEET/SEC) =  16.49 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.37   Tc(MIN.) =   27.51
  LONGEST FLOWPATH FROM NODE   1060.00 TO NODE   5075.00 =   15480.86 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5065.00 TO NODE   5075.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.51
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.363
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        1.44      0.81     1.000    51
```

```
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        4.53      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.52
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.97      SUBAREA RUNOFF(CFS) =    9.88
  EFFECTIVE AREA(ACRES) =   1153.35   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =     1415.2       PEAK FLOW RATE(CFS) =    2269.05
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5070.00 TO NODE   5075.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.51
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.363
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.18      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       16.53      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   16.71      SUBAREA RUNOFF(CFS) =   28.95
  EFFECTIVE AREA(ACRES) =   1170.06   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =     1431.9       PEAK FLOW RATE(CFS) =    2269.05
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     1431.9  TC(MIN.) =     27.51
  EFFECTIVE AREA(ACRES) =   1170.06  AREA-AVERAGED Fm(INCH/HR)=  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap = 0.862
  PEAK FLOW RATE(CFS)   =    2269.05

  ** PEAK FLOW RATE TABLE **
   STREAM       Q       Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     2052.42   17.91    3.057  0.44( 0.38) 0.86     767.5    3520.00
      2     2178.94   20.87    2.789  0.44( 0.37) 0.86     913.6    1400.00
      3     2188.63   21.15    2.767  0.44( 0.37) 0.86     926.6    3000.00
      4     2193.26   21.31    2.754  0.44( 0.37) 0.86     934.0    3535.00
      5     2209.62   21.96    2.705  0.44( 0.37) 0.86     962.2    3197.00
      6     2221.00   22.44    2.670  0.43( 0.37) 0.86     982.8    3500.00
      7     2233.51   22.97    2.633  0.43( 0.37) 0.86    1005.3    3300.00
      8     2261.17   25.81    2.455  0.42( 0.36) 0.86    1111.2    2195.00
      9     2262.77   26.05    2.441  0.42( 0.36) 0.86    1120.1    3712.00
     10     2262.80   26.07    2.441  0.42( 0.36) 0.86    1120.5    3120.00
     11     2264.10   26.52    2.416  0.42( 0.36) 0.86    1136.3    3350.00
     12     2268.31   27.31    2.374  0.42( 0.36) 0.86    1163.4    3095.00
     13     2269.05   27.51    2.363  0.42( 0.36) 0.86    1170.1    4000.00
     14     2268.03   27.94    2.341  0.42( 0.36) 0.86    1183.2    1125.00
     15     2266.15   28.28    2.324  0.42( 0.36) 0.86    1193.1    1195.00
     16     2244.21   31.04    2.198  0.41( 0.36) 0.87    1269.1    3165.00
     17     2237.92   31.84    2.165  0.41( 0.35) 0.87    1290.6    1135.00
     18     2236.75   31.97    2.159  0.41( 0.35) 0.87    1294.1    2000.00
     19     2233.64   32.16    2.151  0.40( 0.35) 0.87    1298.5    3510.00
     20     2218.52   33.14    2.113  0.40( 0.35) 0.88    1320.1    3195.00
     21     2215.49   33.33    2.106  0.40( 0.35) 0.88    1324.1    2175.00
     22     2184.22   35.11    2.041  0.40( 0.35) 0.88    1359.4    1130.00
```



```
     23     2159.08   36.56    1.992  0.40( 0.35) 0.88    1386.7    1000.00
     24     2154.34   36.72    1.987  0.40( 0.35) 0.88    1388.3    3020.00
     25     2119.34   37.90    1.950  0.39( 0.35) 0.88    1399.9    2105.00
     26     2084.98   39.00    1.917  0.39( 0.35) 0.88    1408.4    1060.00
     27     2002.73   41.48    1.847  0.39( 0.35) 0.88    1422.6    3085.00
     28     1998.17   41.62    1.843  0.39( 0.35) 0.88    1423.3    3210.00
     29     1944.13   43.42    1.797  0.39( 0.35) 0.89    1431.9    2030.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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          USING COUNTY HYDROLOGY MANUAL OF SAN BERNARDINO(1986)
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             Ver. 14.0  Release Date: 06/01/2007  License ID 1527

                          Analysis prepared by:




 ---------------------------------------------------------------------------
   FILE NAME: PRUH1295.DAT
   TIME/DATE OF STUDY: 09:02 07/24/2008


                         ** INPUT SUMMARY **


 ***************************************************************************
   FLOW PROCESS FROM NODE   1295.00 TO NODE   1295.00 IS CODE =   1
 ---------------------------------------------------------------------------
   >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS) ADDED TO STREAM #1<<<<<
 ===========================================================================
   WATERSHED AREA =     449.800 ACRES; BASEFLOW =   0.000 CFS/SQUARE-MILE
   *USER ENTERED "LAG" TIME =    0.420 HOURS
   VALLEY(UNDEVELOPED)/DESERT S-GRAPH SELECTED
   MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) =  0.230; LOW LOSS FRACTION = 0.140
   SPECIFIED PEAK RAINFALL DEPTHS(INCH):
   5-MINUTE =  0.30; 30-MINUTE =  0.97;  1-HOUR =  1.50
     3-HOUR =  3.10;    6-HOUR =  4.50; 24-HOUR = 12.00
   PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
   5-MINUTE = 0.980; 30-MINUTE = 0.980;  1-HOUR = 0.980
     3-HOUR = 0.997;    6-HOUR = 0.998; 24-HOUR = 0.999
 ===========================================================================


+-----------------------------------------------------------------------------------------
--------------------------------+
 |                                      * AES FLOODSCx PROGRAM RESULTS SUMMARY *
                                |
 |INPUT FILENAME: [PRUH1295.DAT  ]
                Page:   1 of    |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |UPSTREAM  DOWNSTREAM|                               | UPSTREAM   DOWNSTREAM|
TIME(2) TO | MAX. STORAGE|           |
 | NODE #     NODE #  | HYDROLOGIC/HYDRAULIC PROCESS   |PEAK (CFS)  PEAK (CFS)| PEAK
(HR)  | MODELED (AF)| FOOTNOTES |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |  1295.00    1295.00| Subarea (UH) Added to Stream #1|       0.0       655.7|
16.417 |             |           |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |Notes: 1 = BASIN MODEL VOLUME EXCEEDED; 2 = TIME IS AT END OF 5-MINUTE UNIT
```



```
INTERVAL                                |
 |       3 = RUNOFF ESTIMATES DO NOT EXTEND PAST 2 DAYS AFTER THE PEAK DAY OF THE
DESIGN STORM                            |

+-----------------------------------------------------------------------------------
-------------------------------+

   END OF FLOODSCx ROUTING ANALYSIS
```

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

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                          Analysis prepared by:



 ---------------------------------------------------------------------------
   FILE NAME: PRUH2245.DAT
   TIME/DATE OF STUDY: 09:05 07/24/2008


                         ** INPUT SUMMARY **


 ***************************************************************************
   FLOW PROCESS FROM NODE   2245.00 TO NODE   2245.00 IS CODE =   1
 ---------------------------------------------------------------------------
   >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS) ADDED TO STREAM #1<<<<<
 ===========================================================================
   WATERSHED AREA =     385.700 ACRES; BASEFLOW =   0.000 CFS/SQUARE-MILE
   *USER ENTERED "LAG" TIME =    0.350 HOURS
   "S"-CURVE PERCENTAGE(DECIMAL NOTATION):
   VALLEY(DEVELOPED) =  0.120; FOOTHILL =  0.000; MOUNTAIN =  0.000
   VALLEY(UNDEVELOPED)/DESERT = 0.880; DESERT(UNDEVELOPED) =  0.000
   MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) =  0.190; LOW LOSS FRACTION = 0.110
   SPECIFIED PEAK RAINFALL DEPTHS(INCH):
   5-MINUTE =  0.30; 30-MINUTE =  0.97;  1-HOUR =  1.50
     3-HOUR =  3.10;    6-HOUR =  4.50; 24-HOUR = 12.00
   PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
   5-MINUTE = 0.983; 30-MINUTE = 0.983;  1-HOUR = 0.983
     3-HOUR = 0.997;    6-HOUR = 0.999; 24-HOUR = 0.999
 ===========================================================================


+-----------------------------------------------------------------------------------------
--------------------------------+
 |                                  * AES FLOODSCx PROGRAM RESULTS SUMMARY *
                                |
 |INPUT FILENAME: [PRUH2245.DAT   ]
                Page:   1 of    |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |UPSTREAM  DOWNSTREAM|                               | UPSTREAM   DOWNSTREAM|
TIME(2) TO | MAX. STORAGE|            |
 | NODE #     NODE #  | HYDROLOGIC/HYDRAULIC PROCESS   |PEAK (CFS)  PEAK (CFS)| PEAK
(HR)  | MODELED (AF)| FOOTNOTES |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |  2245.00    2245.00| Subarea (UH) Added to Stream #1|       0.0       624.0|
16.333 |             |           |

+--------------------+-------------------------------+----------------------+------
```



```
------+-------------+-----------+
 |Notes: 1 = BASIN MODEL VOLUME EXCEEDED; 2 = TIME IS AT END OF 5-MINUTE UNIT
INTERVAL                                |
 |       3 = RUNOFF ESTIMATES DO NOT EXTEND PAST 2 DAYS AFTER THE PEAK DAY OF THE
DESIGN STORM                        |

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   END OF FLOODSCx ROUTING ANALYSIS
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                          Analysis prepared by:



 ---------------------------------------------------------------------------
   FILE NAME: PRUH2255.DAT
   TIME/DATE OF STUDY: 09:08 07/24/2008


                         ** INPUT SUMMARY **


 ***************************************************************************
   FLOW PROCESS FROM NODE   2255.00 TO NODE   2255.00 IS CODE =   1
 ---------------------------------------------------------------------------
   >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS) ADDED TO STREAM #1<<<<<
 ===========================================================================
   WATERSHED AREA =     393.400 ACRES; BASEFLOW =   0.000 CFS/SQUARE-MILE
   *USER ENTERED "LAG" TIME =    0.370 HOURS
   "S"-CURVE PERCENTAGE(DECIMAL NOTATION):
   VALLEY(DEVELOPED) =  0.120; FOOTHILL =  0.000; MOUNTAIN =  0.000
   VALLEY(UNDEVELOPED)/DESERT = 0.880; DESERT(UNDEVELOPED) =  0.000
   MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) =  0.200; LOW LOSS FRACTION = 0.120
   SPECIFIED PEAK RAINFALL DEPTHS(INCH):
   5-MINUTE =  0.30; 30-MINUTE =  0.97;  1-HOUR =  1.50
     3-HOUR =  3.10;    6-HOUR =  4.50; 24-HOUR = 12.00
   PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
   5-MINUTE = 0.982; 30-MINUTE = 0.982;  1-HOUR = 0.982
     3-HOUR = 0.997;    6-HOUR = 0.999; 24-HOUR = 0.999
 ===========================================================================


+-----------------------------------------------------------------------------------------
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 |                                  * AES FLOODSCx PROGRAM RESULTS SUMMARY *
                                |
 |INPUT FILENAME: [PRUH2255.DAT   ]
                Page:   1 of    |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |UPSTREAM  DOWNSTREAM|                               | UPSTREAM   DOWNSTREAM|
TIME(2) TO | MAX. STORAGE|            |
 | NODE #     NODE #  | HYDROLOGIC/HYDRAULIC PROCESS   |PEAK (CFS)  PEAK (CFS)| PEAK
(HR)  | MODELED (AF)| FOOTNOTES |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |  2255.00    2255.00| Subarea (UH) Added to Stream #1|       0.0       617.8|
16.333 |             |           |

+--------------------+-------------------------------+----------------------+------
```



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------+-------------+-----------+
 |Notes: 1 = BASIN MODEL VOLUME EXCEEDED; 2 = TIME IS AT END OF 5-MINUTE UNIT
INTERVAL                                |
 |       3 = RUNOFF ESTIMATES DO NOT EXTEND PAST 2 DAYS AFTER THE PEAK DAY OF THE
DESIGN STORM                        |

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   END OF FLOODSCx ROUTING ANALYSIS
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                          Analysis prepared by:



 ---------------------------------------------------------------------------
   FILE NAME: PRUH3070.DAT
   TIME/DATE OF STUDY: 09:10 07/24/2008


                         ** INPUT SUMMARY **


 ***************************************************************************
   FLOW PROCESS FROM NODE   3070.00 TO NODE   3070.00 IS CODE =   1
 ---------------------------------------------------------------------------
   >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS) ADDED TO STREAM #1<<<<<
 ===========================================================================
   WATERSHED AREA =     110.900 ACRES; BASEFLOW =   0.000 CFS/SQUARE-MILE
   *USER ENTERED "LAG" TIME =    0.170 HOURS
   "S"-CURVE PERCENTAGE(DECIMAL NOTATION):
   VALLEY(DEVELOPED) =  0.430; FOOTHILL =  0.000; MOUNTAIN =  0.000
   VALLEY(UNDEVELOPED)/DESERT = 0.570; DESERT(UNDEVELOPED) =  0.000
   MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) =  0.210; LOW LOSS FRACTION = 0.160
   SPECIFIED PEAK RAINFALL DEPTHS(INCH):
   5-MINUTE =  0.30; 30-MINUTE =  0.97;  1-HOUR =  1.50
     3-HOUR =  3.10;    6-HOUR =  4.50; 24-HOUR = 12.00
   PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
   5-MINUTE = 0.995; 30-MINUTE = 0.995;  1-HOUR = 0.995
     3-HOUR = 0.999;    6-HOUR = 1.000; 24-HOUR = 1.000
 ===========================================================================


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 |                                  * AES FLOODSCx PROGRAM RESULTS SUMMARY *
                                |
 |INPUT FILENAME: [PRUH3070.DAT   ]
                Page:   1 of    |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |UPSTREAM  DOWNSTREAM|                               | UPSTREAM   DOWNSTREAM|
TIME(2) TO | MAX. STORAGE|           |
 | NODE #     NODE #  | HYDROLOGIC/HYDRAULIC PROCESS   |PEAK (CFS)  PEAK (CFS)| PEAK
(HR)  | MODELED (AF)| FOOTNOTES |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |  3070.00    3070.00| Subarea (UH) Added to Stream #1|       0.0       227.9|
16.250 |             |           |

+--------------------+-------------------------------+----------------------+------
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------+-------------+-----------+
 |Notes: 1 = BASIN MODEL VOLUME EXCEEDED; 2 = TIME IS AT END OF 5-MINUTE UNIT
INTERVAL                                |
 |       3 = RUNOFF ESTIMATES DO NOT EXTEND PAST 2 DAYS AFTER THE PEAK DAY OF THE
DESIGN STORM                        |

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   END OF FLOODSCx ROUTING ANALYSIS
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                          Analysis prepared by:



 ---------------------------------------------------------------------------
   FILE NAME: PRUH4050.DAT
   TIME/DATE OF STUDY: 09:13 07/24/2008


                         ** INPUT SUMMARY **


 ***************************************************************************
   FLOW PROCESS FROM NODE   4050.00 TO NODE   4050.00 IS CODE =   1
 ---------------------------------------------------------------------------
   >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS) ADDED TO STREAM #1<<<<<
 ===========================================================================
   WATERSHED AREA =      51.700 ACRES; BASEFLOW =   0.000 CFS/SQUARE-MILE
   *USER ENTERED "LAG" TIME =    0.280 HOURS
   "S"-CURVE PERCENTAGE(DECIMAL NOTATION):
   VALLEY(DEVELOPED) =  0.230; FOOTHILL =  0.000; MOUNTAIN =  0.000
   VALLEY(UNDEVELOPED)/DESERT = 0.770; DESERT(UNDEVELOPED) =  0.000
   MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) =  0.190; LOW LOSS FRACTION = 0.110
   SPECIFIED PEAK RAINFALL DEPTHS(INCH):
   5-MINUTE =  0.30; 30-MINUTE =  0.97;  1-HOUR =  1.50
     3-HOUR =  3.10;    6-HOUR =  4.50; 24-HOUR = 12.00
   PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
   5-MINUTE = 0.998; 30-MINUTE = 0.998;  1-HOUR = 0.998
     3-HOUR = 1.000;    6-HOUR = 1.000; 24-HOUR = 1.000
 ===========================================================================


+-----------------------------------------------------------------------------------------
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 |                                  * AES FLOODSCx PROGRAM RESULTS SUMMARY *
                                |
 |INPUT FILENAME: [PRUH4050.DAT   ]
                Page:   1 of    |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |UPSTREAM  DOWNSTREAM|                               | UPSTREAM   DOWNSTREAM|
TIME(2) TO | MAX. STORAGE|           |
 | NODE #     NODE #  | HYDROLOGIC/HYDRAULIC PROCESS   |PEAK (CFS)  PEAK (CFS)| PEAK
(HR)  | MODELED (AF)| FOOTNOTES |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |  4050.00    4050.00| Subarea (UH) Added to Stream #1|       0.0        91.2|
16.333 |             |           |

+--------------------+-------------------------------+----------------------+------
```



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------+-------------+-----------+
 |Notes: 1 = BASIN MODEL VOLUME EXCEEDED; 2 = TIME IS AT END OF 5-MINUTE UNIT
INTERVAL                                |
 |       3 = RUNOFF ESTIMATES DO NOT EXTEND PAST 2 DAYS AFTER THE PEAK DAY OF THE
DESIGN STORM                        |

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   END OF FLOODSCx ROUTING ANALYSIS
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                          Analysis prepared by:



 ---------------------------------------------------------------------------
   FILE NAME: PRUH5020.DAT
   TIME/DATE OF STUDY: 09:16 07/24/2008


                         ** INPUT SUMMARY **


 ***************************************************************************
   FLOW PROCESS FROM NODE   5020.00 TO NODE   5020.00 IS CODE =   1
 ---------------------------------------------------------------------------
   >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS) ADDED TO STREAM #1<<<<<
 ===========================================================================
   WATERSHED AREA =     947.700 ACRES; BASEFLOW =   0.000 CFS/SQUARE-MILE
   *USER ENTERED "LAG" TIME =    0.300 HOURS
   "S"-CURVE PERCENTAGE(DECIMAL NOTATION):
   VALLEY(DEVELOPED) =  0.200; FOOTHILL =  0.000; MOUNTAIN =  0.000
   VALLEY(UNDEVELOPED)/DESERT = 0.800; DESERT(UNDEVELOPED) =  0.000
   MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) =  0.270; LOW LOSS FRACTION = 0.170
   SPECIFIED PEAK RAINFALL DEPTHS(INCH):
   5-MINUTE =  0.30; 30-MINUTE =  0.97;  1-HOUR =  1.50
     3-HOUR =  3.10;    6-HOUR =  4.50; 24-HOUR = 12.00
   PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
   5-MINUTE = 0.958; 30-MINUTE = 0.958;  1-HOUR = 0.958
     3-HOUR = 0.994;    6-HOUR = 0.997; 24-HOUR = 0.998
 ===========================================================================


+-----------------------------------------------------------------------------------------
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 |                                  * AES FLOODSCx PROGRAM RESULTS SUMMARY *
                                |
 |INPUT FILENAME: [PRUH5020.DAT   ]
                Page:   1 of    |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |UPSTREAM  DOWNSTREAM|                               | UPSTREAM   DOWNSTREAM|
TIME(2) TO | MAX. STORAGE|           |
 | NODE #     NODE #  | HYDROLOGIC/HYDRAULIC PROCESS   |PEAK (CFS)  PEAK (CFS)| PEAK
(HR)  | MODELED (AF)| FOOTNOTES |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |  5020.00    5020.00| Subarea (UH) Added to Stream #1|       0.0      1507.2|
16.333 |             |           |

+--------------------+-------------------------------+----------------------+------
```



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------+-------------+-----------+
 |Notes: 1 = BASIN MODEL VOLUME EXCEEDED; 2 = TIME IS AT END OF 5-MINUTE UNIT
INTERVAL                                |
 |       3 = RUNOFF ESTIMATES DO NOT EXTEND PAST 2 DAYS AFTER THE PEAK DAY OF THE
DESIGN STORM                        |

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   END OF FLOODSCx ROUTING ANALYSIS
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                          Analysis prepared by:



 ---------------------------------------------------------------------------
   FILE NAME: EXUH5035.DAT
   TIME/DATE OF STUDY: 09:21 07/24/2008


                         ** INPUT SUMMARY **


 ***************************************************************************
   FLOW PROCESS FROM NODE   5035.00 TO NODE   5035.00 IS CODE =   1
 ---------------------------------------------------------------------------
   >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS) ADDED TO STREAM #1<<<<<
 ===========================================================================
   WATERSHED AREA =    1347.100 ACRES; BASEFLOW =   0.000 CFS/SQUARE-MILE
   *USER ENTERED "LAG" TIME =    0.320 HOURS
   "S"-CURVE PERCENTAGE(DECIMAL NOTATION):
   VALLEY(DEVELOPED) =  0.180; FOOTHILL =  0.000; MOUNTAIN =  0.000
   VALLEY(UNDEVELOPED)/DESERT = 0.820; DESERT(UNDEVELOPED) =  0.000
   MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) =  0.250; LOW LOSS FRACTION = 0.160
   SPECIFIED PEAK RAINFALL DEPTHS(INCH):
   5-MINUTE =  0.30; 30-MINUTE =  0.97;  1-HOUR =  1.50
     3-HOUR =  3.10;    6-HOUR =  4.50; 24-HOUR = 12.00
   PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
   5-MINUTE = 0.940; 30-MINUTE = 0.940;  1-HOUR = 0.940
     3-HOUR = 0.991;    6-HOUR = 0.995; 24-HOUR = 0.997
 ===========================================================================


+-----------------------------------------------------------------------------------------
--------------------------------+
 |                                  * AES FLOODSCx PROGRAM RESULTS SUMMARY *
                                |
 |INPUT FILENAME: [EXUH5035.DAT   ]
                Page:   1 of    |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |UPSTREAM  DOWNSTREAM|                               | UPSTREAM   DOWNSTREAM|
TIME(2) TO | MAX. STORAGE|           |
 | NODE #     NODE #  | HYDROLOGIC/HYDRAULIC PROCESS   |PEAK (CFS)  PEAK (CFS)| PEAK
(HR)  | MODELED (AF)| FOOTNOTES |

+--------------------+-------------------------------+----------------------+------
------+-------------+-----------+
 |  5035.00    5035.00| Subarea (UH) Added to Stream #1|       0.0      2082.7|
16.333 |             |           |

+--------------------+-------------------------------+----------------------+------
```



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------+-------------+-----------+
 |Notes: 1 = BASIN MODEL VOLUME EXCEEDED; 2 = TIME IS AT END OF 5-MINUTE UNIT
INTERVAL                                |
 |       3 = RUNOFF ESTIMATES DO NOT EXTEND PAST 2 DAYS AFTER THE PEAK DAY OF THE
DESIGN STORM                        |

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   END OF FLOODSCx ROUTING ANALYSIS
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____________________________________________________________________________
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              RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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              Ver. 13.5  Release Date: 02/06/2007  License ID 1527

                              Analysis prepared by:




----------------------------------------------------------------------------
  FILE NAME: PRN2_100.DAT
  TIME/DATE OF STUDY: 18:42 09/30/2008
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                      --*TIME-OF-CONCENTRATION MODEL*--

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

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.4800

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 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    635.00 TO NODE    660.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   17.12   RAINFALL INTENSITY(INCH/HR) =  3.14
  EFFECTIVE AREA(ACRES) =   157.76
  TOTAL AREA(ACRES) =   167.20        PEAK FLOW RATE(CFS) =    413.90
  AREA-AVERAGED Fm(INCH/HR) =   0.22  AREA-AVERAGED Fp(INCH/HR) =   0.54
  AREA-AVERAGED Ap =  0.41
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE    660.00 TO NODE    662.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1597.00  DOWNSTREAM(FEET) =   1570.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1445.00   CHANNEL SLOPE =  0.0187
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00

  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.897
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        5.10      0.45     0.850    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     419.67
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.75
  AVERAGE FLOW DEPTH(FEET) =   2.68   TRAVEL TIME(MIN.) =   2.47
  Tc(MIN.) =   19.59
  SUBAREA AREA(ACRES) =     5.10       SUBAREA RUNOFF(CFS) =   11.53
  EFFECTIVE AREA(ACRES) =    162.86     AREA-AVERAGED Fm(INCH/HR) =   0.23
  AREA-AVERAGED Fp(INCH/HR) =   0.53  AREA-AVERAGED Ap =   0.42
  TOTAL AREA(ACRES) =      172.3         PEAK FLOW RATE(CFS) =     413.90
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.67   FLOW VELOCITY(FEET/SEC.) =   9.71
  LONGEST FLOWPATH FROM NODE    635.00 TO NODE    662.00 =    1445.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    655.00 TO NODE    662.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.59
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.897
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        6.40      0.80     0.100    52
  COMMERCIAL                 B        6.40      0.45     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.62
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   12.80      SUBAREA RUNOFF(CFS) =   32.65
  EFFECTIVE AREA(ACRES) =    175.66   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.54  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =      185.1       PEAK FLOW RATE(CFS) =     424.05

****************************************************************************
  FLOW PROCESS FROM NODE    662.00 TO NODE    665.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1570.00  DOWNSTREAM(FEET) =   1565.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   481.00   CHANNEL SLOPE =  0.0104
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00

         ==>>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.

  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.815
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        3.40      0.45     0.850    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     427.77
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.39
  AVERAGE FLOW DEPTH(FEET) =   3.00   TRAVEL TIME(MIN.) =   0.96
  Tc(MIN.) =   20.55
  SUBAREA AREA(ACRES) =     3.40       SUBAREA RUNOFF(CFS) =    7.44
  EFFECTIVE AREA(ACRES) =    179.06     AREA-AVERAGED Fm(INCH/HR) =   0.22
  AREA-AVERAGED Fp(INCH/HR) =   0.53  AREA-AVERAGED Ap =   0.41
```

```
  TOTAL AREA(ACRES) =      188.5         PEAK FLOW RATE(CFS) =     424.05
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

         ==>>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) =  3.00   FLOW VELOCITY(FEET/SEC.) =   8.31

  ==>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH

  LONGEST FLOWPATH FROM NODE    635.00 TO NODE    665.00 =    1926.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    665.00 TO NODE    710.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1565.00  DOWNSTREAM(FEET) =   1515.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2567.00   CHANNEL SLOPE =  0.0195
  CHANNEL BASE(FEET) =   12.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00

         ==>>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.

  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.568
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                 A       16.30      0.80     0.850    52
  PUBLIC PARK                 B       15.30      0.45     0.850    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.63
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     453.02
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  12.58
  AVERAGE FLOW DEPTH(FEET) =   2.00   TRAVEL TIME(MIN.) =   3.40
  Tc(MIN.) =   23.95
  SUBAREA AREA(ACRES) =    31.60       SUBAREA RUNOFF(CFS) =   57.82
  EFFECTIVE AREA(ACRES) =    210.66     AREA-AVERAGED Fm(INCH/HR) =   0.27
  AREA-AVERAGED Fp(INCH/HR) =   0.56  AREA-AVERAGED Ap =   0.47
  TOTAL AREA(ACRES) =      220.1         PEAK FLOW RATE(CFS) =     436.59

         ==>>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) =  2.00   FLOW VELOCITY(FEET/SEC.) =  12.13

  ==>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH

  LONGEST FLOWPATH FROM NODE    635.00 TO NODE    710.00 =    4493.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    710.00 TO NODE    710.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   23.95
  RAINFALL INTENSITY(INCH/HR) =   2.57
  AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.56
  AREA-AVERAGED Ap =  0.47
  EFFECTIVE STREAM AREA(ACRES) =     210.66
  TOTAL STREAM AREA(ACRES) =     220.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     436.59

****************************************************************************
  FLOW PROCESS FROM NODE    680.00 TO NODE    685.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   506.00
  ELEVATION DATA: UPSTREAM(FEET) =   1586.00  DOWNSTREAM(FEET) =   1581.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.238
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.548
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  A        3.30      0.80     0.100    52    9.24
  COMMERCIAL                  B        0.90      0.45     0.100    76    9.24
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.72
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =     16.92
  TOTAL AREA(ACRES) =      4.20   PEAK FLOW RATE(CFS) =     16.92

****************************************************************************
  FLOW PROCESS FROM NODE    685.00 TO NODE    690.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1581.00  DOWNSTREAM(FEET) =  1569.00
  FLOW LENGTH(FEET) =   590.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.09
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.92
  PIPE TRAVEL TIME(MIN.) =   0.97    Tc(MIN.) =   10.21
  LONGEST FLOWPATH FROM NODE    680.00 TO NODE    690.00 =    1096.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    690.00 TO NODE    690.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.21
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.282
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B       16.70      0.45     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   16.70      SUBAREA RUNOFF(CFS) =   63.68
  EFFECTIVE AREA(ACRES) =     20.90   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.51  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       20.9       PEAK FLOW RATE(CFS) =      79.60

****************************************************************************
  FLOW PROCESS FROM NODE    690.00 TO NODE    710.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =  1569.00  DOWNSTREAM(FEET) =  1515.00
  FLOW LENGTH(FEET) =  3128.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  27.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.73
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      79.60
  PIPE TRAVEL TIME(MIN.) =   3.80    Tc(MIN.) =   14.01
  LONGEST FLOWPATH FROM NODE    680.00 TO NODE    710.00 =    4224.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    690.00 TO NODE    710.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.01
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.542
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B       56.50      0.45     0.200    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =   56.50      SUBAREA RUNOFF(CFS) =  175.53
  EFFECTIVE AREA(ACRES) =     77.40   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.46  AREA-AVERAGED Ap =  0.17
  TOTAL AREA(ACRES) =       77.4       PEAK FLOW RATE(CFS) =     241.21

****************************************************************************
  FLOW PROCESS FROM NODE    710.00 TO NODE    710.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.01
  RAINFALL INTENSITY(INCH/HR) =   3.54
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.46
  AREA-AVERAGED Ap =  0.17
  EFFECTIVE STREAM AREA(ACRES) =      77.40
  TOTAL STREAM AREA(ACRES) =      77.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     241.21

****************************************************************************
  FLOW PROCESS FROM NODE    695.00 TO NODE    700.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   885.00
  ELEVATION DATA: UPSTREAM(FEET) =   1568.00  DOWNSTREAM(FEET) =   1560.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.534
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.787
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        5.70      0.80     0.200    52   12.53
  PUBLIC PARK                B        0.70      0.45     0.850    76   18.69
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        2.20      0.45     0.200    76   12.53
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.63
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.253
  SUBAREA RUNOFF(CFS) =     28.07
  TOTAL AREA(ACRES) =      8.60   PEAK FLOW RATE(CFS) =     28.07

****************************************************************************
  FLOW PROCESS FROM NODE    700.00 TO NODE    705.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1560.00  DOWNSTREAM(FEET) =  1555.00
  FLOW LENGTH(FEET) =   681.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.79
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      28.07
  PIPE TRAVEL TIME(MIN.) =   1.46    Tc(MIN.) =   13.99
  LONGEST FLOWPATH FROM NODE    695.00 TO NODE    705.00 =    1566.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    700.00 TO NODE    705.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.99
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.545
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A       25.10      0.80     0.200    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =   25.10      SUBAREA RUNOFF(CFS) =   76.49
  EFFECTIVE AREA(ACRES) =     33.70   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.21
  TOTAL AREA(ACRES) =       33.7       PEAK FLOW RATE(CFS) =     102.69

****************************************************************************
  FLOW PROCESS FROM NODE    700.00 TO NODE    705.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.99
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.545
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        8.60      0.80     0.500    52
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.60      0.45     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.77
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    9.20      SUBAREA RUNOFF(CFS) =   26.15
  EFFECTIVE AREA(ACRES) =     42.90   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.76  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =       42.9       PEAK FLOW RATE(CFS) =     128.84

****************************************************************************
  FLOW PROCESS FROM NODE    705.00 TO NODE    706.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1555.00  DOWNSTREAM(FEET) =  1530.00
  FLOW LENGTH(FEET) =  1201.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  31.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.66
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     128.84
  PIPE TRAVEL TIME(MIN.) =   1.20    Tc(MIN.) =   15.19
  LONGEST FLOWPATH FROM NODE    695.00 TO NODE    706.00 =    2767.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    705.00 TO NODE    706.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   15.19
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.374
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        A       18.00      0.80     0.500    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   18.00      SUBAREA RUNOFF(CFS) =   48.21
  EFFECTIVE AREA(ACRES) =     60.90   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.77  AREA-AVERAGED Ap =  0.34
  TOTAL AREA(ACRES) =       60.9       PEAK FLOW RATE(CFS) =     170.45

****************************************************************************
  FLOW PROCESS FROM NODE    705.00 TO NODE    706.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   15.19
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.374
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"        B       12.40      0.45     0.600    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =   12.40      SUBAREA RUNOFF(CFS) =   34.63
  EFFECTIVE AREA(ACRES) =     73.30   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.69  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =       73.3       PEAK FLOW RATE(CFS) =     205.08

****************************************************************************
  FLOW PROCESS FROM NODE    706.00 TO NODE    707.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1530.00  DOWNSTREAM(FEET) =  1518.00
  FLOW LENGTH(FEET) =   499.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  37.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.65
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     205.08
  PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =   15.62
  LONGEST FLOWPATH FROM NODE    695.00 TO NODE    707.00 =    3266.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    707.00 TO NODE    710.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   15.62
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.319
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        A        3.90      0.80     0.500    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.90      SUBAREA RUNOFF(CFS) =   10.25
  EFFECTIVE AREA(ACRES) =     77.20   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.70  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =       77.2       PEAK FLOW RATE(CFS) =     211.70

****************************************************************************
  FLOW PROCESS FROM NODE    707.00 TO NODE    710.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1518.00  DOWNSTREAM(FEET) =  1515.00
  FLOW LENGTH(FEET) =   536.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  63.0 INCH PIPE IS  50.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.39
  ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     211.70
  PIPE TRAVEL TIME(MIN.) =   0.78    Tc(MIN.) =   16.40
  LONGEST FLOWPATH FROM NODE    695.00 TO NODE    710.00 =    3802.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    710.00 TO NODE    710.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.40
  RAINFALL INTENSITY(INCH/HR) =   3.22
  AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.70
  AREA-AVERAGED Ap =  0.39
  EFFECTIVE STREAM AREA(ACRES) =      77.20
  TOTAL STREAM AREA(ACRES) =      77.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     211.70

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      436.59   23.95    2.568  0.56( 0.27) 0.47     210.7     635.00
      2      241.21   14.01    3.542  0.46( 0.08) 0.17      77.4     680.00
      3      211.70   16.40    3.223  0.70( 0.27) 0.39      77.2     695.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      805.12   14.01    3.542  0.58( 0.21) 0.37     266.6     680.00
      2      814.68   16.40    3.223  0.58( 0.22) 0.38     298.9     695.00
      3      774.65   23.95    2.568  0.58( 0.23) 0.39     365.3     635.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     814.68    Tc(MIN.) =    16.40
  EFFECTIVE AREA(ACRES) =     298.88   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.58  AREA-AVERAGED Ap =  0.38
  TOTAL AREA(ACRES) =      374.7
  LONGEST FLOWPATH FROM NODE    635.00 TO NODE    710.00 =    4493.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    710.00 TO NODE    630.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1515.00  DOWNSTREAM(FEET) =   1473.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1555.00   CHANNEL SLOPE =  0.0270
  CHANNEL BASE(FEET) =   12.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00

        ===>>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.
```

```
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.011
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                A        4.00      0.80     0.850    52
  PUBLIC PARK                B        9.70      0.45     0.850    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.55
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     830.35
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  13.18
  AVERAGE FLOW DEPTH(FEET) =   3.00   TRAVEL TIME(MIN.) =   1.97
  Tc(MIN.) =   18.37
  SUBAREA AREA(ACRES) =    13.70       SUBAREA RUNOFF(CFS) =   31.34
  EFFECTIVE AREA(ACRES) =    312.58     AREA-AVERAGED Fm(INCH/HR) =   0.23
  AREA-AVERAGED Fp(INCH/HR) =   0.58  AREA-AVERAGED Ap =   0.40
  TOTAL AREA(ACRES) =      388.4         PEAK FLOW RATE(CFS) =     814.68
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.99   FLOW VELOCITY(FEET/SEC.) =  13.02
  LONGEST FLOWPATH FROM NODE    635.00 TO NODE    630.00 =    6048.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    630.00 TO NODE    630.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   18.37
  RAINFALL INTENSITY(INCH/HR) =   3.01
  AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.58
  AREA-AVERAGED Ap =  0.40
  EFFECTIVE STREAM AREA(ACRES) =     312.58
  TOTAL STREAM AREA(ACRES) =     388.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     814.68

****************************************************************************
  FLOW PROCESS FROM NODE    615.00 TO NODE    620.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1706.00
  ELEVATION DATA: UPSTREAM(FEET) =   1533.00  DOWNSTREAM(FEET) =   1505.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.366
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.114
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.30      0.45     0.500    76   17.37
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A       15.30      0.80     0.500    52   17.37
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.79
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =     38.18
  TOTAL AREA(ACRES) =     15.60   PEAK FLOW RATE(CFS) =     38.18

****************************************************************************
  FLOW PROCESS FROM NODE    620.00 TO NODE    620.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.37
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.114
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        4.60      0.80     0.500    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    4.60      SUBAREA RUNOFF(CFS) =   11.24
  EFFECTIVE AREA(ACRES) =     20.20   AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.79  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       20.2       PEAK FLOW RATE(CFS) =      49.42

****************************************************************************
  FLOW PROCESS FROM NODE    620.00 TO NODE    622.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1505.00  DOWNSTREAM(FEET) =  1475.00
  FLOW LENGTH(FEET) =  1251.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.01
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      49.42
  PIPE TRAVEL TIME(MIN.) =   1.49    Tc(MIN.) =   18.85
  LONGEST FLOWPATH FROM NODE    615.00 TO NODE    622.00 =    2957.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    620.00 TO NODE    622.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.85
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.964
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A       20.30      0.80     0.500    52
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.10      0.45     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.78
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   21.40      SUBAREA RUNOFF(CFS) =   49.59
  EFFECTIVE AREA(ACRES) =     41.60   AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.78  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       41.6       PEAK FLOW RATE(CFS) =      96.29

****************************************************************************
  FLOW PROCESS FROM NODE    620.00 TO NODE    622.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.85
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.964
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        8.30      0.45     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    8.30      SUBAREA RUNOFF(CFS) =   20.45
  EFFECTIVE AREA(ACRES) =     49.90   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.73  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       49.9       PEAK FLOW RATE(CFS) =     116.75

****************************************************************************
  FLOW PROCESS FROM NODE    622.00 TO NODE    630.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =  1475.00  DOWNSTREAM(FEET) =  1473.00
  FLOW LENGTH(FEET) =   532.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  43.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.42
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     116.75
  PIPE TRAVEL TIME(MIN.) =   1.05    Tc(MIN.) =   19.91
  LONGEST FLOWPATH FROM NODE    615.00 TO NODE    630.00 =    3489.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    630.00 TO NODE    630.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   19.91
  RAINFALL INTENSITY(INCH/HR) =   2.87
  AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.73
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =      49.90
  TOTAL STREAM AREA(ACRES) =      49.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     116.75

****************************************************************************
  FLOW PROCESS FROM NODE    605.00 TO NODE    610.00 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) =   1514.00  DOWNSTREAM(FEET) =   1412.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.650
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.540
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        0.50      0.80     0.500    52    6.65
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        3.50      0.45     0.500    76    6.65
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =     19.05
  TOTAL AREA(ACRES) =      4.00   PEAK FLOW RATE(CFS) =     19.05

****************************************************************************
  FLOW PROCESS FROM NODE    610.00 TO NODE    611.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1512.00  DOWNSTREAM(FEET) =  1500.00
  FLOW LENGTH(FEET) =   792.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.35
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.05
  PIPE TRAVEL TIME(MIN.) =   1.41    Tc(MIN.) =    8.06
  LONGEST FLOWPATH FROM NODE    605.00 TO NODE    611.00 =    1322.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    610.00 TO NODE    611.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.06
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.935
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        8.40      0.45     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    8.40      SUBAREA RUNOFF(CFS) =   35.60
  EFFECTIVE AREA(ACRES) =     12.40   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.47  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       12.4       PEAK FLOW RATE(CFS) =      52.48

****************************************************************************
  FLOW PROCESS FROM NODE    611.00 TO NODE    630.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1500.00  DOWNSTREAM(FEET) =  1473.00
  FLOW LENGTH(FEET) =  1072.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.44
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      52.48
  PIPE TRAVEL TIME(MIN.) =   1.24    Tc(MIN.) =    9.30
  LONGEST FLOWPATH FROM NODE    605.00 TO NODE    630.00 =    2394.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    611.00 TO NODE    630.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.30
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.530
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B       10.60      0.45     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   10.60      SUBAREA RUNOFF(CFS) =   41.06
  EFFECTIVE AREA(ACRES) =     23.00   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.46  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       23.0       PEAK FLOW RATE(CFS) =      89.02

****************************************************************************
  FLOW PROCESS FROM NODE    611.00 TO NODE    630.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.30
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.530
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        7.60      0.45     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    7.60      SUBAREA RUNOFF(CFS) =   29.44
  EFFECTIVE AREA(ACRES) =     30.60   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.46  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       30.6       PEAK FLOW RATE(CFS) =     118.46

****************************************************************************
  FLOW PROCESS FROM NODE    630.00 TO NODE    630.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
```

```
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.30
  RAINFALL INTENSITY(INCH/HR) =   4.53
  AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.46
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =      30.60
  TOTAL STREAM AREA(ACRES) =      30.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     118.46

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
      1      805.12   15.99    3.272  0.58( 0.23) 0.39     280.3     680.00
      1      814.68   18.37    3.011  0.58( 0.23) 0.40     312.6     695.00
      1      774.65   25.96    2.447  0.58( 0.24) 0.41     379.0     635.00
      2      116.75   19.91    2.869  0.73( 0.36) 0.50      49.9     615.00
      3      118.46    9.30    4.530  0.46( 0.23) 0.50      30.6     605.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
      1      870.64    9.30    4.530  0.58( 0.24) 0.42     216.9     605.00
      2      997.81   15.99    3.272  0.59( 0.24) 0.41     351.0     680.00
      3     1005.13   18.37    3.011  0.59( 0.25) 0.42     389.2     695.00
      4      996.01   19.91    2.869  0.59( 0.25) 0.42     406.6     615.00
      5      932.81   25.96    2.447  0.59( 0.25) 0.43     459.5     635.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    1005.13    Tc(MIN.) =    18.37
  EFFECTIVE AREA(ACRES) =     389.22   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.59  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =      468.9
  LONGEST FLOWPATH FROM NODE    635.00 TO NODE    630.00 =    6048.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    630.00 TO NODE    635.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1473.00  DOWNSTREAM(FEET) =   1466.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1382.00   CHANNEL SLOPE =  0.0051
  CHANNEL BASE(FEET) =   12.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00

         ==>>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.

  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.880
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                 A        0.10      0.80     0.850    52
  PUBLIC PARK                 B       20.20      0.45     0.850    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    1027.92
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  16.32
  AVERAGE FLOW DEPTH(FEET) =   3.00   TRAVEL TIME(MIN.) =   1.41
  Tc(MIN.) =   19.78
  SUBAREA AREA(ACRES) =    20.30       SUBAREA RUNOFF(CFS) =   45.58
  EFFECTIVE AREA(ACRES) =    409.52     AREA-AVERAGED Fm(INCH/HR) =   0.25
  AREA-AVERAGED Fp(INCH/HR) =   0.58  AREA-AVERAGED Ap =   0.44
  TOTAL AREA(ACRES) =      489.2         PEAK FLOW RATE(CFS) =    1005.13
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

         ==>>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) =  3.00   FLOW VELOCITY(FEET/SEC.) =  15.95

  ==>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH

  LONGEST FLOWPATH FROM NODE    635.00 TO NODE    635.00 =    7430.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    595.00 TO NODE    635.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.78
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.880
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                 A       34.80      0.80     0.850    52
  PUBLIC PARK                 B       20.00      0.45     0.850    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.67
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =   54.80      SUBAREA RUNOFF(CFS) =  113.95
  EFFECTIVE AREA(ACRES) =    464.32   AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =      544.0       PEAK FLOW RATE(CFS) =    1082.37

****************************************************************************
  FLOW PROCESS FROM NODE    635.00 TO NODE    650.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1466.00  DOWNSTREAM(FEET) =  1420.00
  FLOW LENGTH(FEET) =  2430.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  93.0 INCH PIPE IS  73.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  27.13
  ESTIMATED PIPE DIAMETER(INCH) =  93.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    1082.37
  PIPE TRAVEL TIME(MIN.) =   1.49    Tc(MIN.) =   21.27
  LONGEST FLOWPATH FROM NODE    635.00 TO NODE    650.00 =    9860.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    650.00 TO NODE    650.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   21.27
  RAINFALL INTENSITY(INCH/HR) =   2.76
  AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.60
  AREA-AVERAGED Ap =  0.49
  EFFECTIVE STREAM AREA(ACRES) =     464.32
  TOTAL STREAM AREA(ACRES) =     544.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    1082.37

****************************************************************************
  FLOW PROCESS FROM NODE    640.00 TO NODE    645.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1099.00
  ELEVATION DATA: UPSTREAM(FEET) =   1475.00  DOWNSTREAM(FEET) =   1460.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.112
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.385
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        8.30      0.45     0.500    76   15.11
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =     23.60
  TOTAL AREA(ACRES) =      8.30   PEAK FLOW RATE(CFS) =     23.60

****************************************************************************
  FLOW PROCESS FROM NODE    645.00 TO NODE    645.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   15.11
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.385
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        7.10      0.80     0.500    52
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        5.00      0.45     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.65
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   12.10      SUBAREA RUNOFF(CFS) =   33.30
  EFFECTIVE AREA(ACRES) =     20.40   AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.57  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       20.4       PEAK FLOW RATE(CFS) =      56.90

****************************************************************************
  FLOW PROCESS FROM NODE    645.00 TO NODE    646.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1460.00  DOWNSTREAM(FEET) =  1455.00
  FLOW LENGTH(FEET) =   258.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.40
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      56.90
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   15.43
  LONGEST FLOWPATH FROM NODE    640.00 TO NODE    646.00 =    1357.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    645.00 TO NODE    646.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   15.43
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.343
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        3.00      0.80     0.200    52
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       C        6.40      0.27     0.200    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    9.40      SUBAREA RUNOFF(CFS) =   27.53
  EFFECTIVE AREA(ACRES) =     29.80   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.55  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =       29.8       PEAK FLOW RATE(CFS) =      83.66

****************************************************************************
  FLOW PROCESS FROM NODE    646.00 TO NODE    650.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1455.00  DOWNSTREAM(FEET) =  1420.00
  FLOW LENGTH(FEET) =  1529.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.62
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      83.66
  PIPE TRAVEL TIME(MIN.) =   1.63    Tc(MIN.) =   17.06
  LONGEST FLOWPATH FROM NODE    640.00 TO NODE    650.00 =    2886.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    646.00 TO NODE    650.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   17.06
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.147
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        6.40      0.80     0.500    52
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B       10.10      0.45     0.200    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.66
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.316
  SUBAREA AREA(ACRES) =   16.50      SUBAREA RUNOFF(CFS) =   43.62
  EFFECTIVE AREA(ACRES) =     46.30   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.58  AREA-AVERAGED Ap =  0.37
  TOTAL AREA(ACRES) =       46.3       PEAK FLOW RATE(CFS) =     122.03

****************************************************************************
  FLOW PROCESS FROM NODE    650.00 TO NODE    650.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   17.06
  RAINFALL INTENSITY(INCH/HR) =   3.15
  AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.58
  AREA-AVERAGED Ap =  0.37
  EFFECTIVE STREAM AREA(ACRES) =      46.30
  TOTAL STREAM AREA(ACRES) =      46.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     122.03

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
      1      999.87   12.43    3.807  0.59( 0.31) 0.53     292.0     605.00
      1     1080.83   18.90    2.960  0.59( 0.29) 0.49     426.1     680.00
      1     1082.37   21.27    2.757  0.60( 0.29) 0.49     464.3     695.00
      1     1067.46   22.83    2.643  0.60( 0.29) 0.49     481.7     615.00
      1      999.17   29.01    2.289  0.59( 0.29) 0.49     534.6     635.00
      2      122.03   17.06    3.147  0.58( 0.22) 0.37      46.3     640.00

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

  ** PEAK FLOW RATE TABLE **
```

```
   STREAM        Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1108.75   12.43    3.807  0.59( 0.30) 0.51     325.7     605.00
      2     1179.88   17.06    3.147  0.59( 0.29) 0.49     434.3     640.00
      3     1195.05   18.90    2.960  0.59( 0.28) 0.48     472.4     680.00
      4     1188.15   21.27    2.757  0.60( 0.28) 0.48     510.6     695.00
      5     1168.48   22.83    2.643  0.60( 0.28) 0.48     528.0     615.00
      6     1085.45   29.01    2.289  0.59( 0.28) 0.48     580.9     635.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    1195.05    Tc(MIN.) =    18.90
  EFFECTIVE AREA(ACRES) =     472.37   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.59  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =      590.3
  LONGEST FLOWPATH FROM NODE    635.00 TO NODE    650.00 =    9860.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    650.00 TO NODE    650.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    575.00 TO NODE    585.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   538.00
  ELEVATION DATA: UPSTREAM(FEET) =   1467.00  DOWNSTREAM(FEET) =   1460.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.236
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.508
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                A        3.20      0.80     0.850    52   14.24
  PUBLIC PARK                B        2.20      0.45     0.850    76   14.24
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.66
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =     14.34
  TOTAL AREA(ACRES) =      5.40   PEAK FLOW RATE(CFS) =     14.34

****************************************************************************
  FLOW PROCESS FROM NODE    585.00 TO NODE    565.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1460.00  DOWNSTREAM(FEET) =   1410.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2500.00   CHANNEL SLOPE =  0.0200
  CHANNEL BASE(FEET) =   12.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.728
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                A       58.50      0.80     0.850    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      69.58
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.61
  AVERAGE FLOW DEPTH(FEET) =   0.85   TRAVEL TIME(MIN.) =   7.42
  Tc(MIN.) =   21.66
  SUBAREA AREA(ACRES) =    58.50       SUBAREA RUNOFF(CFS) =  107.98
  EFFECTIVE AREA(ACRES) =     63.90     AREA-AVERAGED Fm(INCH/HR) =   0.67
  AREA-AVERAGED Fp(INCH/HR) =   0.78  AREA-AVERAGED Ap =   0.85
  TOTAL AREA(ACRES) =       63.9         PEAK FLOW RATE(CFS) =     118.53

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.15   FLOW VELOCITY(FEET/SEC.) =   6.64
  LONGEST FLOWPATH FROM NODE    575.00 TO NODE    565.00 =    3038.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    565.00 TO NODE    565.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   21.66
  RAINFALL INTENSITY(INCH/HR) =   2.73
  AREA-AVERAGED Fm(INCH/HR) =  0.67
  AREA-AVERAGED Fp(INCH/HR) =  0.78
  AREA-AVERAGED Ap =  0.85
  EFFECTIVE STREAM AREA(ACRES) =      63.90
  TOTAL STREAM AREA(ACRES) =      63.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     118.53

****************************************************************************
  FLOW PROCESS FROM NODE    530.00 TO NODE    535.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1193.00
  ELEVATION DATA: UPSTREAM(FEET) =   1445.00  DOWNSTREAM(FEET) =   1421.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.451
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.477
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A       11.90      0.80     0.500    52   14.45
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        2.00      0.45     0.500    76   14.45
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =     38.83
  TOTAL AREA(ACRES) =     13.90   PEAK FLOW RATE(CFS) =     38.83

****************************************************************************
  FLOW PROCESS FROM NODE    535.00 TO NODE    565.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1420.00  DOWNSTREAM(FEET) =  1410.00
  FLOW LENGTH(FEET) =  1340.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.45
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      38.83
  PIPE TRAVEL TIME(MIN.) =   2.64    Tc(MIN.) =   17.09
  LONGEST FLOWPATH FROM NODE    530.00 TO NODE    565.00 =    2533.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    535.00 TO NODE    565.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.09
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.144
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A       11.20      0.80     0.500    52
  RESIDENTIAL
```

```
  "5-7 DWELLINGS/ACRE"       B        0.40      0.45     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.78
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   11.60      SUBAREA RUNOFF(CFS) =   28.73
  EFFECTIVE AREA(ACRES) =     25.50   AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.76  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       25.5       PEAK FLOW RATE(CFS) =      63.39

****************************************************************************
  FLOW PROCESS FROM NODE    565.00 TO NODE    565.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   17.09
  RAINFALL INTENSITY(INCH/HR) =   3.14
  AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.76
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =      25.50
  TOTAL STREAM AREA(ACRES) =      25.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      63.39

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      118.53   21.66    2.728  0.78( 0.67) 0.85      63.9     575.00
      2       63.39   17.09    3.144  0.76( 0.38) 0.50      25.5     530.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      175.82   17.09    3.144  0.78( 0.57) 0.73      75.9     530.00
      2      172.36   21.66    2.728  0.78( 0.59) 0.75      89.4     575.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     175.82    Tc(MIN.) =    17.09
  EFFECTIVE AREA(ACRES) =      75.93   AREA-AVERAGED Fm(INCH/HR) =  0.57
  AREA-AVERAGED Fp(INCH/HR) =  0.78  AREA-AVERAGED Ap =  0.73
  TOTAL AREA(ACRES) =       89.4
  LONGEST FLOWPATH FROM NODE    575.00 TO NODE    565.00 =    3038.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    565.00 TO NODE    565.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.09
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.144
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A       14.10      0.80     0.200    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =   14.10      SUBAREA RUNOFF(CFS) =   37.87
  EFFECTIVE AREA(ACRES) =     90.03   AREA-AVERAGED Fm(INCH/HR) =  0.51
  AREA-AVERAGED Fp(INCH/HR) =  0.78  AREA-AVERAGED Ap =  0.65
  TOTAL AREA(ACRES) =      103.5       PEAK FLOW RATE(CFS) =     213.70

****************************************************************************
  FLOW PROCESS FROM NODE    565.00 TO NODE    525.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1410.00  DOWNSTREAM(FEET) =   1377.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1936.00   CHANNEL SLOPE =  0.0170
  CHANNEL BASE(FEET) =   12.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.763
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                A       35.30      0.80     0.850    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     246.90
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.86
  AVERAGE FLOW DEPTH(FEET) =   1.80   TRAVEL TIME(MIN.) =   4.10
  Tc(MIN.) =   21.20
  SUBAREA AREA(ACRES) =    35.30       SUBAREA RUNOFF(CFS) =   66.29
  EFFECTIVE AREA(ACRES) =    125.33     AREA-AVERAGED Fm(INCH/HR) =   0.55
  AREA-AVERAGED Fp(INCH/HR) =   0.79  AREA-AVERAGED Ap =   0.71
  TOTAL AREA(ACRES) =      138.8         PEAK FLOW RATE(CFS) =     249.13

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.81   FLOW VELOCITY(FEET/SEC.) =   7.89
  LONGEST FLOWPATH FROM NODE    575.00 TO NODE    525.00 =    4974.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    525.00 TO NODE    525.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.20
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.763
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A       14.70      0.80     0.500    52
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       A        8.70      0.80     0.600    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.537
  SUBAREA AREA(ACRES) =   23.40      SUBAREA RUNOFF(CFS) =   49.18
  EFFECTIVE AREA(ACRES) =    148.73   AREA-AVERAGED Fm(INCH/HR) =  0.53
  AREA-AVERAGED Fp(INCH/HR) =  0.79  AREA-AVERAGED Ap =  0.68
  TOTAL AREA(ACRES) =      162.2       PEAK FLOW RATE(CFS) =     298.32

****************************************************************************
  FLOW PROCESS FROM NODE    510.00 TO NODE    525.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.20
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.763
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A       26.20      0.80     0.500    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   26.20      SUBAREA RUNOFF(CFS) =   55.77
  EFFECTIVE AREA(ACRES) =    174.93   AREA-AVERAGED Fm(INCH/HR) =  0.51
  AREA-AVERAGED Fp(INCH/HR) =  0.79  AREA-AVERAGED Ap =  0.65
  TOTAL AREA(ACRES) =      188.4       PEAK FLOW RATE(CFS) =     354.08

****************************************************************************
  FLOW PROCESS FROM NODE    525.00 TO NODE    525.00 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      354.08   21.20    2.763  0.79( 0.51) 0.65     174.9     530.00
    2      327.05   25.84    2.454  0.79( 0.52) 0.67     188.4     575.00
LONGEST FLOWPATH FROM NODE    575.00 TO NODE    525.00 =    4974.00 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     1108.75   12.43    3.807  0.59( 0.30) 0.51     325.7     605.00
    2     1179.88   17.06    3.147  0.59( 0.29) 0.49     434.3     640.00
    3     1195.05   18.90    2.960  0.59( 0.28) 0.48     472.4     680.00
    4     1188.15   21.27    2.757  0.60( 0.28) 0.48     510.6     695.00
    5     1168.48   22.83    2.643  0.60( 0.28) 0.48     528.0     615.00
    6     1085.45   29.01    2.289  0.59( 0.28) 0.48     580.9     635.00
LONGEST FLOWPATH FROM NODE    635.00 TO NODE    525.00 =    9860.00 FEET.

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
    1     1412.65   12.43    3.807  0.65( 0.35) 0.55     428.3     605.00
    2     1513.59   17.06    3.147  0.65( 0.34) 0.53     575.1     640.00
    3     1538.40   18.90    2.960  0.65( 0.34) 0.52     628.4     680.00
    4     1542.45   21.20    2.763  0.66( 0.34) 0.52     684.4     530.00
    5     1541.81   21.27    2.757  0.66( 0.34) 0.52     685.8     695.00
    6     1513.07   22.83    2.643  0.66( 0.34) 0.52     707.6     615.00
    7     1455.10   25.84    2.454  0.66( 0.34) 0.52     742.1     575.00
    8     1384.58   29.01    2.289  0.65( 0.34) 0.52     769.3     635.00
  TOTAL AREA(ACRES) =       778.7

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     1542.45  Tc(MIN.) =   21.197
EFFECTIVE AREA(ACRES) =    684.36  AREA-AVERAGED Fm(INCH/HR) =  0.34
AREA-AVERAGED Fp(INCH/HR) =  0.65  AREA-AVERAGED Ap =  0.55
TOTAL AREA(ACRES) =      778.7
LONGEST FLOWPATH FROM NODE    635.00 TO NODE    525.00 =    9860.00 FEET.
================================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =      778.7  TC(MIN.) =     21.20
EFFECTIVE AREA(ACRES) =    684.36  AREA-AVERAGED Fm(INCH/HR)=  0.34
AREA-AVERAGED Fp(INCH/HR) =  0.66  AREA-AVERAGED Ap = 0.521
PEAK FLOW RATE(CFS)   =    1542.45

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
    1     1412.65   12.43    3.807  0.65( 0.35) 0.55     428.3     605.00
    2     1513.59   17.06    3.147  0.65( 0.34) 0.53     575.1     640.00
    3     1538.40   18.90    2.960  0.65( 0.34) 0.52     628.4     680.00
    4     1542.45   21.20    2.763  0.66( 0.34) 0.52     684.4     530.00
    5     1541.81   21.27    2.757  0.66( 0.34) 0.52     685.8     695.00
    6     1513.07   22.83    2.643  0.66( 0.34) 0.52     707.6     615.00
    7     1455.10   25.84    2.454  0.66( 0.34) 0.52     742.1     575.00
    8     1384.58   29.01    2.289  0.65( 0.34) 0.52     769.3     635.00
================================================================================
================================================================================
END OF RATIONAL METHOD ANALYSIS
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____________________________________________________________________________
****************************************************************************
              RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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              Ver. 13.5  Release Date: 02/06/2007  License ID 1527

                              Analysis prepared by:




----------------------------------------------------------------------------
  FILE NAME: PRN2_100.DAT
  TIME/DATE OF STUDY: 18:42 09/30/2008
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                      --*TIME-OF-CONCENTRATION MODEL*--

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

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.4800

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 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    635.00 TO NODE    660.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   17.12   RAINFALL INTENSITY(INCH/HR) =  3.14
  EFFECTIVE AREA(ACRES) =   157.76
  TOTAL AREA(ACRES) =   167.20        PEAK FLOW RATE(CFS) =    413.90
  AREA-AVERAGED Fm(INCH/HR) =   0.22  AREA-AVERAGED Fp(INCH/HR) =   0.54
  AREA-AVERAGED Ap =  0.41
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
        CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE    660.00 TO NODE    662.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1597.00  DOWNSTREAM(FEET) =   1570.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1445.00   CHANNEL SLOPE =  0.0187
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00

  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.897
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        5.10      0.45     0.850    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     419.67
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.75
  AVERAGE FLOW DEPTH(FEET) =   2.68   TRAVEL TIME(MIN.) =   2.47
  Tc(MIN.) =   19.59
  SUBAREA AREA(ACRES) =     5.10       SUBAREA RUNOFF(CFS) =   11.53
  EFFECTIVE AREA(ACRES) =    162.86     AREA-AVERAGED Fm(INCH/HR) =   0.23
  AREA-AVERAGED Fp(INCH/HR) =   0.53  AREA-AVERAGED Ap =   0.42
  TOTAL AREA(ACRES) =      172.3         PEAK FLOW RATE(CFS) =     413.90
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.67   FLOW VELOCITY(FEET/SEC.) =   9.71
  LONGEST FLOWPATH FROM NODE    635.00 TO NODE    662.00 =    1445.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    655.00 TO NODE    662.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.59
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.897
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        6.40      0.80     0.100    52
  COMMERCIAL                 B        6.40      0.45     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.62
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   12.80      SUBAREA RUNOFF(CFS) =   32.65
  EFFECTIVE AREA(ACRES) =    175.66   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.54  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =      185.1       PEAK FLOW RATE(CFS) =     424.05

****************************************************************************
  FLOW PROCESS FROM NODE    662.00 TO NODE    665.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1570.00  DOWNSTREAM(FEET) =   1565.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   481.00   CHANNEL SLOPE =  0.0104
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00

         ==>>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.

  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.815
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        3.40      0.45     0.850    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     427.77
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.39
  AVERAGE FLOW DEPTH(FEET) =   3.00   TRAVEL TIME(MIN.) =   0.96
  Tc(MIN.) =   20.55
  SUBAREA AREA(ACRES) =     3.40       SUBAREA RUNOFF(CFS) =    7.44
  EFFECTIVE AREA(ACRES) =    179.06     AREA-AVERAGED Fm(INCH/HR) =   0.22
  AREA-AVERAGED Fp(INCH/HR) =   0.53  AREA-AVERAGED Ap =   0.41
```

```
  TOTAL AREA(ACRES) =      188.5         PEAK FLOW RATE(CFS) =     424.05
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

         ==>>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) =  3.00   FLOW VELOCITY(FEET/SEC.) =   8.31

  ==>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH

  LONGEST FLOWPATH FROM NODE    635.00 TO NODE    665.00 =    1926.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    665.00 TO NODE    710.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1565.00  DOWNSTREAM(FEET) =   1515.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2567.00   CHANNEL SLOPE =  0.0195
  CHANNEL BASE(FEET) =   12.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00

         ==>>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.

  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.568
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                 A       16.30      0.80     0.850    52
  PUBLIC PARK                 B       15.30      0.45     0.850    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.63
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     453.02
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  12.58
  AVERAGE FLOW DEPTH(FEET) =   2.00   TRAVEL TIME(MIN.) =   3.40
  Tc(MIN.) =   23.95
  SUBAREA AREA(ACRES) =    31.60       SUBAREA RUNOFF(CFS) =   57.82
  EFFECTIVE AREA(ACRES) =    210.66     AREA-AVERAGED Fm(INCH/HR) =   0.27
  AREA-AVERAGED Fp(INCH/HR) =   0.56  AREA-AVERAGED Ap =   0.47
  TOTAL AREA(ACRES) =      220.1         PEAK FLOW RATE(CFS) =     436.59

         ==>>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) =  2.00   FLOW VELOCITY(FEET/SEC.) =  12.13

  ==>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH

  LONGEST FLOWPATH FROM NODE    635.00 TO NODE    710.00 =    4493.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    710.00 TO NODE    710.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   23.95
  RAINFALL INTENSITY(INCH/HR) =   2.57
  AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.56
  AREA-AVERAGED Ap =  0.47
  EFFECTIVE STREAM AREA(ACRES) =     210.66
  TOTAL STREAM AREA(ACRES) =     220.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     436.59

****************************************************************************
  FLOW PROCESS FROM NODE    680.00 TO NODE    685.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   506.00
  ELEVATION DATA: UPSTREAM(FEET) =   1586.00  DOWNSTREAM(FEET) =   1581.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.238
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.548
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  A        3.30      0.80     0.100    52    9.24
  COMMERCIAL                  B        0.90      0.45     0.100    76    9.24
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.72
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =     16.92
  TOTAL AREA(ACRES) =      4.20   PEAK FLOW RATE(CFS) =     16.92

****************************************************************************
  FLOW PROCESS FROM NODE    685.00 TO NODE    690.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1581.00  DOWNSTREAM(FEET) =  1569.00
  FLOW LENGTH(FEET) =   590.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.09
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.92
  PIPE TRAVEL TIME(MIN.) =   0.97    Tc(MIN.) =   10.21
  LONGEST FLOWPATH FROM NODE    680.00 TO NODE    690.00 =    1096.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    690.00 TO NODE    690.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.21
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.282
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B       16.70      0.45     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   16.70      SUBAREA RUNOFF(CFS) =   63.68
  EFFECTIVE AREA(ACRES) =     20.90   AREA-AVERAGED Fm(INCH/HR) =  0.05
  AREA-AVERAGED Fp(INCH/HR) =  0.51  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       20.9       PEAK FLOW RATE(CFS) =      79.60

****************************************************************************
  FLOW PROCESS FROM NODE    690.00 TO NODE    710.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =  1569.00  DOWNSTREAM(FEET) =  1515.00
  FLOW LENGTH(FEET) =  3128.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  27.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.73
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      79.60
  PIPE TRAVEL TIME(MIN.) =   3.80    Tc(MIN.) =   14.01
  LONGEST FLOWPATH FROM NODE    680.00 TO NODE    710.00 =    4224.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    690.00 TO NODE    710.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.01
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.542
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B       56.50      0.45     0.200    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =   56.50      SUBAREA RUNOFF(CFS) =  175.53
  EFFECTIVE AREA(ACRES) =     77.40   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.46  AREA-AVERAGED Ap =  0.17
  TOTAL AREA(ACRES) =       77.4       PEAK FLOW RATE(CFS) =     241.21

****************************************************************************
  FLOW PROCESS FROM NODE    710.00 TO NODE    710.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.01
  RAINFALL INTENSITY(INCH/HR) =   3.54
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.46
  AREA-AVERAGED Ap =  0.17
  EFFECTIVE STREAM AREA(ACRES) =      77.40
  TOTAL STREAM AREA(ACRES) =      77.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     241.21

****************************************************************************
  FLOW PROCESS FROM NODE    695.00 TO NODE    700.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   885.00
  ELEVATION DATA: UPSTREAM(FEET) =   1568.00  DOWNSTREAM(FEET) =   1560.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.534
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.787
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        5.70      0.80     0.200    52   12.53
  PUBLIC PARK                B        0.70      0.45     0.850    76   18.69
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        2.20      0.45     0.200    76   12.53
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.63
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.253
  SUBAREA RUNOFF(CFS) =     28.07
  TOTAL AREA(ACRES) =      8.60   PEAK FLOW RATE(CFS) =     28.07

****************************************************************************
  FLOW PROCESS FROM NODE    700.00 TO NODE    705.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1560.00  DOWNSTREAM(FEET) =  1555.00
  FLOW LENGTH(FEET) =   681.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.79
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      28.07
  PIPE TRAVEL TIME(MIN.) =   1.46    Tc(MIN.) =   13.99
  LONGEST FLOWPATH FROM NODE    695.00 TO NODE    705.00 =    1566.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    700.00 TO NODE    705.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.99
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.545
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A       25.10      0.80     0.200    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =   25.10      SUBAREA RUNOFF(CFS) =   76.49
  EFFECTIVE AREA(ACRES) =     33.70   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.21
  TOTAL AREA(ACRES) =       33.7       PEAK FLOW RATE(CFS) =     102.69

****************************************************************************
  FLOW PROCESS FROM NODE    700.00 TO NODE    705.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.99
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.545
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        8.60      0.80     0.500    52
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.60      0.45     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.77
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    9.20      SUBAREA RUNOFF(CFS) =   26.15
  EFFECTIVE AREA(ACRES) =     42.90   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.76  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =       42.9       PEAK FLOW RATE(CFS) =     128.84

****************************************************************************
  FLOW PROCESS FROM NODE    705.00 TO NODE    706.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1555.00  DOWNSTREAM(FEET) =  1530.00
  FLOW LENGTH(FEET) =  1201.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  31.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.66
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     128.84
  PIPE TRAVEL TIME(MIN.) =   1.20    Tc(MIN.) =   15.19
  LONGEST FLOWPATH FROM NODE    695.00 TO NODE    706.00 =    2767.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    705.00 TO NODE    706.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   15.19
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.374
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        A       18.00      0.80     0.500    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   18.00      SUBAREA RUNOFF(CFS) =   48.21
  EFFECTIVE AREA(ACRES) =     60.90   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.77  AREA-AVERAGED Ap =  0.34
  TOTAL AREA(ACRES) =       60.9       PEAK FLOW RATE(CFS) =     170.45

****************************************************************************
  FLOW PROCESS FROM NODE    705.00 TO NODE    706.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   15.19
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.374
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"        B       12.40      0.45     0.600    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =   12.40      SUBAREA RUNOFF(CFS) =   34.63
  EFFECTIVE AREA(ACRES) =     73.30   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.69  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =       73.3       PEAK FLOW RATE(CFS) =     205.08

****************************************************************************
  FLOW PROCESS FROM NODE    706.00 TO NODE    707.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1530.00  DOWNSTREAM(FEET) =  1518.00
  FLOW LENGTH(FEET) =   499.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  37.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.65
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     205.08
  PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =   15.62
  LONGEST FLOWPATH FROM NODE    695.00 TO NODE    707.00 =    3266.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    707.00 TO NODE    710.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   15.62
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.319
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        A        3.90      0.80     0.500    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.90      SUBAREA RUNOFF(CFS) =   10.25
  EFFECTIVE AREA(ACRES) =     77.20   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.70  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =       77.2       PEAK FLOW RATE(CFS) =     211.70

****************************************************************************
  FLOW PROCESS FROM NODE    707.00 TO NODE    710.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1518.00  DOWNSTREAM(FEET) =  1515.00
  FLOW LENGTH(FEET) =   536.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  63.0 INCH PIPE IS  50.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.39
  ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     211.70
  PIPE TRAVEL TIME(MIN.) =   0.78    Tc(MIN.) =   16.40
  LONGEST FLOWPATH FROM NODE    695.00 TO NODE    710.00 =    3802.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    710.00 TO NODE    710.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.40
  RAINFALL INTENSITY(INCH/HR) =   3.22
  AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.70
  AREA-AVERAGED Ap =  0.39
  EFFECTIVE STREAM AREA(ACRES) =      77.20
  TOTAL STREAM AREA(ACRES) =      77.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     211.70

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      436.59   23.95    2.568  0.56( 0.27) 0.47     210.7     635.00
      2      241.21   14.01    3.542  0.46( 0.08) 0.17      77.4     680.00
      3      211.70   16.40    3.223  0.70( 0.27) 0.39      77.2     695.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      805.12   14.01    3.542  0.58( 0.21) 0.37     266.6     680.00
      2      814.68   16.40    3.223  0.58( 0.22) 0.38     298.9     695.00
      3      774.65   23.95    2.568  0.58( 0.23) 0.39     365.3     635.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     814.68    Tc(MIN.) =    16.40
  EFFECTIVE AREA(ACRES) =     298.88   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.58  AREA-AVERAGED Ap =  0.38
  TOTAL AREA(ACRES) =      374.7
  LONGEST FLOWPATH FROM NODE    635.00 TO NODE    710.00 =    4493.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    710.00 TO NODE    630.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1515.00  DOWNSTREAM(FEET) =   1473.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1555.00   CHANNEL SLOPE =  0.0270
  CHANNEL BASE(FEET) =   12.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00

        ===>>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.
```

```
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.011
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                A        4.00      0.80     0.850    52
  PUBLIC PARK                B        9.70      0.45     0.850    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.55
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     830.35
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  13.18
  AVERAGE FLOW DEPTH(FEET) =   3.00   TRAVEL TIME(MIN.) =   1.97
  Tc(MIN.) =   18.37
  SUBAREA AREA(ACRES) =    13.70       SUBAREA RUNOFF(CFS) =   31.34
  EFFECTIVE AREA(ACRES) =    312.58     AREA-AVERAGED Fm(INCH/HR) =   0.23
  AREA-AVERAGED Fp(INCH/HR) =   0.58  AREA-AVERAGED Ap =   0.40
  TOTAL AREA(ACRES) =      388.4         PEAK FLOW RATE(CFS) =     814.68
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.99   FLOW VELOCITY(FEET/SEC.) =  13.02
  LONGEST FLOWPATH FROM NODE    635.00 TO NODE    630.00 =    6048.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    630.00 TO NODE    630.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   18.37
  RAINFALL INTENSITY(INCH/HR) =   3.01
  AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.58
  AREA-AVERAGED Ap =  0.40
  EFFECTIVE STREAM AREA(ACRES) =     312.58
  TOTAL STREAM AREA(ACRES) =     388.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     814.68

****************************************************************************
  FLOW PROCESS FROM NODE    615.00 TO NODE    620.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1706.00
  ELEVATION DATA: UPSTREAM(FEET) =   1533.00  DOWNSTREAM(FEET) =   1505.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.366
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.114
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.30      0.45     0.500    76   17.37
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A       15.30      0.80     0.500    52   17.37
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.79
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =     38.18
  TOTAL AREA(ACRES) =     15.60   PEAK FLOW RATE(CFS) =     38.18

****************************************************************************
  FLOW PROCESS FROM NODE    620.00 TO NODE    620.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.37
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.114
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        4.60      0.80     0.500    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    4.60      SUBAREA RUNOFF(CFS) =   11.24
  EFFECTIVE AREA(ACRES) =     20.20   AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.79  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       20.2       PEAK FLOW RATE(CFS) =      49.42

****************************************************************************
  FLOW PROCESS FROM NODE    620.00 TO NODE    622.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1505.00  DOWNSTREAM(FEET) =  1475.00
  FLOW LENGTH(FEET) =  1251.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.01
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      49.42
  PIPE TRAVEL TIME(MIN.) =   1.49    Tc(MIN.) =   18.85
  LONGEST FLOWPATH FROM NODE    615.00 TO NODE    622.00 =    2957.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    620.00 TO NODE    622.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.85
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.964
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A       20.30      0.80     0.500    52
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.10      0.45     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.78
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   21.40      SUBAREA RUNOFF(CFS) =   49.59
  EFFECTIVE AREA(ACRES) =     41.60   AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.78  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       41.6       PEAK FLOW RATE(CFS) =      96.29

****************************************************************************
  FLOW PROCESS FROM NODE    620.00 TO NODE    622.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.85
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.964
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        8.30      0.45     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    8.30      SUBAREA RUNOFF(CFS) =   20.45
  EFFECTIVE AREA(ACRES) =     49.90   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.73  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       49.9       PEAK FLOW RATE(CFS) =     116.75

****************************************************************************
  FLOW PROCESS FROM NODE    622.00 TO NODE    630.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =  1475.00  DOWNSTREAM(FEET) =  1473.00
  FLOW LENGTH(FEET) =   532.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  43.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.42
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     116.75
  PIPE TRAVEL TIME(MIN.) =   1.05    Tc(MIN.) =   19.91
  LONGEST FLOWPATH FROM NODE    615.00 TO NODE    630.00 =    3489.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    630.00 TO NODE    630.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   19.91
  RAINFALL INTENSITY(INCH/HR) =   2.87
  AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.73
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =      49.90
  TOTAL STREAM AREA(ACRES) =      49.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     116.75

****************************************************************************
  FLOW PROCESS FROM NODE    605.00 TO NODE    610.00 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) =   1514.00  DOWNSTREAM(FEET) =   1412.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.650
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.540
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        0.50      0.80     0.500    52    6.65
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        3.50      0.45     0.500    76    6.65
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =     19.05
  TOTAL AREA(ACRES) =      4.00   PEAK FLOW RATE(CFS) =     19.05

****************************************************************************
  FLOW PROCESS FROM NODE    610.00 TO NODE    611.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1512.00  DOWNSTREAM(FEET) =  1500.00
  FLOW LENGTH(FEET) =   792.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.35
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.05
  PIPE TRAVEL TIME(MIN.) =   1.41    Tc(MIN.) =    8.06
  LONGEST FLOWPATH FROM NODE    605.00 TO NODE    611.00 =    1322.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    610.00 TO NODE    611.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.06
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.935
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        8.40      0.45     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    8.40      SUBAREA RUNOFF(CFS) =   35.60
  EFFECTIVE AREA(ACRES) =     12.40   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.47  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       12.4       PEAK FLOW RATE(CFS) =      52.48

****************************************************************************
  FLOW PROCESS FROM NODE    611.00 TO NODE    630.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1500.00  DOWNSTREAM(FEET) =  1473.00
  FLOW LENGTH(FEET) =  1072.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.44
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      52.48
  PIPE TRAVEL TIME(MIN.) =   1.24    Tc(MIN.) =    9.30
  LONGEST FLOWPATH FROM NODE    605.00 TO NODE    630.00 =    2394.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    611.00 TO NODE    630.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.30
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.530
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B       10.60      0.45     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   10.60      SUBAREA RUNOFF(CFS) =   41.06
  EFFECTIVE AREA(ACRES) =     23.00   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.46  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       23.0       PEAK FLOW RATE(CFS) =      89.02

****************************************************************************
  FLOW PROCESS FROM NODE    611.00 TO NODE    630.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.30
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.530
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        7.60      0.45     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    7.60      SUBAREA RUNOFF(CFS) =   29.44
  EFFECTIVE AREA(ACRES) =     30.60   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.46  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       30.6       PEAK FLOW RATE(CFS) =     118.46

****************************************************************************
  FLOW PROCESS FROM NODE    630.00 TO NODE    630.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
```

```
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.30
  RAINFALL INTENSITY(INCH/HR) =   4.53
  AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.46
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =      30.60
  TOTAL STREAM AREA(ACRES) =      30.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     118.46

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
      1      805.12   15.99    3.272  0.58( 0.23) 0.39     280.3     680.00
      1      814.68   18.37    3.011  0.58( 0.23) 0.40     312.6     695.00
      1      774.65   25.96    2.447  0.58( 0.24) 0.41     379.0     635.00
      2      116.75   19.91    2.869  0.73( 0.36) 0.50      49.9     615.00
      3      118.46    9.30    4.530  0.46( 0.23) 0.50      30.6     605.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
      1      870.64    9.30    4.530  0.58( 0.24) 0.42     216.9     605.00
      2      997.81   15.99    3.272  0.59( 0.24) 0.41     351.0     680.00
      3     1005.13   18.37    3.011  0.59( 0.25) 0.42     389.2     695.00
      4      996.01   19.91    2.869  0.59( 0.25) 0.42     406.6     615.00
      5      932.81   25.96    2.447  0.59( 0.25) 0.43     459.5     635.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    1005.13    Tc(MIN.) =    18.37
  EFFECTIVE AREA(ACRES) =     389.22   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.59  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =      468.9
  LONGEST FLOWPATH FROM NODE    635.00 TO NODE    630.00 =    6048.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    630.00 TO NODE    635.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1473.00  DOWNSTREAM(FEET) =   1466.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1382.00   CHANNEL SLOPE =  0.0051
  CHANNEL BASE(FEET) =   12.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00

         ==>>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.

  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.880
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                 A        0.10      0.80     0.850    52
  PUBLIC PARK                 B       20.20      0.45     0.850    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    1027.92
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  16.32
  AVERAGE FLOW DEPTH(FEET) =   3.00   TRAVEL TIME(MIN.) =   1.41
  Tc(MIN.) =   19.78
  SUBAREA AREA(ACRES) =    20.30       SUBAREA RUNOFF(CFS) =   45.58
  EFFECTIVE AREA(ACRES) =    409.52     AREA-AVERAGED Fm(INCH/HR) =   0.25
  AREA-AVERAGED Fp(INCH/HR) =   0.58  AREA-AVERAGED Ap =   0.44
  TOTAL AREA(ACRES) =      489.2         PEAK FLOW RATE(CFS) =    1005.13
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

         ==>>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) =  3.00   FLOW VELOCITY(FEET/SEC.) =  15.95

  ==>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH

  LONGEST FLOWPATH FROM NODE    635.00 TO NODE    635.00 =    7430.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    595.00 TO NODE    635.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.78
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.880
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                 A       34.80      0.80     0.850    52
  PUBLIC PARK                 B       20.00      0.45     0.850    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.67
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =   54.80      SUBAREA RUNOFF(CFS) =  113.95
  EFFECTIVE AREA(ACRES) =    464.32   AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =      544.0       PEAK FLOW RATE(CFS) =    1082.37

****************************************************************************
  FLOW PROCESS FROM NODE    635.00 TO NODE    650.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1466.00  DOWNSTREAM(FEET) =  1420.00
  FLOW LENGTH(FEET) =  2430.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  93.0 INCH PIPE IS  73.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  27.13
  ESTIMATED PIPE DIAMETER(INCH) =  93.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    1082.37
  PIPE TRAVEL TIME(MIN.) =   1.49    Tc(MIN.) =   21.27
  LONGEST FLOWPATH FROM NODE    635.00 TO NODE    650.00 =    9860.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    650.00 TO NODE    650.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   21.27
  RAINFALL INTENSITY(INCH/HR) =   2.76
  AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.60
  AREA-AVERAGED Ap =  0.49
  EFFECTIVE STREAM AREA(ACRES) =     464.32
  TOTAL STREAM AREA(ACRES) =     544.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    1082.37

****************************************************************************
  FLOW PROCESS FROM NODE    640.00 TO NODE    645.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1099.00
  ELEVATION DATA: UPSTREAM(FEET) =   1475.00  DOWNSTREAM(FEET) =   1460.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.112
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.385
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        8.30      0.45     0.500    76   15.11
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =     23.60
  TOTAL AREA(ACRES) =      8.30   PEAK FLOW RATE(CFS) =     23.60

****************************************************************************
  FLOW PROCESS FROM NODE    645.00 TO NODE    645.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   15.11
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.385
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        7.10      0.80     0.500    52
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        5.00      0.45     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.65
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   12.10      SUBAREA RUNOFF(CFS) =   33.30
  EFFECTIVE AREA(ACRES) =     20.40   AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.57  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       20.4       PEAK FLOW RATE(CFS) =      56.90

****************************************************************************
  FLOW PROCESS FROM NODE    645.00 TO NODE    646.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1460.00  DOWNSTREAM(FEET) =  1455.00
  FLOW LENGTH(FEET) =   258.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.40
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      56.90
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   15.43
  LONGEST FLOWPATH FROM NODE    640.00 TO NODE    646.00 =    1357.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    645.00 TO NODE    646.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   15.43
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.343
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        3.00      0.80     0.200    52
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       C        6.40      0.27     0.200    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    9.40      SUBAREA RUNOFF(CFS) =   27.53
  EFFECTIVE AREA(ACRES) =     29.80   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.55  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =       29.8       PEAK FLOW RATE(CFS) =      83.66

****************************************************************************
  FLOW PROCESS FROM NODE    646.00 TO NODE    650.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1455.00  DOWNSTREAM(FEET) =  1420.00
  FLOW LENGTH(FEET) =  1529.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.62
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      83.66
  PIPE TRAVEL TIME(MIN.) =   1.63    Tc(MIN.) =   17.06
  LONGEST FLOWPATH FROM NODE    640.00 TO NODE    650.00 =    2886.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    646.00 TO NODE    650.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   17.06
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.147
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        6.40      0.80     0.500    52
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B       10.10      0.45     0.200    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.66
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.316
  SUBAREA AREA(ACRES) =   16.50      SUBAREA RUNOFF(CFS) =   43.62
  EFFECTIVE AREA(ACRES) =     46.30   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.58  AREA-AVERAGED Ap =  0.37
  TOTAL AREA(ACRES) =       46.3       PEAK FLOW RATE(CFS) =     122.03

****************************************************************************
  FLOW PROCESS FROM NODE    650.00 TO NODE    650.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   17.06
  RAINFALL INTENSITY(INCH/HR) =   3.15
  AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.58
  AREA-AVERAGED Ap =  0.37
  EFFECTIVE STREAM AREA(ACRES) =      46.30
  TOTAL STREAM AREA(ACRES) =      46.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     122.03

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
      1      999.87   12.43    3.807  0.59( 0.31) 0.53     292.0     605.00
      1     1080.83   18.90    2.960  0.59( 0.29) 0.49     426.1     680.00
      1     1082.37   21.27    2.757  0.60( 0.29) 0.49     464.3     695.00
      1     1067.46   22.83    2.643  0.60( 0.29) 0.49     481.7     615.00
      1      999.17   29.01    2.289  0.59( 0.29) 0.49     534.6     635.00
      2      122.03   17.06    3.147  0.58( 0.22) 0.37      46.3     640.00

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

  ** PEAK FLOW RATE TABLE **
```

```
   STREAM        Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1108.75   12.43    3.807  0.59( 0.30) 0.51     325.7     605.00
      2     1179.88   17.06    3.147  0.59( 0.29) 0.49     434.3     640.00
      3     1195.05   18.90    2.960  0.59( 0.28) 0.48     472.4     680.00
      4     1188.15   21.27    2.757  0.60( 0.28) 0.48     510.6     695.00
      5     1168.48   22.83    2.643  0.60( 0.28) 0.48     528.0     615.00
      6     1085.45   29.01    2.289  0.59( 0.28) 0.48     580.9     635.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    1195.05    Tc(MIN.) =    18.90
  EFFECTIVE AREA(ACRES) =     472.37   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.59  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =      590.3
  LONGEST FLOWPATH FROM NODE    635.00 TO NODE    650.00 =    9860.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    650.00 TO NODE    650.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    575.00 TO NODE    585.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   538.00
  ELEVATION DATA: UPSTREAM(FEET) =   1467.00  DOWNSTREAM(FEET) =   1460.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.236
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.508
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                A        3.20      0.80     0.850    52   14.24
  PUBLIC PARK                B        2.20      0.45     0.850    76   14.24
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.66
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =     14.34
  TOTAL AREA(ACRES) =      5.40   PEAK FLOW RATE(CFS) =     14.34

****************************************************************************
  FLOW PROCESS FROM NODE    585.00 TO NODE    565.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1460.00  DOWNSTREAM(FEET) =   1410.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2500.00   CHANNEL SLOPE =  0.0200
  CHANNEL BASE(FEET) =   12.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.728
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                A       58.50      0.80     0.850    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      69.58
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.61
  AVERAGE FLOW DEPTH(FEET) =   0.85   TRAVEL TIME(MIN.) =   7.42
  Tc(MIN.) =   21.66
  SUBAREA AREA(ACRES) =    58.50       SUBAREA RUNOFF(CFS) =  107.98
  EFFECTIVE AREA(ACRES) =     63.90     AREA-AVERAGED Fm(INCH/HR) =   0.67
  AREA-AVERAGED Fp(INCH/HR) =   0.78  AREA-AVERAGED Ap =   0.85
  TOTAL AREA(ACRES) =       63.9         PEAK FLOW RATE(CFS) =     118.53

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.15   FLOW VELOCITY(FEET/SEC.) =   6.64
  LONGEST FLOWPATH FROM NODE    575.00 TO NODE    565.00 =    3038.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    565.00 TO NODE    565.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   21.66
  RAINFALL INTENSITY(INCH/HR) =   2.73
  AREA-AVERAGED Fm(INCH/HR) =  0.67
  AREA-AVERAGED Fp(INCH/HR) =  0.78
  AREA-AVERAGED Ap =  0.85
  EFFECTIVE STREAM AREA(ACRES) =      63.90
  TOTAL STREAM AREA(ACRES) =      63.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     118.53

****************************************************************************
  FLOW PROCESS FROM NODE    530.00 TO NODE    535.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1193.00
  ELEVATION DATA: UPSTREAM(FEET) =   1445.00  DOWNSTREAM(FEET) =   1421.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.451
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.477
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A       11.90      0.80     0.500    52   14.45
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        2.00      0.45     0.500    76   14.45
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =     38.83
  TOTAL AREA(ACRES) =     13.90   PEAK FLOW RATE(CFS) =     38.83

****************************************************************************
  FLOW PROCESS FROM NODE    535.00 TO NODE    565.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1420.00  DOWNSTREAM(FEET) =  1410.00
  FLOW LENGTH(FEET) =  1340.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.45
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      38.83
  PIPE TRAVEL TIME(MIN.) =   2.64    Tc(MIN.) =   17.09
  LONGEST FLOWPATH FROM NODE    530.00 TO NODE    565.00 =    2533.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    535.00 TO NODE    565.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.09
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.144
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A       11.20      0.80     0.500    52
  RESIDENTIAL
```

```
  "5-7 DWELLINGS/ACRE"       B        0.40      0.45     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.78
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   11.60      SUBAREA RUNOFF(CFS) =   28.73
  EFFECTIVE AREA(ACRES) =     25.50   AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.76  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       25.5       PEAK FLOW RATE(CFS) =      63.39

****************************************************************************
  FLOW PROCESS FROM NODE    565.00 TO NODE    565.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   17.09
  RAINFALL INTENSITY(INCH/HR) =   3.14
  AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.76
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =      25.50
  TOTAL STREAM AREA(ACRES) =      25.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      63.39

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      118.53   21.66    2.728  0.78( 0.67) 0.85      63.9     575.00
      2       63.39   17.09    3.144  0.76( 0.38) 0.50      25.5     530.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      175.82   17.09    3.144  0.78( 0.57) 0.73      75.9     530.00
      2      172.36   21.66    2.728  0.78( 0.59) 0.75      89.4     575.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     175.82    Tc(MIN.) =    17.09
  EFFECTIVE AREA(ACRES) =      75.93   AREA-AVERAGED Fm(INCH/HR) =  0.57
  AREA-AVERAGED Fp(INCH/HR) =  0.78  AREA-AVERAGED Ap =  0.73
  TOTAL AREA(ACRES) =       89.4
  LONGEST FLOWPATH FROM NODE    575.00 TO NODE    565.00 =    3038.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    565.00 TO NODE    565.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.09
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.144
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A       14.10      0.80     0.200    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =   14.10      SUBAREA RUNOFF(CFS) =   37.87
  EFFECTIVE AREA(ACRES) =     90.03   AREA-AVERAGED Fm(INCH/HR) =  0.51
  AREA-AVERAGED Fp(INCH/HR) =  0.78  AREA-AVERAGED Ap =  0.65
  TOTAL AREA(ACRES) =      103.5       PEAK FLOW RATE(CFS) =     213.70

****************************************************************************
  FLOW PROCESS FROM NODE    565.00 TO NODE    525.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1410.00  DOWNSTREAM(FEET) =   1377.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1936.00   CHANNEL SLOPE =  0.0170
  CHANNEL BASE(FEET) =   12.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.763
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                A       35.30      0.80     0.850    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     246.90
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.86
  AVERAGE FLOW DEPTH(FEET) =   1.80   TRAVEL TIME(MIN.) =   4.10
  Tc(MIN.) =   21.20
  SUBAREA AREA(ACRES) =    35.30       SUBAREA RUNOFF(CFS) =   66.29
  EFFECTIVE AREA(ACRES) =    125.33     AREA-AVERAGED Fm(INCH/HR) =   0.55
  AREA-AVERAGED Fp(INCH/HR) =   0.79  AREA-AVERAGED Ap =   0.71
  TOTAL AREA(ACRES) =      138.8         PEAK FLOW RATE(CFS) =     249.13

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.81   FLOW VELOCITY(FEET/SEC.) =   7.89
  LONGEST FLOWPATH FROM NODE    575.00 TO NODE    525.00 =    4974.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    525.00 TO NODE    525.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.20
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.763
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A       14.70      0.80     0.500    52
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       A        8.70      0.80     0.600    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.537
  SUBAREA AREA(ACRES) =   23.40      SUBAREA RUNOFF(CFS) =   49.18
  EFFECTIVE AREA(ACRES) =    148.73   AREA-AVERAGED Fm(INCH/HR) =  0.53
  AREA-AVERAGED Fp(INCH/HR) =  0.79  AREA-AVERAGED Ap =  0.68
  TOTAL AREA(ACRES) =      162.2       PEAK FLOW RATE(CFS) =     298.32

****************************************************************************
  FLOW PROCESS FROM NODE    510.00 TO NODE    525.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.20
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.763
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A       26.20      0.80     0.500    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   26.20      SUBAREA RUNOFF(CFS) =   55.77
  EFFECTIVE AREA(ACRES) =    174.93   AREA-AVERAGED Fm(INCH/HR) =  0.51
  AREA-AVERAGED Fp(INCH/HR) =  0.79  AREA-AVERAGED Ap =  0.65
  TOTAL AREA(ACRES) =      188.4       PEAK FLOW RATE(CFS) =     354.08

****************************************************************************
  FLOW PROCESS FROM NODE    525.00 TO NODE    525.00 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      354.08   21.20    2.763  0.79( 0.51) 0.65     174.9     530.00
    2      327.05   25.84    2.454  0.79( 0.52) 0.67     188.4     575.00
LONGEST FLOWPATH FROM NODE    575.00 TO NODE    525.00 =    4974.00 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     1108.75   12.43    3.807  0.59( 0.30) 0.51     325.7     605.00
    2     1179.88   17.06    3.147  0.59( 0.29) 0.49     434.3     640.00
    3     1195.05   18.90    2.960  0.59( 0.28) 0.48     472.4     680.00
    4     1188.15   21.27    2.757  0.60( 0.28) 0.48     510.6     695.00
    5     1168.48   22.83    2.643  0.60( 0.28) 0.48     528.0     615.00
    6     1085.45   29.01    2.289  0.59( 0.28) 0.48     580.9     635.00
LONGEST FLOWPATH FROM NODE    635.00 TO NODE    525.00 =    9860.00 FEET.

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
    1     1412.65   12.43    3.807  0.65( 0.35) 0.55     428.3     605.00
    2     1513.59   17.06    3.147  0.65( 0.34) 0.53     575.1     640.00
    3     1538.40   18.90    2.960  0.65( 0.34) 0.52     628.4     680.00
    4     1542.45   21.20    2.763  0.66( 0.34) 0.52     684.4     530.00
    5     1541.81   21.27    2.757  0.66( 0.34) 0.52     685.8     695.00
    6     1513.07   22.83    2.643  0.66( 0.34) 0.52     707.6     615.00
    7     1455.10   25.84    2.454  0.66( 0.34) 0.52     742.1     575.00
    8     1384.58   29.01    2.289  0.65( 0.34) 0.52     769.3     635.00
  TOTAL AREA(ACRES) =       778.7

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     1542.45  Tc(MIN.) =   21.197
EFFECTIVE AREA(ACRES) =    684.36  AREA-AVERAGED Fm(INCH/HR) =  0.34
AREA-AVERAGED Fp(INCH/HR) =  0.65  AREA-AVERAGED Ap =  0.55
TOTAL AREA(ACRES) =      778.7
LONGEST FLOWPATH FROM NODE    635.00 TO NODE    525.00 =    9860.00 FEET.
================================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =      778.7  TC(MIN.) =     21.20
EFFECTIVE AREA(ACRES) =    684.36  AREA-AVERAGED Fm(INCH/HR)=  0.34
AREA-AVERAGED Fp(INCH/HR) =  0.66  AREA-AVERAGED Ap = 0.521
PEAK FLOW RATE(CFS)   =    1542.45

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
    1     1412.65   12.43    3.807  0.65( 0.35) 0.55     428.3     605.00
    2     1513.59   17.06    3.147  0.65( 0.34) 0.53     575.1     640.00
    3     1538.40   18.90    2.960  0.65( 0.34) 0.52     628.4     680.00
    4     1542.45   21.20    2.763  0.66( 0.34) 0.52     684.4     530.00
    5     1541.81   21.27    2.757  0.66( 0.34) 0.52     685.8     695.00
    6     1513.07   22.83    2.643  0.66( 0.34) 0.52     707.6     615.00
    7     1455.10   25.84    2.454  0.66( 0.34) 0.52     742.1     575.00
    8     1384.58   29.01    2.289  0.65( 0.34) 0.52     769.3     635.00
================================================================================
================================================================================
END OF RATIONAL METHOD ANALYSIS
```

```
____________________________________________________________________________
****************************************************************************
              RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
          (c) Copyright 1983-2007 Advanced Engineering Software (aes)
              Ver. 13.5  Release Date: 02/06/2007  License ID 1527

                              Analysis prepared by:



----------------------------------------------------------------------------
  FILE NAME: EXN3_100.DAT
  TIME/DATE OF STUDY: 17:08 09/27/2008
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                      --*TIME-OF-CONCENTRATION MODEL*--

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

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.4800

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 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    535.00 TO NODE    535.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN.) =   33.72   RAINFALL INTENSITY(INCH/HR) =  2.09
  EFFECTIVE AREA(ACRES) =  1034.50
  TOTAL AREA(ACRES) =  1034.50         PEAK FLOW RATE(CFS) =   1486.00
  AREA-AVERAGED Fm(INCH/HR) =   0.14  AREA-AVERAGED Fp(INCH/HR) =   0.38
  AREA-AVERAGED Ap =  0.38
  NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
         CONFLUENCE ANALYSES.

****************************************************************************
  FLOW PROCESS FROM NODE    535.00 TO NODE    540.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2035.00  DOWNSTREAM(FEET) =   1932.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  3357.00   CHANNEL SLOPE =  0.0307
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0307 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    1486.00
  FLOW VELOCITY(FEET/SEC) =  11.17 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.01   Tc(MIN.) =   38.73
  LONGEST FLOWPATH FROM NODE    535.00 TO NODE    540.00 =    3357.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    535.00 TO NODE    540.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   38.73
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.925
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       33.80      0.81     1.000    51
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   33.80      SUBAREA RUNOFF(CFS) =   33.96
  EFFECTIVE AREA(ACRES) =   1068.30   AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.41  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =     1068.3       PEAK FLOW RATE(CFS) =    1691.34

****************************************************************************
  FLOW PROCESS FROM NODE    540.00 TO NODE    545.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1932.00  DOWNSTREAM(FEET) =   1916.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1060.00   CHANNEL SLOPE =  0.0151
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0151 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    1691.34
  FLOW VELOCITY(FEET/SEC) =   8.18 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.16   Tc(MIN.) =   40.89
  LONGEST FLOWPATH FROM NODE    535.00 TO NODE    545.00 =    4417.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    540.00 TO NODE    545.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   40.89
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.863
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       49.80      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        0.10      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   49.90      SUBAREA RUNOFF(CFS) =   47.41
  EFFECTIVE AREA(ACRES) =   1118.20   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.46  AREA-AVERAGED Ap =  0.43
  TOTAL AREA(ACRES) =     1118.2       PEAK FLOW RATE(CFS) =    1691.34
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    545.00 TO NODE    550.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1916.00  DOWNSTREAM(FEET) =   1867.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1968.00   CHANNEL SLOPE =  0.0249
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0249 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
  CHANNEL FLOW THRU SUBAREA(CFS) =    1691.34
  FLOW VELOCITY(FEET/SEC) =  10.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.12   Tc(MIN.) =   44.01
  LONGEST FLOWPATH FROM NODE    535.00 TO NODE    550.00 =    6385.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    545.00 TO NODE    550.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   44.01
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.782
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        9.80      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       12.30      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   22.10      SUBAREA RUNOFF(CFS) =   23.52
  EFFECTIVE AREA(ACRES) =   1140.30   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.46  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =     1140.3       PEAK FLOW RATE(CFS) =    1691.34
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    550.00 TO NODE    555.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1867.00  DOWNSTREAM(FEET) =   1807.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2238.00   CHANNEL SLOPE =  0.0268
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0268 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    1691.34
  FLOW VELOCITY(FEET/SEC) =  10.90 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.42   Tc(MIN.) =   47.44
  LONGEST FLOWPATH FROM NODE    535.00 TO NODE    555.00 =    8623.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    550.00 TO NODE    555.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   47.44
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.704
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        5.10      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       14.65      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.53
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   19.75      SUBAREA RUNOFF(CFS) =   20.86
  EFFECTIVE AREA(ACRES) =   1160.05   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.46  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =     1160.1       PEAK FLOW RATE(CFS) =    1691.34
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    555.00 TO NODE    560.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1807.00  DOWNSTREAM(FEET) =   1769.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1537.00   CHANNEL SLOPE =  0.0247
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0247 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    1691.34
  FLOW VELOCITY(FEET/SEC) =  10.47 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.45   Tc(MIN.) =   49.88
  LONGEST FLOWPATH FROM NODE    535.00 TO NODE    560.00 =   10160.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    555.00 TO NODE    560.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   49.88
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.653
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       14.90      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   14.90      SUBAREA RUNOFF(CFS) =   16.35
  EFFECTIVE AREA(ACRES) =   1174.95   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.46  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =     1175.0       PEAK FLOW RATE(CFS) =    1691.34
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    560.00 TO NODE    560.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    505.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1548.00
  ELEVATION DATA: UPSTREAM(FEET) =   1905.00  DOWNSTREAM(FEET) =   1858.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   35.502
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.028
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        3.60      0.81     1.000    51   35.50
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        5.80      0.43     1.000    77   35.50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.58
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     12.27
  TOTAL AREA(ACRES) =      9.40   PEAK FLOW RATE(CFS) =     12.27

****************************************************************************
  FLOW PROCESS FROM NODE    505.00 TO NODE    510.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1858.00  DOWNSTREAM(FEET) =   1852.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   386.00   CHANNEL SLOPE =  0.0155
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0155 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      12.27
  FLOW VELOCITY(FEET/SEC) =   1.61 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.00   Tc(MIN.) =   39.50
```

```
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    510.00 =    1934.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE    510.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   39.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.902
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        1.90      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        5.80      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.53
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    7.70      SUBAREA RUNOFF(CFS) =    9.53
  EFFECTIVE AREA(ACRES) =     17.10   AREA-AVERAGED Fm(INCH/HR) =  0.55
  AREA-AVERAGED Fp(INCH/HR) =  0.55  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       17.1       PEAK FLOW RATE(CFS) =      20.74

****************************************************************************
  FLOW PROCESS FROM NODE    510.00 TO NODE    530.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1852.00  DOWNSTREAM(FEET) =   1819.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1875.00   CHANNEL SLOPE =  0.0176
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0176 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      20.74
  FLOW VELOCITY(FEET/SEC) =   2.04 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  15.33   Tc(MIN.) =   54.83
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    530.00 =    3809.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    510.00 TO NODE    530.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   54.83
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.562
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        9.20      0.81     1.000    51
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    9.20      SUBAREA RUNOFF(CFS) =    6.25
  EFFECTIVE AREA(ACRES) =     26.30   AREA-AVERAGED Fm(INCH/HR) =  0.64
  AREA-AVERAGED Fp(INCH/HR) =  0.64  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       26.3       PEAK FLOW RATE(CFS) =      21.76

****************************************************************************
  FLOW PROCESS FROM NODE    530.00 TO NODE    530.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   54.83
  RAINFALL INTENSITY(INCH/HR) =   1.56
  AREA-AVERAGED Fm(INCH/HR) =  0.64
  AREA-AVERAGED Fp(INCH/HR) =  0.64
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      26.30
  TOTAL STREAM AREA(ACRES) =      26.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      21.76

****************************************************************************
  FLOW PROCESS FROM NODE    515.00 TO NODE    520.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1634.00
  ELEVATION DATA: UPSTREAM(FEET) =   1930.00  DOWNSTREAM(FEET) =   1880.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   36.222
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.003
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        9.40      0.81     1.000    51   36.22
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     10.11
  TOTAL AREA(ACRES) =      9.40   PEAK FLOW RATE(CFS) =     10.11

****************************************************************************
  FLOW PROCESS FROM NODE    520.00 TO NODE    525.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1880.00  DOWNSTREAM(FEET) =   1859.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   739.00   CHANNEL SLOPE =  0.0284
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0284 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      10.11
  FLOW VELOCITY(FEET/SEC) =   2.04 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.04   Tc(MIN.) =   42.26
  LONGEST FLOWPATH FROM NODE    515.00 TO NODE    525.00 =    2373.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    520.00 TO NODE    525.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   42.26
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.826
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        9.20      0.81     1.000    51
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    9.20      SUBAREA RUNOFF(CFS) =    8.43
  EFFECTIVE AREA(ACRES) =     18.60   AREA-AVERAGED Fm(INCH/HR) =  0.81
  AREA-AVERAGED Fp(INCH/HR) =  0.81  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       18.6       PEAK FLOW RATE(CFS) =      17.05

****************************************************************************
  FLOW PROCESS FROM NODE    525.00 TO NODE    530.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1859.00  DOWNSTREAM(FEET) =   1819.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1695.00   CHANNEL SLOPE =  0.0236
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0236 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      17.05
  FLOW VELOCITY(FEET/SEC) =   2.21 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  12.77   Tc(MIN.) =   55.03
```

```
  LONGEST FLOWPATH FROM NODE    515.00 TO NODE    530.00 =    4068.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    525.00 TO NODE    530.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   55.03
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.559
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       19.50      0.81     1.000    51
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   19.50      SUBAREA RUNOFF(CFS) =   13.18
  EFFECTIVE AREA(ACRES) =     38.10   AREA-AVERAGED Fm(INCH/HR) =  0.81
  AREA-AVERAGED Fp(INCH/HR) =  0.81  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       38.1       PEAK FLOW RATE(CFS) =      25.74

****************************************************************************
  FLOW PROCESS FROM NODE    530.00 TO NODE    530.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   55.03
  RAINFALL INTENSITY(INCH/HR) =   1.56
  AREA-AVERAGED Fm(INCH/HR) =  0.81
  AREA-AVERAGED Fp(INCH/HR) =  0.81
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      38.10
  TOTAL STREAM AREA(ACRES) =      38.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      25.74

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       21.76   54.83    1.562  0.64( 0.64) 1.00      26.3     500.00
      2       25.74   55.03    1.559  0.81( 0.81) 1.00      38.1     515.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       47.50   54.83    1.562  0.74( 0.74) 1.00      64.3     500.00
      2       47.42   55.03    1.559  0.74( 0.74) 1.00      64.4     515.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      47.50    Tc(MIN.) =    54.83
  EFFECTIVE AREA(ACRES) =      64.26   AREA-AVERAGED Fm(INCH/HR) =  0.74
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       64.4
  LONGEST FLOWPATH FROM NODE    515.00 TO NODE    530.00 =    4068.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    530.00 TO NODE    560.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1819.00  DOWNSTREAM(FEET) =   1769.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2166.00   CHANNEL SLOPE =  0.0231
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0231 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      47.50
  FLOW VELOCITY(FEET/SEC) =   3.08 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  11.73   Tc(MIN.) =   66.56
  LONGEST FLOWPATH FROM NODE    515.00 TO NODE    560.00 =    6234.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    530.00 TO NODE    560.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   66.56
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.391
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       14.10      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        5.70      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.70
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   19.80      SUBAREA RUNOFF(CFS) =   12.30
  EFFECTIVE AREA(ACRES) =     84.06   AREA-AVERAGED Fm(INCH/HR) =  0.73
  AREA-AVERAGED Fp(INCH/HR) =  0.73  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       84.2       PEAK FLOW RATE(CFS) =      49.91

****************************************************************************
  FLOW PROCESS FROM NODE    560.00 TO NODE    560.00 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       49.91   66.56    1.391  0.73( 0.73) 1.00      84.1     500.00
      2       49.78   66.77    1.388  0.73( 0.73) 1.00      84.2     515.00
  LONGEST FLOWPATH FROM NODE    515.00 TO NODE    560.00 =    6234.00 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     1691.34   49.88    1.653  0.46( 0.21) 0.45    1175.0     535.00
  LONGEST FLOWPATH FROM NODE    535.00 TO NODE    560.00 =   10160.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1741.24   49.88    1.653  0.49( 0.24) 0.48    1238.0     535.00
      2     1433.39   66.56    1.391  0.50( 0.25) 0.49    1259.0     500.00
      3     1430.15   66.77    1.388  0.50( 0.25) 0.49    1259.2     515.00
    TOTAL AREA(ACRES) =      1259.2

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     1741.24  Tc(MIN.) =   49.885
  EFFECTIVE AREA(ACRES) =   1237.95  AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =     1259.2
  LONGEST FLOWPATH FROM NODE    535.00 TO NODE    560.00 =   10160.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    560.00 TO NODE    560.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    560.00 TO NODE    575.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   1769.00  DOWNSTREAM(FEET) =   1753.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   905.00   CHANNEL SLOPE =  0.0177
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0177 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    1741.24
  FLOW VELOCITY(FEET/SEC) =   8.94 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.69   Tc(MIN.) =   51.57
  LONGEST FLOWPATH FROM NODE    535.00 TO NODE    575.00 =   11065.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    560.00 TO NODE    575.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   51.57
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.621
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        8.70      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    8.70      SUBAREA RUNOFF(CFS) =    9.29
  EFFECTIVE AREA(ACRES) =   1246.65   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.49  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =     1267.8       PEAK FLOW RATE(CFS) =    1741.24
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    575.00 TO NODE    575.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   51.57
  RAINFALL INTENSITY(INCH/HR) =   1.62
  AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.49
  AREA-AVERAGED Ap =  0.49
  EFFECTIVE STREAM AREA(ACRES) =    1246.65
  TOTAL STREAM AREA(ACRES) =    1267.85
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    1741.24

****************************************************************************
  FLOW PROCESS FROM NODE    565.00 TO NODE    570.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1517.00
  ELEVATION DATA: UPSTREAM(FEET) =   1833.00  DOWNSTREAM(FEET) =   1788.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   35.380
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.032
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        7.00      0.43     1.000    77   35.38
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     10.07
  TOTAL AREA(ACRES) =      7.00   PEAK FLOW RATE(CFS) =     10.07

****************************************************************************
  FLOW PROCESS FROM NODE    570.00 TO NODE    575.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
```

```
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1788.00  DOWNSTREAM(FEET) =   1753.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1425.00   CHANNEL SLOPE =  0.0246
  CHANNEL FLOW THRU SUBAREA(CFS) =      10.07
  FLOW VELOCITY(FEET/SEC) =   3.92 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.05   Tc(MIN.) =   41.43
  LONGEST FLOWPATH FROM NODE    565.00 TO NODE    575.00 =    2942.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    570.00 TO NODE    575.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   41.43
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.848
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        9.40      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    9.40      SUBAREA RUNOFF(CFS) =   11.96
  EFFECTIVE AREA(ACRES) =     16.40   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       16.4       PEAK FLOW RATE(CFS) =      20.87

****************************************************************************
  FLOW PROCESS FROM NODE    575.00 TO NODE    575.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   41.43
  RAINFALL INTENSITY(INCH/HR) =   1.85
  AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      16.40
  TOTAL STREAM AREA(ACRES) =      16.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      20.87

  ** CONFLUENCE DATA **
   STREAM        Q       Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
      1      1741.24   51.57    1.621  0.49( 0.24) 0.49    1246.7     535.00
      1      1433.39   68.36    1.369  0.50( 0.25) 0.49    1267.7     500.00
      1      1430.15   68.57    1.366  0.50( 0.25) 0.49    1267.8     515.00
      2        20.87   41.43    1.848  0.43( 0.43) 1.00      16.4     565.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM        Q       Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
      1      1649.97   41.43    1.848  0.49( 0.24) 0.49    1018.0     565.00
      2      1758.76   51.57    1.621  0.49( 0.24) 0.49    1263.1     535.00
      3      1447.18   68.36    1.369  0.50( 0.25) 0.50    1284.1     500.00
      4      1443.91   68.57    1.366  0.50( 0.25) 0.50    1284.2     515.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    1758.76    Tc(MIN.) =    51.57
  EFFECTIVE AREA(ACRES) =    1263.05   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.49  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =     1284.2
  LONGEST FLOWPATH FROM NODE    535.00 TO NODE    575.00 =   11065.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    575.00 TO NODE    580.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1753.00  DOWNSTREAM(FEET) =   1743.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   484.00   CHANNEL SLOPE =  0.0207
  CHANNEL FLOW THRU SUBAREA(CFS) =    1758.76
  FLOW VELOCITY(FEET/SEC) =  16.96 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.48   Tc(MIN.) =   52.05
  LONGEST FLOWPATH FROM NODE    535.00 TO NODE    580.00 =   11549.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    575.00 TO NODE    580.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   52.05
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.612
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       12.60      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   12.60      SUBAREA RUNOFF(CFS) =   13.36
  EFFECTIVE AREA(ACRES) =   1275.65   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.49  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =     1296.8       PEAK FLOW RATE(CFS) =    1758.76
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    580.00 TO NODE    580.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    605.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1138.00
  ELEVATION DATA: UPSTREAM(FEET) =   1770.00  DOWNSTREAM(FEET) =   1723.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   29.517
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.265
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        5.60      0.43     1.000    77   29.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      9.23
  TOTAL AREA(ACRES) =      5.60   PEAK FLOW RATE(CFS) =      9.23

****************************************************************************
  FLOW PROCESS FROM NODE    605.00 TO NODE    610.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1723.00  DOWNSTREAM(FEET) =   1708.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   916.00   CHANNEL SLOPE =  0.0164
  CHANNEL FLOW THRU SUBAREA(CFS) =      9.23
  FLOW VELOCITY(FEET/SEC) =   3.13 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.87   Tc(MIN.) =   34.39
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    610.00 =    2054.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    605.00 TO NODE    610.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   34.39
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.067
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        8.80      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    8.80      SUBAREA RUNOFF(CFS) =   12.93
  EFFECTIVE AREA(ACRES) =     14.40   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       14.4       PEAK FLOW RATE(CFS) =      21.16

****************************************************************************
  FLOW PROCESS FROM NODE    610.00 TO NODE    615.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1708.00  DOWNSTREAM(FEET) =   1677.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   834.00   CHANNEL SLOPE =  0.0372
  CHANNEL FLOW THRU SUBAREA(CFS) =      21.16
  FLOW VELOCITY(FEET/SEC) =   5.87 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.37   Tc(MIN.) =   36.76
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    615.00 =    2888.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    610.00 TO NODE    615.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   36.76
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.986
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       21.80      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   21.80      SUBAREA RUNOFF(CFS) =   30.45
  EFFECTIVE AREA(ACRES) =     36.20   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       36.2       PEAK FLOW RATE(CFS) =      50.56

****************************************************************************
  FLOW PROCESS FROM NODE    615.00 TO NODE    615.00 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       50.56   36.76    1.986  0.43( 0.43) 1.00      36.2     600.00
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    615.00 =    2888.00 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     1649.97   41.92    1.835  0.49( 0.24) 0.50    1030.6     565.00
      2     1758.76   52.05    1.612  0.49( 0.24) 0.50    1275.7     535.00
```

```
     3     1447.18   68.86    1.363  0.50( 0.25) 0.51    1296.7     500.00
     4     1443.91   69.08    1.360  0.50( 0.25) 0.51    1296.8     515.00
  LONGEST FLOWPATH FROM NODE    535.00 TO NODE    615.00 =   11549.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1     1634.23   36.76    1.986  0.48( 0.25) 0.52     939.9     600.00
     2     1695.63   41.92    1.835  0.48( 0.25) 0.52    1066.8     565.00
     3     1797.13   52.05    1.612  0.49( 0.25) 0.51    1311.9     535.00
     4     1477.43   68.86    1.363  0.49( 0.26) 0.52    1332.9     500.00
     5     1474.08   69.08    1.360  0.49( 0.26) 0.52    1333.0     515.00
    TOTAL AREA(ACRES) =      1333.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     1797.13  Tc(MIN.) =   52.048
  EFFECTIVE AREA(ACRES) =   1311.85  AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.49  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =     1333.0
  LONGEST FLOWPATH FROM NODE    535.00 TO NODE    615.00 =   11549.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    615.00 TO NODE    615.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    615.00 TO NODE    615.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    700.00 TO NODE    705.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1124.00
  ELEVATION DATA: UPSTREAM(FEET) =   1777.00  DOWNSTREAM(FEET) =   1704.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   26.829
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.399
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        6.70      0.43     1.000    77   26.83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     11.85
  TOTAL AREA(ACRES) =      6.70   PEAK FLOW RATE(CFS) =     11.85

****************************************************************************
  FLOW PROCESS FROM NODE    705.00 TO NODE    710.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1704.00  DOWNSTREAM(FEET) =   1703.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   529.00   CHANNEL SLOPE =  0.0019
  CHANNEL FLOW THRU SUBAREA(CFS) =      11.85
  FLOW VELOCITY(FEET/SEC) =   1.13 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.77   Tc(MIN.) =   34.60
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    710.00 =    1653.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    705.00 TO NODE    710.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   34.60
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.059
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        6.50      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    6.50      SUBAREA RUNOFF(CFS) =    9.51
  EFFECTIVE AREA(ACRES) =    13.20   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       13.2       PEAK FLOW RATE(CFS) =      19.31

****************************************************************************
  FLOW PROCESS FROM NODE    710.00 TO NODE    715.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1703.00  DOWNSTREAM(FEET) =   1604.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1264.00   CHANNEL SLOPE =  0.0783
  CHANNEL FLOW THRU SUBAREA(CFS) =      19.31
  FLOW VELOCITY(FEET/SEC) =   8.31 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.54   Tc(MIN.) =   37.14
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    715.00 =    2917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    710.00 TO NODE    715.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   37.14
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.974
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       21.50      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   21.50      SUBAREA RUNOFF(CFS) =   29.79
  EFFECTIVE AREA(ACRES) =     34.70   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       34.7       PEAK FLOW RATE(CFS) =      48.08

****************************************************************************
  FLOW PROCESS FROM NODE    715.00 TO NODE    715.00 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       48.08   37.14    1.974  0.43( 0.43) 1.00      34.7     700.00
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    715.00 =    2917.00 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     1634.23   36.76    1.986  0.48( 0.25) 0.52     939.9     600.00
     2     1695.63   41.92    1.835  0.48( 0.25) 0.52    1066.8     565.00
     3     1797.13   52.05    1.612  0.49( 0.25) 0.51    1311.9     535.00
     4     1477.43   68.86    1.363  0.49( 0.26) 0.52    1332.9     500.00
     5     1474.08   69.08    1.360  0.49( 0.26) 0.52    1333.0     515.00
  LONGEST FLOWPATH FROM NODE    535.00 TO NODE    715.00 =   11549.00 FEET.

  ** PEAK FLOW RATE TABLE **
```

```
  STREAM        Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      1682.20   36.76    1.986  0.48( 0.26) 0.54     974.2     600.00
     2      1686.80   37.14    1.974  0.48( 0.26) 0.54     983.8     700.00
     3      1739.39   41.92    1.835  0.48( 0.26) 0.53    1101.5     565.00
     4      1833.91   52.05    1.612  0.48( 0.25) 0.52    1346.6     535.00
     5      1506.43   68.86    1.363  0.49( 0.26) 0.53    1367.6     500.00
     6      1503.00   69.08    1.360  0.49( 0.26) 0.53    1367.7     515.00
   TOTAL AREA(ACRES) =      1367.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     1833.91  Tc(MIN.) =   52.048
  EFFECTIVE AREA(ACRES) =   1346.55  AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.48  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =     1367.7
  LONGEST FLOWPATH FROM NODE    535.00 TO NODE    715.00 =   11549.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    715.00 TO NODE    715.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    715.00 TO NODE    715.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    750.00 TO NODE    755.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1367.00
  ELEVATION DATA: UPSTREAM(FEET) =   1714.00  DOWNSTREAM(FEET) =   1596.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   27.409
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.368
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       14.00      0.43     1.000    77   27.41
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     24.37
  TOTAL AREA(ACRES) =     14.00   PEAK FLOW RATE(CFS) =     24.37

****************************************************************************
  FLOW PROCESS FROM NODE    755.00 TO NODE    755.00 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       24.37   27.41    2.368  0.43( 0.43) 1.00      14.0     750.00
  LONGEST FLOWPATH FROM NODE    750.00 TO NODE    755.00 =    1367.00 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      1682.20   36.76    1.986  0.48( 0.26) 0.54     974.2     600.00
     2      1686.80   37.14    1.974  0.48( 0.26) 0.54     983.8     700.00
     3      1739.39   41.92    1.835  0.48( 0.26) 0.53    1101.5     565.00
     4      1833.91   52.05    1.612  0.48( 0.25) 0.52    1346.6     535.00
     5      1506.43   68.86    1.363  0.49( 0.26) 0.53    1367.6     500.00
     6      1503.00   69.08    1.360  0.49( 0.26) 0.53    1367.7     515.00
  LONGEST FLOWPATH FROM NODE    535.00 TO NODE    755.00 =   11549.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM        Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      1556.24   27.41    2.368  0.48( 0.26) 0.54     740.4     750.00
     2      1701.76   36.76    1.986  0.48( 0.26) 0.54     988.2     600.00
     3      1706.20   37.14    1.974  0.48( 0.26) 0.54     997.8     700.00
     4      1757.05   41.92    1.835  0.48( 0.26) 0.54    1115.5     565.00
     5      1848.75   52.05    1.612  0.48( 0.25) 0.53    1360.6     535.00
     6      1518.13   68.86    1.363  0.49( 0.26) 0.54    1381.6     500.00
     7      1514.67   69.08    1.360  0.49( 0.26) 0.54    1381.7     515.00
   TOTAL AREA(ACRES) =      1381.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     1848.75  Tc(MIN.) =   52.048
  EFFECTIVE AREA(ACRES) =   1360.55  AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.48  AREA-AVERAGED Ap =  0.53
  TOTAL AREA(ACRES) =     1381.7
  LONGEST FLOWPATH FROM NODE    535.00 TO NODE    755.00 =   11549.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    755.00 TO NODE    755.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    755.00 TO NODE    755.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    800.00 TO NODE    805.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  2091.00
  ELEVATION DATA: UPSTREAM(FEET) =   1810.00  DOWNSTREAM(FEET) =   1737.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   38.937
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.918
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.50      0.81     1.000    51   38.94
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        9.20      0.43     1.000    77   38.94
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     12.79
  TOTAL AREA(ACRES) =      9.70   PEAK FLOW RATE(CFS) =     12.79

****************************************************************************
  FLOW PROCESS FROM NODE    805.00 TO NODE    810.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1737.00  DOWNSTREAM(FEET) =   1726.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   323.00   CHANNEL SLOPE =  0.0341
  CHANNEL FLOW THRU SUBAREA(CFS) =      12.79
  FLOW VELOCITY(FEET/SEC) =   4.91 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.10   Tc(MIN.) =   40.03
  LONGEST FLOWPATH FROM NODE    800.00 TO NODE    810.00 =    2414.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    805.00 TO NODE    810.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   40.03
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.887
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       10.00      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   10.00      SUBAREA RUNOFF(CFS) =   13.07
  EFFECTIVE AREA(ACRES) =     19.70   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       19.7       PEAK FLOW RATE(CFS) =      25.59

****************************************************************************
  FLOW PROCESS FROM NODE    810.00 TO NODE    815.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1726.00  DOWNSTREAM(FEET) =   1619.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2907.00   CHANNEL SLOPE =  0.0368
  CHANNEL FLOW THRU SUBAREA(CFS) =      25.59
  FLOW VELOCITY(FEET/SEC) =   6.15 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.88   Tc(MIN.) =   47.91
  LONGEST FLOWPATH FROM NODE    800.00 TO NODE    815.00 =    5321.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    810.00 TO NODE    815.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   47.91
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.694
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       17.00      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   17.00      SUBAREA RUNOFF(CFS) =   19.28
  EFFECTIVE AREA(ACRES) =     36.70   AREA-AVERAGED Fm(INCH/HR) =  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       36.7       PEAK FLOW RATE(CFS) =      41.45

****************************************************************************
  FLOW PROCESS FROM NODE    815.00 TO NODE    815.00 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       41.45   47.91    1.694  0.44( 0.44) 1.00      36.7     800.00
  LONGEST FLOWPATH FROM NODE    800.00 TO NODE    815.00 =    5321.00 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     1556.24   27.41    2.368  0.48( 0.26) 0.54     740.4     750.00
      2     1701.76   36.76    1.986  0.48( 0.26) 0.54     988.2     600.00
      3     1706.20   37.14    1.974  0.48( 0.26) 0.54     997.8     700.00
      4     1757.05   41.92    1.835  0.48( 0.26) 0.54    1115.5     565.00
      5     1848.75   52.05    1.612  0.48( 0.25) 0.53    1360.6     535.00
      6     1518.13   68.86    1.363  0.49( 0.26) 0.54    1381.6     500.00
      7     1514.67   69.08    1.360  0.49( 0.26) 0.54    1381.7     515.00
  LONGEST FLOWPATH FROM NODE    535.00 TO NODE    815.00 =   11549.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q       Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1592.69   27.41    2.368  0.48( 0.27) 0.56     761.4     750.00
      2     1740.95   36.76    1.986  0.48( 0.26) 0.56    1016.4     600.00
      3     1745.49   37.14    1.974  0.48( 0.26) 0.56    1026.3     700.00
      4     1797.39   41.92    1.835  0.48( 0.26) 0.55    1147.6     565.00
      5     1852.76   47.91    1.694  0.48( 0.26) 0.55    1297.2     800.00
      6     1887.49   52.05    1.612  0.48( 0.26) 0.54    1397.3     535.00
      7     1548.64   68.86    1.363  0.49( 0.27) 0.55    1418.3     500.00
      8     1545.08   69.08    1.360  0.49( 0.27) 0.55    1418.4     515.00
    TOTAL AREA(ACRES) =      1418.4

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     1887.49  Tc(MIN.) =   52.048
  EFFECTIVE AREA(ACRES) =   1397.25  AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.48  AREA-AVERAGED Ap =  0.54
  TOTAL AREA(ACRES) =     1418.4
  LONGEST FLOWPATH FROM NODE    535.00 TO NODE    815.00 =   11549.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    815.00 TO NODE    815.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    815.00 TO NODE    815.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    900.00 TO NODE    905.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  2155.00
  ELEVATION DATA: UPSTREAM(FEET) =   1943.00  DOWNSTREAM(FEET) =   1874.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   40.097
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.885
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        9.30      0.81     1.000    51   40.10
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      9.01
  TOTAL AREA(ACRES) =      9.30   PEAK FLOW RATE(CFS) =      9.01

****************************************************************************
  FLOW PROCESS FROM NODE    905.00 TO NODE    910.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1874.00  DOWNSTREAM(FEET) =   1869.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   240.00   CHANNEL SLOPE =  0.0208
  CHANNEL FLOW THRU SUBAREA(CFS) =       9.01
  FLOW VELOCITY(FEET/SEC) =   3.51 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.14   Tc(MIN.) =   41.24
  LONGEST FLOWPATH FROM NODE    900.00 TO NODE    910.00 =    2395.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    905.00 TO NODE    910.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   41.24
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.853
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       10.00      0.81     1.000    51
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   10.00      SUBAREA RUNOFF(CFS) =    9.41
  EFFECTIVE AREA(ACRES) =     19.30   AREA-AVERAGED Fm(INCH/HR) =  0.81
  AREA-AVERAGED Fp(INCH/HR) =  0.81  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       19.3       PEAK FLOW RATE(CFS) =      18.16

****************************************************************************
  FLOW PROCESS FROM NODE    910.00 TO NODE    915.00 IS CODE =  82
----------------------------------------------------------------------------
  >>>>>ADD SUBAREA RUNOFF TO MAINLINE, AT MAINLINE Tc,<<<<<
  >>>>>(AND COMPUTE INITIAL SUBAREA RUNOFF)<<<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  5892.00
  ELEVATION DATA: UPSTREAM(FEET) =   2033.00  DOWNSTREAM(FEET) =   1869.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   61.660
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.456
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       56.70      0.81     1.000    51   61.66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   56.70   INITIAL SUBAREA RUNOFF(CFS) =   33.07

  ** ADD SUBAREA RUNOFF TO MAINLINE AT MAINLINE Tc:
  MAINLINE Tc(MIN.) =   41.24
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.853
  SUBAREA AREA(ACRES) =   56.70      SUBAREA RUNOFF(CFS) =   53.35
  EFFECTIVE AREA(ACRES) =     76.00   AREA-AVERAGED Fm(INCH/HR) =  0.81
  AREA-AVERAGED Fp(INCH/HR) =  0.81  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       76.0       PEAK FLOW RATE(CFS) =      71.51

****************************************************************************
  FLOW PROCESS FROM NODE    915.00 TO NODE    920.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1869.00  DOWNSTREAM(FEET) =   1835.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1288.00   CHANNEL SLOPE =  0.0264
  CHANNEL FLOW THRU SUBAREA(CFS) =      71.51
  FLOW VELOCITY(FEET/SEC) =   6.98 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.08   Tc(MIN.) =   44.31
  LONGEST FLOWPATH FROM NODE    900.00 TO NODE    920.00 =    3683.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    915.00 TO NODE    920.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   44.31
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.775
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       24.50      0.81     1.000    51
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   24.50      SUBAREA RUNOFF(CFS) =   21.33
  EFFECTIVE AREA(ACRES) =    100.50   AREA-AVERAGED Fm(INCH/HR) =  0.81
  AREA-AVERAGED Fp(INCH/HR) =  0.81  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      100.5       PEAK FLOW RATE(CFS) =      87.48

****************************************************************************
  FLOW PROCESS FROM NODE    920.00 TO NODE    925.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1835.00  DOWNSTREAM(FEET) =   1740.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  3503.00   CHANNEL SLOPE =  0.0271
  CHANNEL FLOW THRU SUBAREA(CFS) =      87.48
  FLOW VELOCITY(FEET/SEC) =   7.51 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.77   Tc(MIN.) =   52.08
  LONGEST FLOWPATH FROM NODE    900.00 TO NODE    925.00 =    7186.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    920.00 TO NODE    925.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   52.08
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.611
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       27.00      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        1.20      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.79
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   28.20      SUBAREA RUNOFF(CFS) =   20.79
  EFFECTIVE AREA(ACRES) =    128.70   AREA-AVERAGED Fm(INCH/HR) =  0.80
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      128.7       PEAK FLOW RATE(CFS) =      93.43

****************************************************************************
  FLOW PROCESS FROM NODE    925.00 TO NODE    930.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1740.00  DOWNSTREAM(FEET) =   1694.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1851.00   CHANNEL SLOPE =  0.0249
  CHANNEL FLOW THRU SUBAREA(CFS) =      93.43
  FLOW VELOCITY(FEET/SEC) =   7.33 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.21   Tc(MIN.) =   56.29
  LONGEST FLOWPATH FROM NODE    900.00 TO NODE    930.00 =    9037.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    925.00 TO NODE    930.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   56.29
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.538
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       30.40      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       31.40      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.62
```

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  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   61.80      SUBAREA RUNOFF(CFS) =   51.16
  EFFECTIVE AREA(ACRES) =    190.50   AREA-AVERAGED Fm(INCH/HR) =  0.74
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      190.5       PEAK FLOW RATE(CFS) =     136.09

****************************************************************************
  FLOW PROCESS FROM NODE    930.00 TO NODE    935.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1694.00  DOWNSTREAM(FEET) =   1636.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2986.00   CHANNEL SLOPE =  0.0194
  CHANNEL FLOW THRU SUBAREA(CFS) =     136.09
  FLOW VELOCITY(FEET/SEC) =   7.26 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.85   Tc(MIN.) =   63.15
  LONGEST FLOWPATH FROM NODE    900.00 TO NODE    935.00 =   12023.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    930.00 TO NODE    935.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   63.15
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.435
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        1.70      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       17.20      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.47
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   18.90      SUBAREA RUNOFF(CFS) =   16.46
  EFFECTIVE AREA(ACRES) =    209.40   AREA-AVERAGED Fm(INCH/HR) =  0.72
  AREA-AVERAGED Fp(INCH/HR) =  0.72  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      209.4       PEAK FLOW RATE(CFS) =     136.09
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    935.00 TO NODE    935.00 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      136.09   63.15    1.435  0.72( 0.72) 1.00     209.4     900.00
  LONGEST FLOWPATH FROM NODE    900.00 TO NODE    935.00 =   12023.00 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     1592.69   27.41    2.368  0.48( 0.27) 0.56     761.4     750.00
      2     1740.95   36.76    1.986  0.48( 0.26) 0.56    1016.4     600.00
      3     1745.49   37.14    1.974  0.48( 0.26) 0.56    1026.3     700.00
      4     1797.39   41.92    1.835  0.48( 0.26) 0.55    1147.6     565.00
      5     1852.76   47.91    1.694  0.48( 0.26) 0.55    1297.2     800.00
      6     1887.49   52.05    1.612  0.48( 0.26) 0.54    1397.3     535.00
      7     1548.64   68.86    1.363  0.49( 0.27) 0.55    1418.3     500.00
      8     1545.08   69.08    1.360  0.49( 0.27) 0.55    1418.4     515.00
  LONGEST FLOWPATH FROM NODE    535.00 TO NODE    935.00 =   11549.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM        Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1728.69   27.41    2.368  0.52( 0.31) 0.60     852.3     750.00
      2     1877.04   36.76    1.986  0.52( 0.31) 0.60    1138.3     600.00
      3     1881.58   37.14    1.974  0.52( 0.31) 0.60    1149.4     700.00
      4     1933.48   41.92    1.835  0.52( 0.31) 0.60    1286.6     565.00
      5     1988.85   47.91    1.694  0.52( 0.31) 0.60    1456.1     800.00
      6     2023.58   52.05    1.612  0.52( 0.31) 0.59    1569.9     535.00
      7     1799.96   63.15    1.435  0.53( 0.32) 0.60    1620.5     900.00
      8     1670.90   68.86    1.363  0.54( 0.32) 0.61    1627.7     500.00
      9     1666.87   69.08    1.360  0.54( 0.32) 0.61    1627.8     515.00
    TOTAL AREA(ACRES) =      1627.8

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     2023.58  Tc(MIN.) =   52.048
  EFFECTIVE AREA(ACRES) =   1569.85  AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.53  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =     1627.8
  LONGEST FLOWPATH FROM NODE    900.00 TO NODE    935.00 =   12023.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    935.00 TO NODE    935.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    935.00 TO NODE    935.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    950.00 TO NODE    955.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1760.00
  ELEVATION DATA: UPSTREAM(FEET) =   1688.00  DOWNSTREAM(FEET) =   1642.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   38.509
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.931
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        8.70      0.43     1.000    77   38.51
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     11.72
  TOTAL AREA(ACRES) =      8.70   PEAK FLOW RATE(CFS) =     11.72

****************************************************************************
  FLOW PROCESS FROM NODE    955.00 TO NODE    960.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1642.00  DOWNSTREAM(FEET) =   1635.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   244.00   CHANNEL SLOPE =  0.0287
  CHANNEL FLOW THRU SUBAREA(CFS) =      11.72
  FLOW VELOCITY(FEET/SEC) =   4.41 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.92   Tc(MIN.) =   39.43
  LONGEST FLOWPATH FROM NODE    950.00 TO NODE    960.00 =    2004.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    955.00 TO NODE    960.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   39.43
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.904
  SUBAREA LOSS RATE DATA(AMC III):
```

```
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B         9.40      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    9.40      SUBAREA RUNOFF(CFS) =   12.44
  EFFECTIVE AREA(ACRES) =     18.10   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       18.1       PEAK FLOW RATE(CFS) =      23.94

****************************************************************************
  FLOW PROCESS FROM NODE    960.00 TO NODE    960.00 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       23.94   39.43    1.904  0.43( 0.43) 1.00      18.1     950.00
  LONGEST FLOWPATH FROM NODE    950.00 TO NODE    960.00 =    2004.00 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     1728.69   27.41    2.368  0.52( 0.31) 0.60     852.3     750.00
      2     1877.04   36.76    1.986  0.52( 0.31) 0.60    1138.3     600.00
      3     1881.58   37.14    1.974  0.52( 0.31) 0.60    1149.4     700.00
      4     1933.48   41.92    1.835  0.52( 0.31) 0.60    1286.6     565.00
      5     1988.85   47.91    1.694  0.52( 0.31) 0.60    1456.1     800.00
      6     2023.58   52.05    1.612  0.52( 0.31) 0.59    1569.9     535.00
      7     1799.96   63.15    1.435  0.53( 0.32) 0.60    1620.5     900.00
      8     1670.90   68.86    1.363  0.54( 0.32) 0.61    1627.7     500.00
      9     1666.87   69.08    1.360  0.54( 0.32) 0.61    1627.8     515.00
  LONGEST FLOWPATH FROM NODE    900.00 TO NODE    960.00 =   12023.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1750.59   27.41    2.368  0.52( 0.32) 0.61     864.9     750.00
      2     1900.60   36.76    1.986  0.52( 0.32) 0.61    1155.1     600.00
      3     1905.20   37.14    1.974  0.52( 0.32) 0.61    1166.5     700.00
      4     1930.44   39.43    1.904  0.52( 0.31) 0.61    1233.4     950.00
      5     1956.31   41.92    1.835  0.52( 0.31) 0.61    1304.7     565.00
      6     2009.37   47.91    1.694  0.52( 0.31) 0.60    1474.2     800.00
      7     2042.76   52.05    1.612  0.52( 0.31) 0.60    1588.0     535.00
      8     1816.27   63.15    1.435  0.53( 0.32) 0.61    1638.6     900.00
      9     1686.03   68.86    1.363  0.53( 0.33) 0.61    1645.8     500.00
     10     1681.95   69.08    1.360  0.53( 0.33) 0.61    1645.9     515.00
    TOTAL AREA(ACRES) =      1645.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     2042.76  Tc(MIN.) =   52.048
  EFFECTIVE AREA(ACRES) =   1587.95  AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.52  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =     1645.9
  LONGEST FLOWPATH FROM NODE    900.00 TO NODE    960.00 =   12023.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    960.00 TO NODE    960.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    960.00 TO NODE    960.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================
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****************************************************************************
  FLOW PROCESS FROM NODE    975.00 TO NODE    980.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  2284.00
  ELEVATION DATA: UPSTREAM(FEET) =   1665.00  DOWNSTREAM(FEET) =   1622.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   45.639
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.744
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A         0.50      0.81     1.000    51   45.64
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B         9.00      0.43     1.000    77   45.64
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     11.03
  TOTAL AREA(ACRES) =      9.50   PEAK FLOW RATE(CFS) =     11.03

****************************************************************************
  FLOW PROCESS FROM NODE    980.00 TO NODE    980.00 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       11.03   45.64    1.744  0.45( 0.45) 1.00       9.5     975.00
  LONGEST FLOWPATH FROM NODE    975.00 TO NODE    980.00 =    2284.00 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     1750.59   27.41    2.368  0.52( 0.32) 0.61     864.9     750.00
      2     1900.60   36.76    1.986  0.52( 0.32) 0.61    1155.1     600.00
      3     1905.20   37.14    1.974  0.52( 0.32) 0.61    1166.5     700.00
      4     1930.44   39.43    1.904  0.52( 0.31) 0.61    1233.4     950.00
      5     1956.31   41.92    1.835  0.52( 0.31) 0.61    1304.7     565.00
      6     2009.37   47.91    1.694  0.52( 0.31) 0.60    1474.2     800.00
      7     2042.76   52.05    1.612  0.52( 0.31) 0.60    1588.0     535.00
      8     1816.27   63.15    1.435  0.53( 0.32) 0.61    1638.6     900.00
      9     1686.03   68.86    1.363  0.53( 0.33) 0.61    1645.8     500.00
     10     1681.95   69.08    1.360  0.53( 0.33) 0.61    1645.9     515.00
  LONGEST FLOWPATH FROM NODE    900.00 TO NODE    980.00 =   12023.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1760.42   27.41    2.368  0.52( 0.32) 0.61     870.6     750.00
      2     1911.16   36.76    1.986  0.52( 0.32) 0.61    1162.8     600.00
      3     1915.77   37.14    1.974  0.52( 0.32) 0.61    1174.2     700.00
      4     1941.15   39.43    1.904  0.52( 0.32) 0.61    1241.6     950.00
      5     1967.16   41.92    1.835  0.52( 0.32) 0.61    1313.4     565.00
      6     2000.27   45.64    1.744  0.52( 0.31) 0.60    1419.4     975.00
      7     2019.97   47.91    1.694  0.52( 0.31) 0.60    1483.7     800.00
      8     2052.66   52.05    1.612  0.52( 0.31) 0.60    1597.5     535.00
      9     1824.66   63.15    1.435  0.53( 0.32) 0.61    1648.1     900.00
     10     1693.80   68.86    1.363  0.53( 0.33) 0.61    1655.3     500.00
     11     1689.70   69.08    1.360  0.53( 0.33) 0.61    1655.4     515.00
    TOTAL AREA(ACRES) =      1655.4

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     2052.66  Tc(MIN.) =   52.048
  EFFECTIVE AREA(ACRES) =   1597.45  AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.52  AREA-AVERAGED Ap =  0.60
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```
  TOTAL AREA(ACRES) =     1655.4
  LONGEST FLOWPATH FROM NODE    900.00 TO NODE    980.00 =   12023.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    980.00 TO NODE    980.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    980.00 TO NODE    980.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1000.00 TO NODE   1005.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1276.00
  ELEVATION DATA: UPSTREAM(FEET) =   1654.00  DOWNSTREAM(FEET) =   1626.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   35.066
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.043
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        2.50      0.81     1.000    51   35.07
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        2.10      0.43     1.000    77   35.07
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.64
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      5.82
  TOTAL AREA(ACRES) =      4.60   PEAK FLOW RATE(CFS) =      5.82

****************************************************************************
  FLOW PROCESS FROM NODE   1005.00 TO NODE   1005.00 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        5.82   35.07    2.043  0.64( 0.64) 1.00       4.6    1000.00
  LONGEST FLOWPATH FROM NODE   1000.00 TO NODE   1005.00 =    1276.00 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     1760.42   27.41    2.368  0.52( 0.32) 0.61     870.6     750.00
      2     1911.16   36.76    1.986  0.52( 0.32) 0.61    1162.8     600.00
      3     1915.77   37.14    1.974  0.52( 0.32) 0.61    1174.2     700.00
      4     1941.15   39.43    1.904  0.52( 0.32) 0.61    1241.6     950.00
      5     1967.16   41.92    1.835  0.52( 0.32) 0.61    1313.4     565.00
      6     2000.27   45.64    1.744  0.52( 0.31) 0.60    1419.4     975.00
      7     2019.97   47.91    1.694  0.52( 0.31) 0.60    1483.7     800.00
      8     2052.66   52.05    1.612  0.52( 0.31) 0.60    1597.5     535.00
      9     1824.66   63.15    1.435  0.53( 0.32) 0.61    1648.1     900.00
     10     1693.80   68.86    1.363  0.53( 0.33) 0.61    1655.3     500.00
     11     1689.70   69.08    1.360  0.53( 0.33) 0.61    1655.4     515.00
  LONGEST FLOWPATH FROM NODE    900.00 TO NODE   1005.00 =   12023.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q       Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1766.02   27.41    2.368  0.52( 0.32) 0.61     874.2     750.00
      2     1889.70   35.07    2.043  0.52( 0.32) 0.61    1114.5    1000.00
      3     1916.74   36.76    1.986  0.52( 0.32) 0.61    1167.4     600.00
      4     1921.30   37.14    1.974  0.52( 0.32) 0.61    1178.8     700.00
      5     1946.40   39.43    1.904  0.52( 0.32) 0.61    1246.2     950.00
      6     1972.12   41.92    1.835  0.52( 0.32) 0.61    1318.0     565.00
      7     2004.85   45.64    1.744  0.52( 0.32) 0.61    1424.0     975.00
      8     2024.35   47.91    1.694  0.52( 0.31) 0.60    1488.3     800.00
      9     2056.70   52.05    1.612  0.52( 0.31) 0.60    1602.1     535.00
     10     1827.97   63.15    1.435  0.53( 0.33) 0.61    1652.7     900.00
     11     1696.80   68.86    1.363  0.53( 0.33) 0.61    1659.9     500.00
     12     1692.70   69.08    1.360  0.53( 0.33) 0.61    1660.0     515.00
    TOTAL AREA(ACRES) =      1660.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     2056.70  Tc(MIN.) =   52.048
  EFFECTIVE AREA(ACRES) =   1602.05  AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.52  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =     1660.0
  LONGEST FLOWPATH FROM NODE    900.00 TO NODE   1005.00 =   12023.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1005.00 TO NODE   1005.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1005.00 TO NODE   1005.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   1050.00 TO NODE   1055.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1965.00
  ELEVATION DATA: UPSTREAM(FEET) =   1721.00  DOWNSTREAM(FEET) =   1670.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   40.301
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.879
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        7.80      0.81     1.000    51   40.30
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      7.52
  TOTAL AREA(ACRES) =      7.80   PEAK FLOW RATE(CFS) =      7.52

****************************************************************************
  FLOW PROCESS FROM NODE   1055.00 TO NODE   1060.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1670.00  DOWNSTREAM(FEET) =   1657.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   659.00   CHANNEL SLOPE =  0.0197
  CHANNEL FLOW THRU SUBAREA(CFS) =       7.52
  FLOW VELOCITY(FEET/SEC) =   3.27 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.36   Tc(MIN.) =   43.66
  LONGEST FLOWPATH FROM NODE   1050.00 TO NODE   1060.00 =    2624.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1055.00 TO NODE   1060.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==============================================================================
  MAINLINE Tc(MIN.) =   43.66
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.791
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        2.40      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        3.20      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.59
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    5.60      SUBAREA RUNOFF(CFS) =    6.03
  EFFECTIVE AREA(ACRES) =     13.40   AREA-AVERAGED Fm(INCH/HR) =  0.72
  AREA-AVERAGED Fp(INCH/HR) =  0.72  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       13.4       PEAK FLOW RATE(CFS) =      12.93

****************************************************************************
  FLOW PROCESS FROM NODE   1060.00 TO NODE   1065.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1657.00  DOWNSTREAM(FEET) =   1628.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1454.00   CHANNEL SLOPE =  0.0199
  CHANNEL FLOW THRU SUBAREA(CFS) =      12.93
  FLOW VELOCITY(FEET/SEC) =   3.77 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.43   Tc(MIN.) =   50.09
  LONGEST FLOWPATH FROM NODE   1050.00 TO NODE   1065.00 =    4078.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1060.00 TO NODE   1065.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   50.09
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.649
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        8.00      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       11.20      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.59
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   19.20      SUBAREA RUNOFF(CFS) =   18.31
  EFFECTIVE AREA(ACRES) =     32.60   AREA-AVERAGED Fm(INCH/HR) =  0.64
  AREA-AVERAGED Fp(INCH/HR) =  0.64  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       32.6       PEAK FLOW RATE(CFS) =      29.53

****************************************************************************
  FLOW PROCESS FROM NODE   1065.00 TO NODE   1065.00 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       29.53   50.09    1.649  0.64( 0.64) 1.00      32.6    1050.00
  LONGEST FLOWPATH FROM NODE   1050.00 TO NODE   1065.00 =    4078.00 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     1766.02   27.41    2.368  0.52( 0.32) 0.61     874.2     750.00
      2     1889.70   35.07    2.043  0.52( 0.32) 0.61    1114.5    1000.00
      3     1916.74   36.76    1.986  0.52( 0.32) 0.61    1167.4     600.00
      4     1921.30   37.14    1.974  0.52( 0.32) 0.61    1178.8     700.00
      5     1946.40   39.43    1.904  0.52( 0.32) 0.61    1246.2     950.00
      6     1972.12   41.92    1.835  0.52( 0.32) 0.61    1318.0     565.00
      7     2004.85   45.64    1.744  0.52( 0.32) 0.61    1424.0     975.00
      8     2024.35   47.91    1.694  0.52( 0.31) 0.60    1488.3     800.00
      9     2056.70   52.05    1.612  0.52( 0.31) 0.60    1602.1     535.00
     10     1827.97   63.15    1.435  0.53( 0.33) 0.61    1652.7     900.00
     11     1696.80   68.86    1.363  0.53( 0.33) 0.61    1659.9     500.00
     12     1692.70   69.08    1.360  0.53( 0.33) 0.61    1660.0     515.00
  LONGEST FLOWPATH FROM NODE    900.00 TO NODE   1065.00 =   12023.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1793.73   27.41    2.368  0.52( 0.32) 0.62     892.1     750.00
      2     1918.45   35.07    2.043  0.52( 0.32) 0.62    1137.3    1000.00
      3     1945.66   36.76    1.986  0.52( 0.32) 0.62    1191.3     600.00
      4     1950.25   37.14    1.974  0.52( 0.32) 0.62    1203.0     700.00
      5     1975.53   39.43    1.904  0.52( 0.32) 0.62    1271.8     950.00
      6     2001.40   41.92    1.835  0.52( 0.32) 0.62    1345.3     565.00
      7     2034.29   45.64    1.744  0.52( 0.32) 0.61    1453.7     975.00
      8     2053.85   47.91    1.694  0.53( 0.32) 0.61    1519.5     800.00
      9     2070.90   50.09    1.649  0.53( 0.32) 0.61    1580.7    1050.00
     10     2085.13   52.05    1.612  0.53( 0.32) 0.61    1634.7     535.00
     11     1851.22   63.15    1.435  0.54( 0.33) 0.62    1685.3     900.00
     12     1717.92   68.86    1.363  0.54( 0.33) 0.62    1692.5     500.00
     13     1713.74   69.08    1.360  0.54( 0.33) 0.62    1692.6     515.00
    TOTAL AREA(ACRES) =      1692.6

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     2085.13  Tc(MIN.) =   52.048
  EFFECTIVE AREA(ACRES) =   1634.65  AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.53  AREA-AVERAGED Ap =  0.61
  TOTAL AREA(ACRES) =     1692.6
  LONGEST FLOWPATH FROM NODE    900.00 TO NODE   1065.00 =   12023.00 FEET.
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     1692.6  TC(MIN.) =     52.05
  EFFECTIVE AREA(ACRES) =   1634.65  AREA-AVERAGED Fm(INCH/HR)=  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.53  AREA-AVERAGED Ap = 0.608
  PEAK FLOW RATE(CFS)   =    2085.13

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1793.73   27.41    2.368  0.52( 0.32) 0.62     892.1     750.00
      2     1918.45   35.07    2.043  0.52( 0.32) 0.62    1137.3    1000.00
      3     1945.66   36.76    1.986  0.52( 0.32) 0.62    1191.3     600.00
      4     1950.25   37.14    1.974  0.52( 0.32) 0.62    1203.0     700.00
      5     1975.53   39.43    1.904  0.52( 0.32) 0.62    1271.8     950.00
      6     2001.40   41.92    1.835  0.52( 0.32) 0.62    1345.3     565.00
      7     2034.29   45.64    1.744  0.52( 0.32) 0.61    1453.7     975.00
      8     2053.85   47.91    1.694  0.53( 0.32) 0.61    1519.5     800.00
      9     2070.90   50.09    1.649  0.53( 0.32) 0.61    1580.7    1050.00
     10     2085.13   52.05    1.612  0.53( 0.32) 0.61    1634.7     535.00
     11     1851.22   63.15    1.435  0.54( 0.33) 0.62    1685.3     900.00
     12     1717.92   68.86    1.363  0.54( 0.33) 0.62    1692.5     500.00
     13     1713.74   69.08    1.360  0.54( 0.33) 0.62    1692.6     515.00
==============================================================================
==============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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____________________________________________________________________________
****************************************************************************
              RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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              Ver. 13.5  Release Date: 02/06/2007  License ID 1527

                              Analysis prepared by:




----------------------------------------------------------------------------
  FILE NAME: PRN3_100.DAT
  TIME/DATE OF STUDY: 15:05 09/29/2008
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                       --*TIME-OF-CONCENTRATION MODEL*--

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

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.4800

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 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    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   949.00
  ELEVATION DATA: UPSTREAM(FEET) =   1980.00  DOWNSTREAM(FEET) =   1960.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.210
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.283
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A       10.04      0.80     0.100    52   10.21
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =     37.98
  TOTAL AREA(ACRES) =     10.04   PEAK FLOW RATE(CFS) =     37.98

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    103.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1960.00  DOWNSTREAM(FEET) =  1955.00
  FLOW LENGTH(FEET) =   402.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.20
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      37.98
  PIPE TRAVEL TIME(MIN.) =   0.66    Tc(MIN.) =   10.87
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =    1351.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.87
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.126
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A       14.00      0.80     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   14.00      SUBAREA RUNOFF(CFS) =   50.98
  EFFECTIVE AREA(ACRES) =     24.04   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       24.0       PEAK FLOW RATE(CFS) =      87.54

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    106.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1955.00  DOWNSTREAM(FEET) =  1950.00
  FLOW LENGTH(FEET) =   341.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.29
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      87.54
  PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =   11.29
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    106.00 =    1692.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    106.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.29
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.031
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                A       17.70      0.80     0.850    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =   17.70      SUBAREA RUNOFF(CFS) =   53.44
  EFFECTIVE AREA(ACRES) =     41.74   AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =       41.7       PEAK FLOW RATE(CFS) =     138.93

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    125.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1950.00  DOWNSTREAM(FEET) =   140.00
  FLOW LENGTH(FEET) =   383.00   MANNING'S N =  0.013
```

```
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) = 132.86
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     138.93
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   11.34
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    125.00 =    2075.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    125.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.34
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.021
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A       18.90      0.80     0.100    52
  COMMERCIAL                 B        0.50      0.45     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.79
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   19.40      SUBAREA RUNOFF(CFS) =   68.83
  EFFECTIVE AREA(ACRES) =     61.14   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.32
  TOTAL AREA(ACRES) =       61.1       PEAK FLOW RATE(CFS) =     207.38

****************************************************************************
  FLOW PROCESS FROM NODE    125.00 TO NODE    145.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1940.00  DOWNSTREAM(FEET) =   1910.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1511.00   CHANNEL SLOPE =  0.0199
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.485
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                A        2.10      0.80     0.850    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     210.03
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.24
  AVERAGE FLOW DEPTH(FEET) =   1.87   TRAVEL TIME(MIN.) =   3.06
  Tc(MIN.) =   14.40
  SUBAREA AREA(ACRES) =     2.10       SUBAREA RUNOFF(CFS) =    5.31
  EFFECTIVE AREA(ACRES) =     63.24     AREA-AVERAGED Fm(INCH/HR) =   0.27
  AREA-AVERAGED Fp(INCH/HR) =   0.80  AREA-AVERAGED Ap =   0.33
  TOTAL AREA(ACRES) =       63.2         PEAK FLOW RATE(CFS) =     207.38
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.86   FLOW VELOCITY(FEET/SEC.) =   8.22
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    145.00 =    3586.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    145.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.40
  RAINFALL INTENSITY(INCH/HR) =   3.48
  AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.80
  AREA-AVERAGED Ap =  0.33
  EFFECTIVE STREAM AREA(ACRES) =      63.24
  TOTAL STREAM AREA(ACRES) =      63.24
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     207.38

****************************************************************************
  FLOW PROCESS FROM NODE    130.00 TO NODE    135.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   609.00
  ELEVATION DATA: UPSTREAM(FEET) =   1975.00  DOWNSTREAM(FEET) =   1952.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.608
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.109
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                A        0.20      0.80     0.850    52   12.09
  PUBLIC PARK                B        0.42      0.45     0.850    76   12.09
  COMMERCIAL                 A        4.35      0.80     0.100    52    7.61
  COMMERCIAL                 B        0.30      0.45     0.100    76    7.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.66
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.188
  SUBAREA RUNOFF(CFS) =     23.64
  TOTAL AREA(ACRES) =      5.27   PEAK FLOW RATE(CFS) =     23.64

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    140.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1952.00  DOWNSTREAM(FEET) =  1928.00
  FLOW LENGTH(FEET) =   819.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.43
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.64
  PIPE TRAVEL TIME(MIN.) =   1.10    Tc(MIN.) =    8.71
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    140.00 =    1428.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    140.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.71
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.712
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.36      0.45     0.850    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        9.63      0.80     0.500    52
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.33      0.45     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.511
  SUBAREA AREA(ACRES) =   11.32      SUBAREA RUNOFF(CFS) =   44.16
  EFFECTIVE AREA(ACRES) =     16.59   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.73  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =       16.6       PEAK FLOW RATE(CFS) =      65.92

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    145.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1928.00  DOWNSTREAM(FEET) =  1905.00
  FLOW LENGTH(FEET) =   766.00   MANNING'S N =  0.013
```

```
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.06
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      65.92
  PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =    9.50
  LONGEST FLOWPATH FROM NODE    130.00 TO NODE    145.00 =    2194.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    145.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.472
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS               A        4.85      0.80     0.350    52
  CONDOMINIUMS               B        1.51      0.45     0.350    76
  PUBLIC PARK                B        0.28      0.45     0.850    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.69
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.371
  SUBAREA AREA(ACRES) =    6.64      SUBAREA RUNOFF(CFS) =   25.19
  EFFECTIVE AREA(ACRES) =     23.23   AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.72  AREA-AVERAGED Ap =  0.40
  TOTAL AREA(ACRES) =       23.2       PEAK FLOW RATE(CFS) =      87.53

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    145.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.50
  RAINFALL INTENSITY(INCH/HR) =   4.47
  AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.72
  AREA-AVERAGED Ap =  0.40
  EFFECTIVE STREAM AREA(ACRES) =      23.23
  TOTAL STREAM AREA(ACRES) =      23.23
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      87.53

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      207.38   14.40    3.485  0.80( 0.27) 0.33      63.2     100.00
      2       87.53    9.50    4.472  0.72( 0.29) 0.40      23.2     130.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      266.35    9.50    4.472  0.76( 0.27) 0.36      65.0     130.00
      2      274.27   14.40    3.485  0.77( 0.27) 0.35      86.5     100.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     274.27    Tc(MIN.) =    14.40
  EFFECTIVE AREA(ACRES) =      86.47   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.77  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =       86.5
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    145.00 =    3586.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    145.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    155.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1131.00
  ELEVATION DATA: UPSTREAM(FEET) =   1955.00  DOWNSTREAM(FEET) =   1925.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.148
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.063
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A       14.40      0.80     0.200    52   11.15
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =     50.59
  TOTAL AREA(ACRES) =     14.40   PEAK FLOW RATE(CFS) =     50.59

****************************************************************************
  FLOW PROCESS FROM NODE    152.00 TO NODE    155.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.15
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.063
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A       14.40      0.80     0.500    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   14.40      SUBAREA RUNOFF(CFS) =   47.50
  EFFECTIVE AREA(ACRES) =     28.80   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =       28.8       PEAK FLOW RATE(CFS) =      98.09

****************************************************************************
  FLOW PROCESS FROM NODE    155.00 TO NODE    160.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1925.00  DOWNSTREAM(FEET) =  1908.00
  FLOW LENGTH(FEET) =   570.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.90
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      98.09
  PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =   11.68
  LONGEST FLOWPATH FROM NODE    150.00 TO NODE    160.00 =    1701.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.68
  RAINFALL INTENSITY(INCH/HR) =   3.95
  AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.80
  AREA-AVERAGED Ap =  0.35
  EFFECTIVE STREAM AREA(ACRES) =      28.80
  TOTAL STREAM AREA(ACRES) =      28.80
```

```
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      98.09

****************************************************************************
  FLOW PROCESS FROM NODE    156.00 TO NODE    157.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   367.00
  ELEVATION DATA: UPSTREAM(FEET) =   1938.00  DOWNSTREAM(FEET) =   1922.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   7.725
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.063
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        4.30      0.80     0.500    52    7.73
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =     18.05
  TOTAL AREA(ACRES) =      4.30   PEAK FLOW RATE(CFS) =     18.05

****************************************************************************
  FLOW PROCESS FROM NODE    157.00 TO NODE    160.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1922.00  DOWNSTREAM(FEET) =  1908.00
  FLOW LENGTH(FEET) =   707.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.10
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.05
  PIPE TRAVEL TIME(MIN.) =   1.17    Tc(MIN.) =    8.89
  LONGEST FLOWPATH FROM NODE    156.00 TO NODE    160.00 =    1074.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    157.00 TO NODE    160.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.89
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.653
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS              A        5.70      0.80     0.350    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =    5.70      SUBAREA RUNOFF(CFS) =   22.44
  EFFECTIVE AREA(ACRES) =     10.00   AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =       10.0       PEAK FLOW RATE(CFS) =      38.91

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.89
  RAINFALL INTENSITY(INCH/HR) =   4.65
  AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.80
  AREA-AVERAGED Ap =  0.41
  EFFECTIVE STREAM AREA(ACRES) =      10.00
  TOTAL STREAM AREA(ACRES) =      10.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      38.91

  ** CONFLUENCE DATA **
   STREAM        Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
      1       98.09   11.68    3.951  0.80( 0.28) 0.35      28.8     150.00
      2       38.91    8.89    4.653  0.80( 0.33) 0.41      10.0     156.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM        Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
      1      127.87    8.89    4.653  0.80( 0.29) 0.37      31.9     156.00
      2      130.68   11.68    3.951  0.80( 0.29) 0.37      38.8     150.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     130.68    Tc(MIN.) =    11.68
  EFFECTIVE AREA(ACRES) =      38.80   AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.37
  TOTAL AREA(ACRES) =       38.8
  LONGEST FLOWPATH FROM NODE    150.00 TO NODE    160.00 =    1701.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    180.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1908.00  DOWNSTREAM(FEET) =   1902.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   611.00   CHANNEL SLOPE =  0.0098
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.626
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                A        3.60      0.80     0.850    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     135.46
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.66
  AVERAGE FLOW DEPTH(FEET) =   1.79   TRAVEL TIME(MIN.) =   1.80
  Tc(MIN.) =   13.48
  SUBAREA AREA(ACRES) =     3.60       SUBAREA RUNOFF(CFS) =    9.55
  EFFECTIVE AREA(ACRES) =     42.40     AREA-AVERAGED Fm(INCH/HR) =   0.32
  AREA-AVERAGED Fp(INCH/HR) =   0.80  AREA-AVERAGED Ap =   0.41
  TOTAL AREA(ACRES) =       42.4         PEAK FLOW RATE(CFS) =     130.68
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.76   FLOW VELOCITY(FEET/SEC.) =   5.60
  LONGEST FLOWPATH FROM NODE    150.00 TO NODE    180.00 =    2312.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    180.00 TO NODE    145.00 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      127.87   10.70    4.165  0.80( 0.33) 0.42      35.5     156.00
      2      130.68   13.48    3.626  0.80( 0.32) 0.41      42.4     150.00
  LONGEST FLOWPATH FROM NODE    150.00 TO NODE    145.00 =    2312.00 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      266.35    9.50    4.472  0.76( 0.27) 0.36      65.0     130.00
    2      274.27   14.40    3.485  0.77( 0.27) 0.35      86.5     100.00
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    145.00 =    3586.00 FEET.

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1      389.03    9.50    4.472  0.78( 0.29) 0.38      96.5     130.00
    2      396.15   10.70    4.165  0.78( 0.29) 0.38     105.7     156.00
    3      403.46   13.48    3.626  0.78( 0.29) 0.37     124.8     150.00
    4      399.37   14.40    3.485  0.78( 0.29) 0.37     128.9     100.00
  TOTAL AREA(ACRES) =       128.9

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      403.46  Tc(MIN.) =   13.478
EFFECTIVE AREA(ACRES) =    124.83  AREA-AVERAGED Fm(INCH/HR) =  0.29
AREA-AVERAGED Fp(INCH/HR) =  0.78  AREA-AVERAGED Ap =  0.38
TOTAL AREA(ACRES) =      128.9
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    145.00 =    3586.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    145.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    145.00 TO NODE    185.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1902.00  DOWNSTREAM(FEET) =   1895.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   558.00   CHANNEL SLOPE =  0.0125
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00

         ===>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.

  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.527
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS               A        5.80      0.80     0.350    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     411.94
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  14.71
  AVERAGE FLOW DEPTH(FEET) =   2.00   TRAVEL TIME(MIN.) =   0.63
  Tc(MIN.) =   14.11
  SUBAREA AREA(ACRES) =     5.80       SUBAREA RUNOFF(CFS) =   16.96
  EFFECTIVE AREA(ACRES) =    130.63     AREA-AVERAGED Fm(INCH/HR) =   0.29
  AREA-AVERAGED Fp(INCH/HR) =   0.78  AREA-AVERAGED Ap =   0.37
  TOTAL AREA(ACRES) =      134.7         PEAK FLOW RATE(CFS) =     403.46
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

         ===>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) =  2.00   FLOW VELOCITY(FEET/SEC.) =  14.41

  ===>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH

  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    185.00 =    4144.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    185.00 TO NODE    215.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1895.00  DOWNSTREAM(FEET) =   1880.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   653.00   CHANNEL SLOPE =  0.0230
  CHANNEL BASE(FEET) =   12.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00

         ===>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.

  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.390
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                A        2.30      0.80     0.850    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     406.27
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  11.29
  AVERAGE FLOW DEPTH(FEET) =   2.00   TRAVEL TIME(MIN.) =   0.96
  Tc(MIN.) =   15.07
  SUBAREA AREA(ACRES) =     2.30       SUBAREA RUNOFF(CFS) =    5.62
  EFFECTIVE AREA(ACRES) =    132.93     AREA-AVERAGED Fm(INCH/HR) =   0.30
  AREA-AVERAGED Fp(INCH/HR) =   0.78  AREA-AVERAGED Ap =   0.38
  TOTAL AREA(ACRES) =      137.0         PEAK FLOW RATE(CFS) =     403.46
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

         ===>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) =  2.00   FLOW VELOCITY(FEET/SEC.) =  11.21

  ===>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH

  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    215.00 =    4797.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    215.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.07
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.390
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.50      0.45     0.850    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        4.10      0.80     0.500    52
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        4.50      0.45     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.60
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.519
  SUBAREA AREA(ACRES) =    9.10      SUBAREA RUNOFF(CFS) =   25.21
  EFFECTIVE AREA(ACRES) =    142.03   AREA-AVERAGED Fm(INCH/HR) =  0.30
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.77  AREA-AVERAGED Ap =  0.39
  TOTAL AREA(ACRES) =      146.1       PEAK FLOW RATE(CFS) =     403.46
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    215.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   15.07
  RAINFALL INTENSITY(INCH/HR) =   3.39
  AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.77
  AREA-AVERAGED Ap =  0.39
  EFFECTIVE STREAM AREA(ACRES) =     142.03
  TOTAL STREAM AREA(ACRES) =     146.07
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     403.46

****************************************************************************
  FLOW PROCESS FROM NODE    190.00 TO NODE    192.00 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) =   1910.00  DOWNSTREAM(FEET) =   1900.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.084
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.871
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       A       20.60      0.80     0.600    52   12.08
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =     62.91
  TOTAL AREA(ACRES) =     20.60   PEAK FLOW RATE(CFS) =     62.91

****************************************************************************
  FLOW PROCESS FROM NODE    192.00 TO NODE    195.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1900.00  DOWNSTREAM(FEET) =  1880.00
  FLOW LENGTH(FEET) =   939.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.18
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      62.91
  PIPE TRAVEL TIME(MIN.) =   1.10    Tc(MIN.) =   13.19
  LONGEST FLOWPATH FROM NODE    190.00 TO NODE    195.00 =    1540.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    195.00 TO NODE    200.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1880.00  DOWNSTREAM(FEET) =  1879.00
  FLOW LENGTH(FEET) =   213.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.94
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      62.91
  PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =   13.64
  LONGEST FLOWPATH FROM NODE    190.00 TO NODE    200.00 =    1753.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    196.00 TO NODE    200.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.64
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.600
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        5.20      0.80     0.500    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    5.20      SUBAREA RUNOFF(CFS) =   14.99
  EFFECTIVE AREA(ACRES) =     25.80   AREA-AVERAGED Fm(INCH/HR) =  0.46
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.58
  TOTAL AREA(ACRES) =       25.8       PEAK FLOW RATE(CFS) =      72.88

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    215.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1879.00  DOWNSTREAM(FEET) =  1878.00
  FLOW LENGTH(FEET) =   301.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  35.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.27
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      72.88
  PIPE TRAVEL TIME(MIN.) =   0.69    Tc(MIN.) =   14.33
  LONGEST FLOWPATH FROM NODE    190.00 TO NODE    215.00 =    2054.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    215.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.33
  RAINFALL INTENSITY(INCH/HR) =   3.50
  AREA-AVERAGED Fm(INCH/HR) =  0.46
  AREA-AVERAGED Fp(INCH/HR) =  0.80
  AREA-AVERAGED Ap =  0.58
  EFFECTIVE STREAM AREA(ACRES) =      25.80
  TOTAL STREAM AREA(ACRES) =      25.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      72.88

  ** CONFLUENCE DATA **
   STREAM        Q       Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       389.03   11.15    4.062  0.76( 0.30) 0.40     113.7     130.00
      1       396.15   12.32    3.827  0.76( 0.30) 0.40     122.9     156.00
      1       403.46   15.07    3.390  0.77( 0.30) 0.39     142.0     150.00
      1       399.37   16.01    3.269  0.77( 0.30) 0.39     146.1     100.00
      2        72.88   14.33    3.495  0.80( 0.46) 0.58      25.8     190.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM        Q       Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
   NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       456.37   11.15    4.062  0.77( 0.33) 0.42     133.8     130.00
      2       465.67   12.32    3.827  0.77( 0.33) 0.42     145.1     156.00
      3       474.36   14.33    3.495  0.77( 0.32) 0.42     162.6     190.00
      4       473.81   15.07    3.390  0.77( 0.32) 0.42     167.8     150.00
```

```
      5      466.83   16.01    3.269  0.77( 0.32) 0.42     171.9     100.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     474.36    Tc(MIN.) =    14.33
  EFFECTIVE AREA(ACRES) =     162.64   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.77  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =      171.9
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    215.00 =    4797.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    215.00 TO NODE    250.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1978.00  DOWNSTREAM(FEET) =   1940.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1199.00   CHANNEL SLOPE =  0.0317
  CHANNEL BASE(FEET) =   12.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00

         ==>>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.

  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.292
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                A        1.70      0.80     0.850    52
  PUBLIC PARK                B        1.60      0.45     0.850    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.63
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     478.45
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  13.29
  AVERAGE FLOW DEPTH(FEET) =   2.00   TRAVEL TIME(MIN.) =   1.50
  Tc(MIN.) =   15.83
  SUBAREA AREA(ACRES) =     3.30       SUBAREA RUNOFF(CFS) =    8.19
  EFFECTIVE AREA(ACRES) =    165.94     AREA-AVERAGED Fm(INCH/HR) =   0.33
  AREA-AVERAGED Fp(INCH/HR) =   0.77  AREA-AVERAGED Ap =   0.43
  TOTAL AREA(ACRES) =      175.2         PEAK FLOW RATE(CFS) =     474.36
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

         ==>>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) =  2.00   FLOW VELOCITY(FEET/SEC.) =  13.18

  ==>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH

  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    250.00 =    5996.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    245.00 TO NODE    250.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.83
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.292
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS               A        0.20      0.80     0.350    52
  CONDOMINIUMS               B       11.20      0.45     0.350    76
  PUBLIC PARK                B        0.60      0.45     0.850    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.46
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.375
  SUBAREA AREA(ACRES) =   12.00      SUBAREA RUNOFF(CFS) =   33.70
  EFFECTIVE AREA(ACRES) =    177.94   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.42
  TOTAL AREA(ACRES) =      187.2       PEAK FLOW RATE(CFS) =     476.36

****************************************************************************
  FLOW PROCESS FROM NODE    250.00 TO NODE    250.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   15.83
  RAINFALL INTENSITY(INCH/HR) =   3.29
  AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.75
  AREA-AVERAGED Ap =  0.42
  EFFECTIVE STREAM AREA(ACRES) =     177.94
  TOTAL STREAM AREA(ACRES) =     187.17
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     476.36

****************************************************************************
  FLOW PROCESS FROM NODE    220.00 TO NODE    221.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   742.00
  ELEVATION DATA: UPSTREAM(FEET) =   1870.00  DOWNSTREAM(FEET) =   1861.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.005
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.543
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  SCHOOL                     A       22.10      0.80     0.600    52   14.01
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =     60.97
  TOTAL AREA(ACRES) =     22.10   PEAK FLOW RATE(CFS) =     60.97

****************************************************************************
  FLOW PROCESS FROM NODE    221.00 TO NODE    225.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1961.00  DOWNSTREAM(FEET) =  1955.00
  FLOW LENGTH(FEET) =   769.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.63
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      60.97
  PIPE TRAVEL TIME(MIN.) =   1.33    Tc(MIN.) =   15.34
  LONGEST FLOWPATH FROM NODE    220.00 TO NODE    225.00 =    1511.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    225.00 TO NODE    240.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1855.00  DOWNSTREAM(FEET) =   1852.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   268.00   CHANNEL SLOPE =  0.0112
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.242
  SUBAREA LOSS RATE DATA(AMC III):
```

```
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
CONDOMINIUMS               A        7.80      0.80     0.350    52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      71.37
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.95
AVERAGE FLOW DEPTH(FEET) =   1.23   TRAVEL TIME(MIN.) =   0.90
Tc(MIN.) =   16.24
SUBAREA AREA(ACRES) =     7.80       SUBAREA RUNOFF(CFS) =   20.80
EFFECTIVE AREA(ACRES) =     29.90     AREA-AVERAGED Fm(INCH/HR) =   0.43
AREA-AVERAGED Fp(INCH/HR) =   0.80  AREA-AVERAGED Ap =   0.53
TOTAL AREA(ACRES) =       29.9         PEAK FLOW RATE(CFS) =      75.79

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  1.28   FLOW VELOCITY(FEET/SEC.) =   5.02
LONGEST FLOWPATH FROM NODE    220.00 TO NODE    240.00 =    1779.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    240.00 TO NODE    250.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1852.00  DOWNSTREAM(FEET) =   1840.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   599.00   CHANNEL SLOPE =  0.0200
CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   3.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.066
SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
PUBLIC PARK                A        5.20      0.80     0.850    52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      81.38
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.29
AVERAGE FLOW DEPTH(FEET) =   1.13   TRAVEL TIME(MIN.) =   1.59
Tc(MIN.) =   17.82
SUBAREA AREA(ACRES) =     5.20       SUBAREA RUNOFF(CFS) =   11.18
EFFECTIVE AREA(ACRES) =     35.10     AREA-AVERAGED Fm(INCH/HR) =   0.46
AREA-AVERAGED Fp(INCH/HR) =   0.80  AREA-AVERAGED Ap =   0.58
TOTAL AREA(ACRES) =       35.1         PEAK FLOW RATE(CFS) =      82.23

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  1.14   FLOW VELOCITY(FEET/SEC.) =   6.32
LONGEST FLOWPATH FROM NODE    220.00 TO NODE    250.00 =    2378.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    250.00 TO NODE    250.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =   17.82
RAINFALL INTENSITY(INCH/HR) =   3.07
AREA-AVERAGED Fm(INCH/HR) =  0.46
AREA-AVERAGED Fp(INCH/HR) =  0.80
AREA-AVERAGED Ap =  0.58
EFFECTIVE STREAM AREA(ACRES) =      35.10
TOTAL STREAM AREA(ACRES) =      35.10
PEAK FLOW RATE(CFS) AT CONFLUENCE =      82.23

** CONFLUENCE DATA **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1      461.31   12.71    3.755  0.74( 0.32) 0.43     149.1     130.00
    1      469.05   13.85    3.567  0.74( 0.32) 0.43     160.4     156.00
    1      476.36   15.83    3.292  0.75( 0.32) 0.42     177.9     190.00
    1      475.60   16.58    3.202  0.75( 0.32) 0.42     183.1     150.00
    1      468.36   17.54    3.095  0.75( 0.32) 0.42     187.2     100.00
    2       82.23   17.82    3.066  0.80( 0.46) 0.58      35.1     220.00

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

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1      535.48   12.71    3.755  0.75( 0.34) 0.45     174.1     130.00
    2      545.24   13.85    3.567  0.75( 0.34) 0.45     187.7     156.00
    3      555.73   15.83    3.292  0.76( 0.34) 0.45     209.1     190.00
    4      556.08   16.58    3.202  0.76( 0.34) 0.45     215.8     150.00
    5      550.20   17.54    3.095  0.76( 0.34) 0.45     221.7     100.00
    6      545.59   17.82    3.066  0.76( 0.34) 0.45     222.3     220.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =     556.08    Tc(MIN.) =    16.58
EFFECTIVE AREA(ACRES) =     215.77   AREA-AVERAGED Fm(INCH/HR) =  0.34
AREA-AVERAGED Fp(INCH/HR) =  0.76  AREA-AVERAGED Ap =  0.45
TOTAL AREA(ACRES) =      222.3
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    250.00 =    5996.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    250.00 TO NODE    253.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1840.00  DOWNSTREAM(FEET) =   1820.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   700.00   CHANNEL SLOPE =  0.0286
CHANNEL BASE(FEET) =   12.00   "Z" FACTOR =   3.000
MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.094
SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
PUBLIC PARK                A        1.10      0.80     0.850    52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     557.28
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  11.95
AVERAGE FLOW DEPTH(FEET) =   2.42   TRAVEL TIME(MIN.) =   0.98
Tc(MIN.) =   17.56
SUBAREA AREA(ACRES) =     1.10       SUBAREA RUNOFF(CFS) =    2.39
EFFECTIVE AREA(ACRES) =    216.87     AREA-AVERAGED Fm(INCH/HR) =   0.34
AREA-AVERAGED Fp(INCH/HR) =   0.76  AREA-AVERAGED Ap =   0.45
TOTAL AREA(ACRES) =      223.4         PEAK FLOW RATE(CFS) =     556.08
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  2.42   FLOW VELOCITY(FEET/SEC.) =  11.96
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    253.00 =    6696.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    251.00 TO NODE    253.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   17.56
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.094
SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
RESIDENTIAL
"11+ DWELLINGS/ACRE"       A        0.10      0.80     0.200    52
RESIDENTIAL
"11+ DWELLINGS/ACRE"       B        7.30      0.45     0.200    76
PUBLIC PARK                B        0.30      0.45     0.850    76
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.46
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.225
  SUBAREA AREA(ACRES) =    7.70      SUBAREA RUNOFF(CFS) =   20.73
  EFFECTIVE AREA(ACRES) =    224.57   AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =      231.1       PEAK FLOW RATE(CFS) =     558.21

****************************************************************************
  FLOW PROCESS FROM NODE    253.00 TO NODE    280.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1820.00  DOWNSTREAM(FEET) =   1800.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   530.00   CHANNEL SLOPE =  0.0377
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.024
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                A        0.20      0.80     0.850    52
  PUBLIC PARK                B        0.60      0.45     0.850    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.54
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     559.14
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  12.90
  AVERAGE FLOW DEPTH(FEET) =   2.05   TRAVEL TIME(MIN.) =   0.68
  Tc(MIN.) =   18.24
  SUBAREA AREA(ACRES) =     0.80       SUBAREA RUNOFF(CFS) =    1.85
  EFFECTIVE AREA(ACRES) =    225.37     AREA-AVERAGED Fm(INCH/HR) =   0.33
  AREA-AVERAGED Fp(INCH/HR) =   0.75  AREA-AVERAGED Ap =   0.44
  TOTAL AREA(ACRES) =      231.9         PEAK FLOW RATE(CFS) =     558.21
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.05   FLOW VELOCITY(FEET/SEC.) =  12.88
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    280.00 =    7226.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    280.00 TO NODE    280.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    255.00 TO NODE    260.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   580.00
  ELEVATION DATA: UPSTREAM(FEET) =   1852.00  DOWNSTREAM(FEET) =   1840.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.769
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.148
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A       13.80      0.80     0.500    52   10.77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =     46.58
  TOTAL AREA(ACRES) =     13.80   PEAK FLOW RATE(CFS) =     46.58

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    265.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1840.00  DOWNSTREAM(FEET) =  1810.00
  FLOW LENGTH(FEET) =  1485.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.92
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      46.58
  PIPE TRAVEL TIME(MIN.) =   1.92    Tc(MIN.) =   12.69
  LONGEST FLOWPATH FROM NODE    255.00 TO NODE    265.00 =    2065.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    265.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.760
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A       16.40      0.80     0.500    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   16.40      SUBAREA RUNOFF(CFS) =   49.62
  EFFECTIVE AREA(ACRES) =     30.20   AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       30.2       PEAK FLOW RATE(CFS) =      91.38

****************************************************************************
  FLOW PROCESS FROM NODE    265.00 TO NODE    275.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1810.00  DOWNSTREAM(FEET) =  1805.00
  FLOW LENGTH(FEET) =   302.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.09
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      91.38
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =   13.04
  LONGEST FLOWPATH FROM NODE    255.00 TO NODE    275.00 =    2367.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    275.00 TO NODE    275.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.04
  RAINFALL INTENSITY(INCH/HR) =   3.70
  AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.80
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =      30.20
  TOTAL STREAM AREA(ACRES) =       30.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      91.38

****************************************************************************
  FLOW PROCESS FROM NODE    270.00 TO NODE    271.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   580.00
  ELEVATION DATA: UPSTREAM(FEET) =   1847.00  DOWNSTREAM(FEET) =   1828.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.091
```

```
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.592
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  CONDOMINIUMS                A        7.10      0.80     0.350    52    9.09
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA RUNOFF(CFS) =     27.56
  TOTAL AREA(ACRES) =      7.10   PEAK FLOW RATE(CFS) =     27.56

****************************************************************************
  FLOW PROCESS FROM NODE    271.00 TO NODE    275.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1828.00  DOWNSTREAM(FEET) =  1805.00
  FLOW LENGTH(FEET) =   766.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.24
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      27.56
  PIPE TRAVEL TIME(MIN.) =   0.96    Tc(MIN.) =   10.06
  LONGEST FLOWPATH FROM NODE    270.00 TO NODE    275.00 =    1346.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    271.00 TO NODE    275.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.06
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.322
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        A        7.40      0.80     0.200    52
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        0.10      0.45     0.200    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.79
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    7.50      SUBAREA RUNOFF(CFS) =   28.11
  EFFECTIVE AREA(ACRES) =     14.60   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.79  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =       14.6       PEAK FLOW RATE(CFS) =      53.95

****************************************************************************
  FLOW PROCESS FROM NODE    275.00 TO NODE    275.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.06
  RAINFALL INTENSITY(INCH/HR) =   4.32
  AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.79
  AREA-AVERAGED Ap =  0.27
  EFFECTIVE STREAM AREA(ACRES) =      14.60
  TOTAL STREAM AREA(ACRES) =      14.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      53.95

  ** CONFLUENCE DATA **
   STREAM        Q       Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       91.38   13.04    3.698  0.80( 0.40) 0.50      30.2     255.00
      2       53.95   10.06    4.322  0.79( 0.22) 0.27      14.6     270.00

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

```
  ** PEAK FLOW RATE TABLE **
   STREAM        Q       Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      137.73   10.06    4.322  0.80( 0.33) 0.41      37.9     270.00
      2      137.12   13.04    3.698  0.80( 0.34) 0.43      44.8     255.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     137.73    Tc(MIN.) =    10.06
  EFFECTIVE AREA(ACRES) =      37.88   AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =        44.8
  LONGEST FLOWPATH FROM NODE    255.00 TO NODE    275.00 =    2367.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    275.00 TO NODE    280.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1805.00  DOWNSTREAM(FEET) =  1800.00
  FLOW LENGTH(FEET) =   275.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  32.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.20
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     137.73
  PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =   10.34
  LONGEST FLOWPATH FROM NODE    255.00 TO NODE    280.00 =    2642.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    280.00 TO NODE    280.00 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      137.73   10.34    4.251  0.80( 0.33) 0.41      37.9     270.00
      2      137.12   13.33    3.650  0.80( 0.34) 0.43      44.8     255.00
  LONGEST FLOWPATH FROM NODE    255.00 TO NODE    280.00 =    2642.00 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      536.70   14.39    3.485  0.74( 0.33) 0.45     183.7     130.00
      2      546.77   15.52    3.332  0.75( 0.33) 0.45     197.3     156.00
      3      557.63   17.49    3.101  0.75( 0.33) 0.44     218.7     190.00
      4      558.21   18.24    3.024  0.75( 0.33) 0.44     225.4     150.00
      5      552.76   19.21    2.931  0.75( 0.33) 0.44     231.3     100.00
      6      548.29   19.50    2.905  0.75( 0.33) 0.44     231.9     220.00
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    280.00 =    7226.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM        Q       Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      616.78   10.34    4.251  0.75( 0.33) 0.44     169.9     270.00
      2      660.00   13.33    3.650  0.75( 0.33) 0.44     214.9     255.00
      3      666.99   14.39    3.485  0.75( 0.33) 0.44     228.5     130.00
      4      670.69   15.52    3.332  0.75( 0.33) 0.44     242.1     156.00
      5      671.98   17.49    3.101  0.76( 0.33) 0.44     263.5     190.00
      6      669.37   18.24    3.024  0.76( 0.33) 0.44     270.2     150.00
      7      660.10   19.21    2.931  0.76( 0.33) 0.44     276.1     100.00
      8      654.55   19.50    2.905  0.76( 0.33) 0.44     276.7     220.00
    TOTAL AREA(ACRES) =       276.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      671.98  Tc(MIN.) =   17.491
  EFFECTIVE AREA(ACRES) =    263.51  AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.76  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =      276.7
```

```
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    280.00 =    7226.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    280.00 TO NODE    280.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    280.00 TO NODE    295.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1800.00  DOWNSTREAM(FEET) =   1783.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   510.00   CHANNEL SLOPE =  0.0333
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.033
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK               B        1.80      0.45     0.850    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     674.13
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  13.05
  AVERAGE FLOW DEPTH(FEET) =   2.35   TRAVEL TIME(MIN.) =   0.65
  Tc(MIN.) =   18.14
  SUBAREA AREA(ACRES) =     1.80       SUBAREA RUNOFF(CFS) =    4.29
  EFFECTIVE AREA(ACRES) =    265.31     AREA-AVERAGED Fm(INCH/HR) =   0.33
  AREA-AVERAGED Fp(INCH/HR) =   0.75  AREA-AVERAGED Ap =   0.44
  TOTAL AREA(ACRES) =      278.5         PEAK FLOW RATE(CFS) =     671.98
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.34   FLOW VELOCITY(FEET/SEC.) =  13.05
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    295.00 =    7736.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    285.00 TO NODE    295.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.14
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.033
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.40      0.45     0.850    76
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B       12.70      0.45     0.200    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.220
  SUBAREA AREA(ACRES) =   13.10      SUBAREA RUNOFF(CFS) =   34.59
  EFFECTIVE AREA(ACRES) =    278.41   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.43
  TOTAL AREA(ACRES) =      291.6       PEAK FLOW RATE(CFS) =     679.05

****************************************************************************
  FLOW PROCESS FROM NODE    295.00 TO NODE    350.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1783.00  DOWNSTREAM(FEET) =   1764.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1069.00   CHANNEL SLOPE =  0.0178
  CHANNEL BASE(FEET) =   15.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.874
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK               B        1.90      0.45     0.850    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     681.18
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.46
  AVERAGE FLOW DEPTH(FEET) =   2.79   TRAVEL TIME(MIN.) =   1.70
  Tc(MIN.) =   19.85
  SUBAREA AREA(ACRES) =     1.90       SUBAREA RUNOFF(CFS) =    4.26
  EFFECTIVE AREA(ACRES) =    280.31     AREA-AVERAGED Fm(INCH/HR) =   0.32
  AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.44
  TOTAL AREA(ACRES) =      293.5         PEAK FLOW RATE(CFS) =     679.05
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.78   FLOW VELOCITY(FEET/SEC.) =  10.46
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    350.00 =    8805.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    350.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.85
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.874
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        0.50      0.45     0.850    76
  CONDOMINIUMS               B        8.40      0.45     0.350    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        5.70      0.45     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.426
  SUBAREA AREA(ACRES) =   14.60      SUBAREA RUNOFF(CFS) =   35.24
  EFFECTIVE AREA(ACRES) =    294.91   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.73  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =      308.1       PEAK FLOW RATE(CFS) =     679.05
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    350.00 TO NODE    350.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    305.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   580.00
  ELEVATION DATA: UPSTREAM(FEET) =   1805.00  DOWNSTREAM(FEET) =   1790.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.299
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.261
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A       13.80      0.80     0.500    52   10.30
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =     47.97
  TOTAL AREA(ACRES) =     13.80   PEAK FLOW RATE(CFS) =     47.97

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    310.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1790.00  DOWNSTREAM(FEET) =  1760.00
  FLOW LENGTH(FEET) =  1416.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.24
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      47.97
  PIPE TRAVEL TIME(MIN.) =   1.78    Tc(MIN.) =   12.08
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    310.00 =    1996.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    310.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.08
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.872
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        A       13.50      0.80     0.500    52
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.30      0.45     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.79
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =   13.80      SUBAREA RUNOFF(CFS) =   43.19
  EFFECTIVE AREA(ACRES) =     27.60   AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.79  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       27.6       PEAK FLOW RATE(CFS) =      86.33

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    330.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.08
  RAINFALL INTENSITY(INCH/HR) =   3.87
  AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.79
  AREA-AVERAGED Ap =  0.50
  EFFECTIVE STREAM AREA(ACRES) =      27.60
  TOTAL STREAM AREA(ACRES) =      27.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      86.33

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    320.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   453.00
  ELEVATION DATA: UPSTREAM(FEET) =   1805.00  DOWNSTREAM(FEET) =   1788.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.213
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.276
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        A        3.70      0.80     0.200    52    7.21
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        1.70      0.45     0.200    76    7.21
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.69
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =     24.97
  TOTAL AREA(ACRES) =      5.40   PEAK FLOW RATE(CFS) =     24.97

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    325.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1788.00  DOWNSTREAM(FEET) =  1770.00
  FLOW LENGTH(FEET) =   649.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.18
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      24.97
  PIPE TRAVEL TIME(MIN.) =   0.89    Tc(MIN.) =    8.10
  LONGEST FLOWPATH FROM NODE    315.00 TO NODE    325.00 =    1102.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    325.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.10
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.921
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS                A        0.80      0.80     0.350    52
  CONDOMINIUMS                B        4.50      0.45     0.350    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =    5.30      SUBAREA RUNOFF(CFS) =   22.63
  EFFECTIVE AREA(ACRES) =     10.70   AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.57  AREA-AVERAGED Ap =  0.27
  TOTAL AREA(ACRES) =       10.7       PEAK FLOW RATE(CFS) =      45.88

****************************************************************************
  FLOW PROCESS FROM NODE    325.00 TO NODE    330.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.10
  RAINFALL INTENSITY(INCH/HR) =   4.92
  AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.57
  AREA-AVERAGED Ap =  0.27
  EFFECTIVE STREAM AREA(ACRES) =      10.70
  TOTAL STREAM AREA(ACRES) =      10.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      45.88

  ** CONFLUENCE DATA **
   STREAM        Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       86.33   12.08    3.872  0.79( 0.40) 0.50      27.6     300.00
      2       45.88    8.10    4.921  0.57( 0.16) 0.27      10.7     315.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM        Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      121.24    8.10    4.921  0.74( 0.31) 0.42      29.2     315.00
      2      122.10   12.08    3.872  0.75( 0.33) 0.44      38.3     300.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     122.10    Tc(MIN.) =    12.08
```

```
  EFFECTIVE AREA(ACRES) =      38.30   AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =       38.3
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    330.00 =    1996.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    330.00 TO NODE    350.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1763.00  DOWNSTREAM(FEET) =   1761.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   278.00   CHANNEL SLOPE =  0.0072
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.704
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        4.70      0.45     0.850    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     129.12
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.00
  AVERAGE FLOW DEPTH(FEET) =   1.89   TRAVEL TIME(MIN.) =   0.93
  Tc(MIN.) =   13.01
  SUBAREA AREA(ACRES) =     4.70       SUBAREA RUNOFF(CFS) =   14.04
  EFFECTIVE AREA(ACRES) =     43.00     AREA-AVERAGED Fm(INCH/HR) =   0.34
  AREA-AVERAGED Fp(INCH/HR) =   0.70  AREA-AVERAGED Ap =   0.48
  TOTAL AREA(ACRES) =       43.0         PEAK FLOW RATE(CFS) =     130.36

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.90   FLOW VELOCITY(FEET/SEC.) =   5.00
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    350.00 =    2274.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      131.00    9.02    4.612  0.67( 0.32) 0.48      33.9     315.00
      2      130.36   13.01    3.704  0.70( 0.34) 0.48      43.0     300.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =     131.00  Tc(MIN.) =    9.02
  AREA-AVERAGED Fm(INCH/HR) =  0.32  AREA-AVERAGED Fp(INCH/HR) =  0.67
  AREA-AVERAGED Ap =  0.48  EFFECTIVE AREA(ACRES) =      33.91

****************************************************************************
  FLOW PROCESS FROM NODE    350.00 TO NODE    350.00 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      131.00    9.02    4.612  0.67( 0.32) 0.48      33.9     315.00
      2      130.36   13.01    3.704  0.70( 0.34) 0.48      43.0     300.00
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    350.00 =    2274.00 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      628.51   12.74    3.750  0.71( 0.31) 0.43     201.3     270.00
      2      667.42   15.69    3.309  0.72( 0.31) 0.44     246.3     255.00
      3      673.35   16.75    3.182  0.72( 0.31) 0.44     259.9     130.00
      4      677.30   17.87    3.061  0.72( 0.32) 0.44     273.5     156.00
      5      679.05   19.85    2.874  0.73( 0.32) 0.44     294.9     190.00
      6      676.88   20.60    2.811  0.73( 0.32) 0.43     301.6     150.00
      7      668.83   21.57    2.734  0.73( 0.32) 0.43     307.5     100.00
      8      663.84   21.87    2.712  0.73( 0.32) 0.43     308.1     220.00
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    350.00 =    8805.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      687.60    9.02    4.612  0.70( 0.31) 0.44     176.4     315.00
      2      758.90   12.74    3.750  0.71( 0.31) 0.44     243.7     270.00
      3      762.35   13.01    3.704  0.71( 0.31) 0.44     248.3     300.00
      4      782.51   15.69    3.309  0.71( 0.32) 0.44     289.3     255.00
      5      783.53   16.75    3.182  0.72( 0.32) 0.44     302.9     130.00
      6      782.79   17.87    3.061  0.72( 0.32) 0.44     316.5     156.00
      7      777.31   19.85    2.874  0.72( 0.32) 0.44     337.9     190.00
      8      772.69   20.60    2.811  0.73( 0.32) 0.44     344.6     150.00
      9      761.65   21.57    2.734  0.73( 0.32) 0.44     350.5     100.00
     10      755.82   21.87    2.712  0.73( 0.32) 0.44     351.1     220.00
    TOTAL AREA(ACRES) =       351.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      783.53  Tc(MIN.) =   16.752
  EFFECTIVE AREA(ACRES) =    302.94  AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.72  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =      351.1
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    350.00 =    8805.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    350.00 TO NODE    350.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    350.00 TO NODE    360.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1761.00  DOWNSTREAM(FEET) =   1758.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   276.00   CHANNEL SLOPE =  0.0109
  CHANNEL BASE(FEET) =   18.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00

         ===>>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.

  CHANNEL FLOW THRU SUBAREA(CFS) =     783.53
  FLOW VELOCITY(FEET/SEC.) =   9.67   FLOW DEPTH(FEET) =   3.00
  TRAVEL TIME(MIN.) =   0.48   Tc(MIN.) =   17.23
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    360.00 =    9081.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      687.60    9.56    4.456  0.70( 0.31) 0.44     176.4     315.00
      2      758.90   13.23    3.665  0.71( 0.31) 0.44     243.7     270.00
      3      762.35   13.50    3.623  0.71( 0.31) 0.44     248.3     300.00
      4      782.51   16.17    3.250  0.71( 0.32) 0.44     289.3     255.00
      5      783.53   17.23    3.129  0.72( 0.32) 0.44     302.9     130.00
      6      782.79   18.35    3.013  0.72( 0.32) 0.44     316.5     156.00
      7      777.31   20.33    2.834  0.72( 0.32) 0.44     337.9     190.00
      8      772.69   21.08    2.772  0.73( 0.32) 0.44     344.6     150.00
      9      761.65   22.06    2.697  0.73( 0.32) 0.44     350.5     100.00
     10      755.82   22.36    2.676  0.73( 0.32) 0.44     351.1     220.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =     783.53  Tc(MIN.) =   17.23
  AREA-AVERAGED Fm(INCH/HR) =  0.32  AREA-AVERAGED Fp(INCH/HR) =  0.72
  AREA-AVERAGED Ap =  0.44  EFFECTIVE AREA(ACRES) =     302.94

****************************************************************************
  FLOW PROCESS FROM NODE    355.00 TO NODE    360.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   17.23
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.129
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        5.00      0.45     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    5.00      SUBAREA RUNOFF(CFS) =   13.06
  EFFECTIVE AREA(ACRES) =    307.94   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.71  AREA-AVERAGED Ap =  0.44
  TOTAL AREA(ACRES) =      356.1       PEAK FLOW RATE(CFS) =     783.53
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    360.00 TO NODE    395.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1958.00  DOWNSTREAM(FEET) =   1950.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   412.00   CHANNEL SLOPE =  0.0194
  CHANNEL BASE(FEET) =   18.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.063
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                 B        1.30      0.45     0.850    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     785.09
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  11.04
  AVERAGE FLOW DEPTH(FEET) =   2.72   TRAVEL TIME(MIN.) =   0.62
  Tc(MIN.) =   17.85
  SUBAREA AREA(ACRES) =     1.30       SUBAREA RUNOFF(CFS) =    3.13
  EFFECTIVE AREA(ACRES) =    309.24     AREA-AVERAGED Fm(INCH/HR) =   0.32
  AREA-AVERAGED Fp(INCH/HR) =   0.71  AREA-AVERAGED Ap =   0.45
  TOTAL AREA(ACRES) =      357.4         PEAK FLOW RATE(CFS) =     783.53
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.72   FLOW VELOCITY(FEET/SEC.) =  11.02
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    395.00 =    9493.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      687.60   10.20    4.285  0.69( 0.31) 0.44     182.7     315.00
      2      758.90   13.86    3.565  0.70( 0.31) 0.44     250.0     270.00
      3      762.35   14.12    3.525  0.70( 0.31) 0.44     254.6     300.00
      4      782.51   16.79    3.178  0.71( 0.31) 0.45     295.6     255.00
      5      783.53   17.85    3.063  0.71( 0.32) 0.45     309.2     130.00
      6      782.79   18.97    2.953  0.71( 0.32) 0.44     322.8     156.00
      7      777.31   20.95    2.783  0.72( 0.32) 0.44     344.2     190.00
      8      772.69   21.70    2.724  0.72( 0.32) 0.44     350.9     150.00
      9      761.65   22.69    2.652  0.72( 0.32) 0.44     356.8     100.00
     10      755.82   22.99    2.632  0.72( 0.32) 0.44     357.4     220.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =     783.53  Tc(MIN.) =   17.85
  AREA-AVERAGED Fm(INCH/HR) =  0.32  AREA-AVERAGED Fp(INCH/HR) =  0.71
  AREA-AVERAGED Ap =  0.45  EFFECTIVE AREA(ACRES) =     309.24

****************************************************************************
  FLOW PROCESS FROM NODE    390.00 TO NODE    395.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
```

```
  MAINLINE Tc(MIN.) =   17.85
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.063
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                 B        3.50      0.45     0.850    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    3.50      SUBAREA RUNOFF(CFS) =    8.44
  EFFECTIVE AREA(ACRES) =    312.74   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.70  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =      360.9       PEAK FLOW RATE(CFS) =     783.53
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    380.00 TO NODE    395.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   17.85
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.063
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS                B        6.50      0.45     0.350    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =    6.50      SUBAREA RUNOFF(CFS) =   16.99
  EFFECTIVE AREA(ACRES) =    319.24   AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.70  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =      367.4       PEAK FLOW RATE(CFS) =     790.11

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      690.59   10.20    4.285  0.68( 0.30) 0.45     192.7     315.00
      2      762.17   13.86    3.565  0.69( 0.31) 0.45     260.0     270.00
      3      766.17   14.12    3.525  0.69( 0.31) 0.45     264.6     300.00
      4      788.05   16.79    3.178  0.70( 0.31) 0.45     305.6     255.00
      5      790.11   17.85    3.063  0.70( 0.31) 0.45     319.2     130.00
      6      790.29   18.97    2.953  0.70( 0.31) 0.45     332.8     156.00
      7      786.29   20.95    2.783  0.71( 0.32) 0.45     354.2     190.00
      8      782.10   21.70    2.724  0.71( 0.32) 0.44     360.9     150.00
      9      771.22   22.69    2.652  0.71( 0.32) 0.44     366.8     100.00
     10      765.48   22.99    2.632  0.71( 0.32) 0.44     367.4     220.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =     790.29  Tc(MIN.) =   18.97
  AREA-AVERAGED Fm(INCH/HR) =  0.31  AREA-AVERAGED Fp(INCH/HR) =  0.70
  AREA-AVERAGED Ap =  0.45  EFFECTIVE AREA(ACRES) =     332.79

****************************************************************************
  FLOW PROCESS FROM NODE    395.00 TO NODE    405.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1750.00  DOWNSTREAM(FEET) =   1745.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   719.00   CHANNEL SLOPE =  0.0070
  CHANNEL BASE(FEET) =   18.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00

         ===>>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.

  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.844
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  PUBLIC PARK                B        0.70      0.45     0.850    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     791.07
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   9.77
  AVERAGE FLOW DEPTH(FEET) =   3.00   TRAVEL TIME(MIN.) =   1.23
  Tc(MIN.) =   20.20
  SUBAREA AREA(ACRES) =     0.70       SUBAREA RUNOFF(CFS) =    1.55
  EFFECTIVE AREA(ACRES) =    333.49     AREA-AVERAGED Fm(INCH/HR) =   0.31
  AREA-AVERAGED Fp(INCH/HR) =   0.70  AREA-AVERAGED Ap =   0.45
  TOTAL AREA(ACRES) =      368.1         PEAK FLOW RATE(CFS) =     790.29
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

         ==>>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) =  3.00   FLOW VELOCITY(FEET/SEC.) =   9.76

  ==>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH

  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    405.00 =   10212.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM        Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      690.59   11.61    3.966  0.67( 0.30) 0.45     193.4     315.00
      2      762.17   15.13    3.382  0.69( 0.31) 0.45     260.7     270.00
      3      766.17   15.39    3.348  0.69( 0.31) 0.45     265.3     300.00
      4      788.05   18.02    3.046  0.70( 0.31) 0.45     306.3     255.00
      5      790.11   19.08    2.943  0.70( 0.31) 0.45     319.9     130.00
      6      790.29   20.20    2.844  0.70( 0.31) 0.45     333.5     156.00
      7      786.29   22.18    2.689  0.71( 0.32) 0.45     354.9     190.00
      8      782.10   22.94    2.635  0.71( 0.32) 0.45     361.6     150.00
      9      771.22   23.95    2.568  0.71( 0.32) 0.45     367.5     100.00
     10      765.48   24.26    2.548  0.71( 0.32) 0.45     368.1     220.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =     790.29  Tc(MIN.) =   20.20
  AREA-AVERAGED Fm(INCH/HR) =  0.31  AREA-AVERAGED Fp(INCH/HR) =  0.70
  AREA-AVERAGED Ap =  0.45  EFFECTIVE AREA(ACRES) =     333.49

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    405.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.20
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.844
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                B        1.50      0.45     0.850    76
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B       12.10      0.45     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.539
  SUBAREA AREA(ACRES) =   13.60      SUBAREA RUNOFF(CFS) =   31.83
  EFFECTIVE AREA(ACRES) =    347.09   AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.69  AREA-AVERAGED Ap =  0.45
  TOTAL AREA(ACRES) =      381.7       PEAK FLOW RATE(CFS) =     791.03

****************************************************************************
  FLOW PROCESS FROM NODE    405.00 TO NODE    410.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   1745.00  DOWNSTREAM(FEET) =   1740.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   584.00   CHANNEL SLOPE =  0.0086
  CHANNEL BASE(FEET) =   18.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00

         ==>>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.

  CHANNEL FLOW THRU SUBAREA(CFS) =     791.03
  FLOW VELOCITY(FEET/SEC.) =   9.77   FLOW DEPTH(FEET) =   3.00
  TRAVEL TIME(MIN.) =   1.00   Tc(MIN.) =   21.19
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    410.00 =   10796.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM        Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      690.59   12.75    3.749  0.66( 0.30) 0.46     207.0     315.00
      2      762.17   16.17    3.250  0.67( 0.30) 0.45     274.3     270.00
      3      766.17   16.42    3.221  0.67( 0.30) 0.45     278.9     300.00
      4      788.05   19.02    2.948  0.68( 0.31) 0.45     319.9     255.00
      5      790.35   20.07    2.855  0.69( 0.31) 0.45     333.5     130.00
      6      791.03   21.19    2.763  0.69( 0.31) 0.45     347.1     156.00
      7      787.74   23.18    2.618  0.70( 0.31) 0.45     368.5     190.00
      8      783.78   23.95    2.568  0.70( 0.31) 0.45     375.2     150.00
      9      773.17   24.97    2.504  0.70( 0.31) 0.45     381.1     100.00
     10      767.50   25.28    2.486  0.70( 0.31) 0.45     381.7     220.00
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =     791.03  Tc(MIN.) =   21.19
  AREA-AVERAGED Fm(INCH/HR) =  0.31  AREA-AVERAGED Fp(INCH/HR) =  0.69
  AREA-AVERAGED Ap =  0.45  EFFECTIVE AREA(ACRES) =     347.09

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    365.00 TO NODE    370.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   942.00
  ELEVATION DATA: UPSTREAM(FEET) =   1770.00  DOWNSTREAM(FEET) =   1740.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.990
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.339
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        2.20      0.80     0.200    52    9.99
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       A        5.20      0.80     0.600    52   12.70
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        6.00      0.45     0.200    76    9.99
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B        7.10      0.45     0.600    76   12.70
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.59
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.440
  SUBAREA RUNOFF(CFS) =     75.29
  TOTAL AREA(ACRES) =     20.50   PEAK FLOW RATE(CFS) =     75.29

****************************************************************************
  FLOW PROCESS FROM NODE    370.00 TO NODE    375.00 IS CODE =  31
----------------------------------------------------------------------------
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```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1745.00  DOWNSTREAM(FEET) =  1740.00
  FLOW LENGTH(FEET) =   825.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  33.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.04
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      75.29
  PIPE TRAVEL TIME(MIN.) =   1.52    Tc(MIN.) =   11.51
  LONGEST FLOWPATH FROM NODE    365.00 TO NODE    375.00 =    1767.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    375.00 TO NODE    565.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1740.00  DOWNSTREAM(FEET) =  1722.00
  FLOW LENGTH(FEET) =   621.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.61
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      75.29
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =   12.13
  LONGEST FLOWPATH FROM NODE    365.00 TO NODE    565.00 =    2388.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    560.00 TO NODE    565.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   12.13
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.862
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        8.50      0.80     0.500    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    8.50      SUBAREA RUNOFF(CFS) =   26.50
  EFFECTIVE AREA(ACRES) =     29.00   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.65  AREA-AVERAGED Ap =  0.46
  TOTAL AREA(ACRES) =       29.0       PEAK FLOW RATE(CFS) =      92.97

****************************************************************************
  FLOW PROCESS FROM NODE    550.00 TO NODE    565.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   12.13
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.862
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  SCHOOL                     A       3.10      0.80     0.600    52
  SCHOOL                     B      10.80      0.45     0.600    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.53
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =   13.90      SUBAREA RUNOFF(CFS) =   44.34
  EFFECTIVE AREA(ACRES) =     42.90   AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.61  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =       42.9       PEAK FLOW RATE(CFS) =     137.31

****************************************************************************
  FLOW PROCESS FROM NODE    565.00 TO NODE    575.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1722.00  DOWNSTREAM(FEET) =  1715.00
  FLOW LENGTH(FEET) =   316.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.25
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     137.31
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =   12.44
  LONGEST FLOWPATH FROM NODE    365.00 TO NODE    575.00 =    2704.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    570.00 TO NODE    575.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   12.44
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.804
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        5.80      0.45     0.200    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    5.80      SUBAREA RUNOFF(CFS) =   19.39
  EFFECTIVE AREA(ACRES) =     48.70   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.47
  TOTAL AREA(ACRES) =       48.7       PEAK FLOW RATE(CFS) =     154.49

****************************************************************************
  FLOW PROCESS FROM NODE    575.00 TO NODE    590.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1715.00  DOWNSTREAM(FEET) =  1695.00
  FLOW LENGTH(FEET) =   713.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.41
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     154.49
  PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =   13.05
  LONGEST FLOWPATH FROM NODE    365.00 TO NODE    590.00 =    3417.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    580.00 TO NODE    590.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   13.05
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.696
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                A        6.70      0.80     0.850    52
  PUBLIC PARK                B        7.90      0.45     0.850    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.61
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =   14.60      SUBAREA RUNOFF(CFS) =   41.76
  EFFECTIVE AREA(ACRES) =     63.30   AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.56
  TOTAL AREA(ACRES) =       63.3       PEAK FLOW RATE(CFS) =     191.51

****************************************************************************
  FLOW PROCESS FROM NODE    590.00 TO NODE    590.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   13.05
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.696
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK               A        0.20      0.80     0.850    52
  PUBLIC PARK               B        4.70      0.45     0.850    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.47
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    4.90      SUBAREA RUNOFF(CFS) =   14.55
  EFFECTIVE AREA(ACRES) =     68.20   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.59  AREA-AVERAGED Ap =  0.58
  TOTAL AREA(ACRES) =       68.2       PEAK FLOW RATE(CFS) =     206.07

****************************************************************************
  FLOW PROCESS FROM NODE    590.00 TO NODE    600.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1695.00  DOWNSTREAM(FEET) =   1670.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1185.00   CHANNEL SLOPE =  0.0211
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   3.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     206.07
  FLOW VELOCITY(FEET/SEC.) =   8.37   FLOW DEPTH(FEET) =   1.83
  TRAVEL TIME(MIN.) =   2.36   Tc(MIN.) =   15.41
  LONGEST FLOWPATH FROM NODE    365.00 TO NODE    600.00 =    4602.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    595.00 TO NODE    600.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.41
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.346
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        4.90      0.80     0.200    52
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       B        3.30      0.45     0.200    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.66
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    8.20      SUBAREA RUNOFF(CFS) =   23.72
  EFFECTIVE AREA(ACRES) =     76.40   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.59  AREA-AVERAGED Ap =  0.54
  TOTAL AREA(ACRES) =       76.4       PEAK FLOW RATE(CFS) =     208.26

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    600.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   15.41
  RAINFALL INTENSITY(INCH/HR) =   3.35
  AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.59
  AREA-AVERAGED Ap =  0.54
  EFFECTIVE STREAM AREA(ACRES) =      76.40
  TOTAL STREAM AREA(ACRES) =      76.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     208.26

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    505.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   943.00
  ELEVATION DATA: UPSTREAM(FEET) =   1740.00  DOWNSTREAM(FEET) =   1730.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.834
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.291
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B       13.20      0.45     0.600    76   15.83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA RUNOFF(CFS) =     35.88
  TOTAL AREA(ACRES) =     13.20   PEAK FLOW RATE(CFS) =     35.88

****************************************************************************
  FLOW PROCESS FROM NODE    505.00 TO NODE    510.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1730.00  DOWNSTREAM(FEET) =  1708.00
  FLOW LENGTH(FEET) =  1062.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.21
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       35.88
  PIPE TRAVEL TIME(MIN.) =   1.45    Tc(MIN.) =   17.28
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    510.00 =    2005.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    505.00 TO NODE    510.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.28
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.123
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"       B       11.70      0.45     0.600    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =   11.70      SUBAREA RUNOFF(CFS) =   30.03
  EFFECTIVE AREA(ACRES) =     24.90   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =       24.9       PEAK FLOW RATE(CFS) =      63.91

****************************************************************************
  FLOW PROCESS FROM NODE    510.00 TO NODE    515.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1708.00  DOWNSTREAM(FEET) =  1700.00
  FLOW LENGTH(FEET) =   293.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.33
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       63.91
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   17.60
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    515.00 =    2298.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    510.00 TO NODE    515.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.60
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.089
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
```

```
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"        B        8.90      0.45     0.600    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    8.90      SUBAREA RUNOFF(CFS) =   22.57
  EFFECTIVE AREA(ACRES) =     33.80   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =       33.8       PEAK FLOW RATE(CFS) =      85.71

****************************************************************************
  FLOW PROCESS FROM NODE    515.00 TO NODE    520.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1700.00  DOWNSTREAM(FEET) =  1685.00
  FLOW LENGTH(FEET) =   784.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  28.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.48
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      85.71
  PIPE TRAVEL TIME(MIN.) =   0.90    Tc(MIN.) =   18.51
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    520.00 =    3082.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    515.00 TO NODE    520.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.51
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.998
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "3-4 DWELLINGS/ACRE"        B        4.80      0.45     0.600    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.600
  SUBAREA AREA(ACRES) =    4.80      SUBAREA RUNOFF(CFS) =   11.78
  EFFECTIVE AREA(ACRES) =     38.60   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.60
  TOTAL AREA(ACRES) =       38.6       PEAK FLOW RATE(CFS) =      94.71

****************************************************************************
  FLOW PROCESS FROM NODE    520.00 TO NODE    600.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1685.00  DOWNSTREAM(FEET) =  1670.00
  FLOW LENGTH(FEET) =   636.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  28.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.07
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      94.71
  PIPE TRAVEL TIME(MIN.) =   0.66    Tc(MIN.) =   19.17
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    600.00 =    3718.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    600.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.17
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.935
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"        B        9.90      0.45     0.200    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    9.90      SUBAREA RUNOFF(CFS) =   25.35
  EFFECTIVE AREA(ACRES) =     48.50   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =       48.5       PEAK FLOW RATE(CFS) =     117.90

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    635.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1670.00  DOWNSTREAM(FEET) =  1650.00
  FLOW LENGTH(FEET) =  1683.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  33.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.20
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     117.90
  PIPE TRAVEL TIME(MIN.) =   2.13    Tc(MIN.) =   21.29
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    635.00 =    5401.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    635.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.29
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.756
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  A        9.00      0.80     0.100    52
  COMMERCIAL                  B       34.30      0.45     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.52
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   43.30      SUBAREA RUNOFF(CFS) =  105.35
  EFFECTIVE AREA(ACRES) =     91.80   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.46  AREA-AVERAGED Ap =  0.32
  TOTAL AREA(ACRES) =       91.8       PEAK FLOW RATE(CFS) =     215.41
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       91.8  TC(MIN.) =     21.29
  EFFECTIVE AREA(ACRES) =     91.80  AREA-AVERAGED Fm(INCH/HR)=  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.46  AREA-AVERAGED Ap = 0.321
  PEAK FLOW RATE(CFS)   =     215.41
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
____________________________________________________________________________
****************************************************************************
              RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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              Ver. 13.5  Release Date: 02/06/2007  License ID 1527

                              Analysis prepared by:



----------------------------------------------------------------------------
  FILE NAME: EXN4_100.DAT
  TIME/DATE OF STUDY: 08:08 09/23/2008
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                       --*TIME-OF-CONCENTRATION MODEL*--

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

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.4800

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 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   4000.00 TO NODE   4005.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   990.00
  ELEVATION DATA: UPSTREAM(FEET) =   4747.00  DOWNSTREAM(FEET) =   4661.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   24.060
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.561
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        6.93      0.43     1.000    77   24.06
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     13.26
  TOTAL AREA(ACRES) =      6.93   PEAK FLOW RATE(CFS) =     13.26

****************************************************************************
  FLOW PROCESS FROM NODE   4005.00 TO NODE   4010.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   4661.00  DOWNSTREAM(FEET) =   4298.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1270.00   CHANNEL SLOPE =  0.2858
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1915 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      13.26
  FLOW VELOCITY(FEET/SEC) =   5.80 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.65   Tc(MIN.) =   27.71
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4010.00 =    2260.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4010.00 TO NODE   4010.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.71
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.353
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       30.30      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   30.30      SUBAREA RUNOFF(CFS) =   52.32
  EFFECTIVE AREA(ACRES) =     37.23   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       37.2       PEAK FLOW RATE(CFS) =      64.29

****************************************************************************
  FLOW PROCESS FROM NODE   4010.00 TO NODE   4015.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   4298.00  DOWNSTREAM(FEET) =   4082.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =   926.00   CHANNEL SLOPE =  0.2326
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1742 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      64.29
  FLOW VELOCITY(FEET/SEC) =   9.35 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.65   Tc(MIN.) =   29.36
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4015.00 =    3186.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4015.00 TO NODE   4015.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   29.36
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.272
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       36.17      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   36.17      SUBAREA RUNOFF(CFS) =   59.84
  EFFECTIVE AREA(ACRES) =     73.40   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       73.4       PEAK FLOW RATE(CFS) =     121.44

****************************************************************************
  FLOW PROCESS FROM NODE   4015.00 TO NODE   4020.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   4082.60  DOWNSTREAM(FEET) =   3949.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   349.00   CHANNEL SLOPE =  0.3828
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2110 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     121.44
  FLOW VELOCITY(FEET/SEC) =  12.72 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.46   Tc(MIN.) =   29.82
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4020.00 =    3535.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4020.00 TO NODE   4020.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   29.82
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.251
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       29.95      0.43     1.000    77
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        2.43      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   32.38      SUBAREA RUNOFF(CFS) =   53.39
  EFFECTIVE AREA(ACRES) =    105.78   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      105.8       PEAK FLOW RATE(CFS) =     173.45

****************************************************************************
  FLOW PROCESS FROM NODE   4020.00 TO NODE   4035.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3949.00  DOWNSTREAM(FEET) =   3391.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1777.00   CHANNEL SLOPE =  0.3140
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1985 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     173.45
  FLOW VELOCITY(FEET/SEC) =  13.89 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.13   Tc(MIN.) =   31.95
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4035.00 =    5312.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4035.00 TO NODE   4035.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   31.95
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.160
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       21.90      0.43     1.000    77
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       27.92      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.32
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   49.82      SUBAREA RUNOFF(CFS) =   82.37
  EFFECTIVE AREA(ACRES) =    155.60   AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      155.6       PEAK FLOW RATE(CFS) =     247.12

****************************************************************************
  FLOW PROCESS FROM NODE   4035.00 TO NODE   4035.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   31.95
  RAINFALL INTENSITY(INCH/HR) =   2.16
  AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.40
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =     155.60
  TOTAL STREAM AREA(ACRES) =     155.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     247.12

****************************************************************************
  FLOW PROCESS FROM NODE   4025.00 TO NODE   4030.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   990.00
  ELEVATION DATA: UPSTREAM(FEET) =   4645.00  DOWNSTREAM(FEET) =   4341.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   18.690
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.980
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        3.36      0.43     1.000    77   18.69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      7.70
  TOTAL AREA(ACRES) =      3.36   PEAK FLOW RATE(CFS) =      7.70

****************************************************************************
  FLOW PROCESS FROM NODE   4030.00 TO NODE   4035.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   4341.00  DOWNSTREAM(FEET) =   3391.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2793.50   CHANNEL SLOPE =  0.3401
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2035 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       7.70
  FLOW VELOCITY(FEET/SEC) =   4.98 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   9.34   Tc(MIN.) =   28.03
  LONGEST FLOWPATH FROM NODE   4025.00 TO NODE   4035.00 =    3783.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4035.00 TO NODE   4035.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   28.03
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.337
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       24.50      0.43     1.000    77
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       41.10      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.31
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   65.60      SUBAREA RUNOFF(CFS) =  119.65
  EFFECTIVE AREA(ACRES) =     68.96   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.32  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       69.0       PEAK FLOW RATE(CFS) =     125.40

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

```
  FLOW PROCESS FROM NODE   4035.00 TO NODE   4035.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   28.03
  RAINFALL INTENSITY(INCH/HR) =   2.34
  AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.32
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      68.96
  TOTAL STREAM AREA(ACRES) =      68.96
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     125.40

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      247.12   31.95    2.160  0.40( 0.40) 1.00     155.6    4000.00
      2      125.40   28.03    2.337  0.32( 0.32) 1.00      69.0    4025.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      363.88   28.03    2.337  0.37( 0.37) 1.00     205.5    4025.00
      2      361.56   31.95    2.160  0.37( 0.37) 1.00     224.6    4000.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     363.88    Tc(MIN.) =    28.03
  EFFECTIVE AREA(ACRES) =     205.46   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      224.6
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4035.00 =    5312.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4035.00 TO NODE   4040.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3391.00  DOWNSTREAM(FEET) =   2986.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2089.00   CHANNEL SLOPE =  0.1939
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1569 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     363.88
  FLOW VELOCITY(FEET/SEC) =  15.81 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.20   Tc(MIN.) =   30.23
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4040.00 =    7401.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4040.00 TO NODE   4040.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   30.23
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.233
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        1.30      0.43     1.000    77
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       69.93      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   71.23      SUBAREA RUNOFF(CFS) =  127.78
  EFFECTIVE AREA(ACRES) =    276.69   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      295.8       PEAK FLOW RATE(CFS) =     472.49

****************************************************************************
  FLOW PROCESS FROM NODE   4040.00 TO NODE   4042.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2986.00  DOWNSTREAM(FEET) =   2437.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  3047.00   CHANNEL SLOPE =  0.1802
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1501 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     472.49
  FLOW VELOCITY(FEET/SEC) =  16.86 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.01   Tc(MIN.) =   33.24
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4042.00 =   10448.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4042.00 TO NODE   4042.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   33.24
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.109
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        1.57      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       72.50      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   74.07      SUBAREA RUNOFF(CFS) =  124.07
  EFFECTIVE AREA(ACRES) =    350.76   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.32  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      369.9       PEAK FLOW RATE(CFS) =     565.76

****************************************************************************
  FLOW PROCESS FROM NODE   4042.00 TO NODE   4045.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2437.00  DOWNSTREAM(FEET) =   2193.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  3275.40   CHANNEL SLOPE =  0.0745
  CHANNEL FLOW THRU SUBAREA(CFS) =     565.76
  FLOW VELOCITY(FEET/SEC) =  22.24 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.45   Tc(MIN.) =   35.70
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4045.00 =   13723.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4045.00 TO NODE   4045.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   35.70
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.021
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       49.24      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        3.01      0.43     1.000    77
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       27.42      0.24     1.000    88
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      D        6.86      0.14     1.000    93
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.56
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   86.53      SUBAREA RUNOFF(CFS) =  113.71
  EFFECTIVE AREA(ACRES) =    437.29   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      456.4       PEAK FLOW RATE(CFS) =     651.61

****************************************************************************
  FLOW PROCESS FROM NODE   4045.00 TO NODE   4045.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   35.70
  RAINFALL INTENSITY(INCH/HR) =   2.02
  AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.37
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =     437.29
  TOTAL STREAM AREA(ACRES) =     456.39
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     651.61

****************************************************************************
  FLOW PROCESS FROM NODE   4070.00 TO NODE   4075.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   984.50
  ELEVATION DATA: UPSTREAM(FEET) =   2224.50  DOWNSTREAM(FEET) =   2190.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   28.786
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.300
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.94      0.81     1.000    51   28.79
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      D        5.51      0.14     1.000    93   28.79
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     11.97
  TOTAL AREA(ACRES) =      6.45   PEAK FLOW RATE(CFS) =     11.97

****************************************************************************
  FLOW PROCESS FROM NODE   4075.00 TO NODE   4075.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   28.79
  RAINFALL INTENSITY(INCH/HR) =   2.30
  AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       6.45
  TOTAL STREAM AREA(ACRES) =       6.45
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      11.97

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      651.61   35.70    2.021  0.37( 0.37) 1.00     437.3    4025.00
      1      628.64   39.67    1.897  0.37( 0.37) 1.00     456.4    4000.00
      2       11.97   28.79    2.300  0.24( 0.24) 1.00       6.5    4070.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      625.81   28.79    2.300  0.36( 0.36) 1.00     359.1    4070.00
      2      661.97   35.70    2.021  0.36( 0.36) 1.00     443.7    4025.00
      3      638.27   39.67    1.897  0.36( 0.36) 1.00     462.8    4000.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     661.97    Tc(MIN.) =    35.70
  EFFECTIVE AREA(ACRES) =     443.74   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      462.8
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4075.00 =   13723.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4075.00 TO NODE   5030.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   35.70
  RAINFALL INTENSITY(INCH/HR) =   2.02
  AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.36
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =     443.74
  TOTAL STREAM AREA(ACRES) =     462.84
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     661.97

****************************************************************************
  FLOW PROCESS FROM NODE   4080.00 TO NODE   4085.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   990.00
  ELEVATION DATA: UPSTREAM(FEET) =   2791.50  DOWNSTREAM(FEET) =   2560.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   19.737
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.884
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        3.84      0.81     1.000    51   19.74
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        4.07      0.24     1.000    88   19.74
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.51
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     16.87
  TOTAL AREA(ACRES) =      7.91   PEAK FLOW RATE(CFS) =     16.87

****************************************************************************
  FLOW PROCESS FROM NODE   4085.00 TO NODE   4090.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2560.00  DOWNSTREAM(FEET) =   2158.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =  4028.00   CHANNEL SLOPE =  0.0997
  CHANNEL FLOW THRU SUBAREA(CFS) =      16.87
  FLOW VELOCITY(FEET/SEC) =   9.04 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.43   Tc(MIN.) =   27.16
  LONGEST FLOWPATH FROM NODE   4080.00 TO NODE   4090.00 =    5018.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4090.00 TO NODE   4090.00 IS CODE =  81
```

```
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.16
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.381
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       44.64      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        1.58      0.43     1.000    77
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        1.45      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.78
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   47.67      SUBAREA RUNOFF(CFS) =   68.76
  EFFECTIVE AREA(ACRES) =     55.58   AREA-AVERAGED Fm(INCH/HR) =  0.74
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       55.6       PEAK FLOW RATE(CFS) =      82.05

****************************************************************************
  FLOW PROCESS FROM NODE   4090.00 TO NODE   5030.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   27.16
  RAINFALL INTENSITY(INCH/HR) =   2.38
  AREA-AVERAGED Fm(INCH/HR) =  0.74
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      55.58
  TOTAL STREAM AREA(ACRES) =      55.58
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      82.05

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      625.81   28.79    2.300  0.36( 0.36) 1.00     359.1    4070.00
      1      661.97   35.70    2.021  0.36( 0.36) 1.00     443.7    4025.00
      1      638.27   39.67    1.897  0.36( 0.36) 1.00     462.8    4000.00
      2       82.05   27.16    2.381  0.74( 0.74) 1.00      55.6    4080.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      697.44   27.16    2.381  0.42( 0.42) 1.00     394.4    4080.00
      2      703.79   28.79    2.300  0.41( 0.41) 1.00     414.6    4070.00
      3      726.02   35.70    2.021  0.41( 0.41) 1.00     499.3    4025.00
      4      696.12   39.67    1.897  0.41( 0.41) 1.00     518.4    4000.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     726.02    Tc(MIN.) =    35.70
  EFFECTIVE AREA(ACRES) =     499.32   AREA-AVERAGED Fm(INCH/HR) =  0.41
  AREA-AVERAGED Fp(INCH/HR) =  0.41  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      518.4
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   5030.00 =   13723.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5030.00 TO NODE   5045.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

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

```
  FLOW PROCESS FROM NODE   4100.00 TO NODE   4105.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   979.00
  ELEVATION DATA: UPSTREAM(FEET) =   4250.40  DOWNSTREAM(FEET) =   3831.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.408
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.110
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        4.97      0.43     1.000    77   17.41
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        2.44      0.24     1.000    88   17.41
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.37
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     18.28
  TOTAL AREA(ACRES) =      7.41   PEAK FLOW RATE(CFS) =     18.28

****************************************************************************
  FLOW PROCESS FROM NODE   4105.00 TO NODE   4110.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3831.00  DOWNSTREAM(FEET) =   3169.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =  3831.00   CHANNEL SLOPE =  0.1727
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1463 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      18.28
  FLOW VELOCITY(FEET/SEC) =   5.64 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  11.33   Tc(MIN.) =   28.73
  LONGEST FLOWPATH FROM NODE   4100.00 TO NODE   4110.00 =    4810.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4110.00 TO NODE   4110.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   28.73
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.302
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        8.54      0.43     1.000    77
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       47.95      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   56.49      SUBAREA RUNOFF(CFS) =  103.52
  EFFECTIVE AREA(ACRES) =     63.90   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       63.9       PEAK FLOW RATE(CFS) =     116.41

****************************************************************************
  FLOW PROCESS FROM NODE   4110.00 TO NODE   4115.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3169.40  DOWNSTREAM(FEET) =   2959.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   891.00   CHANNEL SLOPE =  0.2360
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1753 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     116.41
  FLOW VELOCITY(FEET/SEC) =  11.43 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
  TRAVEL TIME(MIN.) =   1.30   Tc(MIN.) =   30.03
  LONGEST FLOWPATH FROM NODE   4100.00 TO NODE   4115.00 =    5701.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4115.00 TO NODE   4115.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   30.03
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.242
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       47.89      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   47.89      SUBAREA RUNOFF(CFS) =   86.45
  EFFECTIVE AREA(ACRES) =    111.79   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      111.8       PEAK FLOW RATE(CFS) =     199.40

****************************************************************************
  FLOW PROCESS FROM NODE   4115.00 TO NODE   4140.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2959.10  DOWNSTREAM(FEET) =   2425.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  3438.70   CHANNEL SLOPE =  0.1553
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1377 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     199.40
  FLOW VELOCITY(FEET/SEC) =  12.12 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.73   Tc(MIN.) =   34.76
  LONGEST FLOWPATH FROM NODE   4100.00 TO NODE   4140.00 =    9139.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4140.00 TO NODE   4140.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   34.76
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.053
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        3.17      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       63.00      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   66.17      SUBAREA RUNOFF(CFS) =  106.60
  EFFECTIVE AREA(ACRES) =    177.96   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      178.0       PEAK FLOW RATE(CFS) =     287.05

****************************************************************************
  FLOW PROCESS FROM NODE   4140.00 TO NODE   4140.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   34.76
  RAINFALL INTENSITY(INCH/HR) =   2.05
  AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =     177.96
  TOTAL STREAM AREA(ACRES) =     177.96
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     287.05

****************************************************************************
  FLOW PROCESS FROM NODE   4120.00 TO NODE   4125.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   995.00
  ELEVATION DATA: UPSTREAM(FEET) =   4054.00  DOWNSTREAM(FEET) =   3679.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.976
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.050
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        3.67      0.24     1.000    88   17.98
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =       9.30
  TOTAL AREA(ACRES) =      3.67   PEAK FLOW RATE(CFS) =      9.30

****************************************************************************
  FLOW PROCESS FROM NODE   4125.00 TO NODE   4130.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3679.00  DOWNSTREAM(FEET) =   3198.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1993.50   CHANNEL SLOPE =  0.2410
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1770 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       9.30
  FLOW VELOCITY(FEET/SEC) =   4.95 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.71   Tc(MIN.) =   24.69
  LONGEST FLOWPATH FROM NODE   4120.00 TO NODE   4130.00 =    2988.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4130.00 TO NODE   4130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   24.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.522
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       35.00      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   35.00      SUBAREA RUNOFF(CFS) =   71.99
  EFFECTIVE AREA(ACRES) =     38.67   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       38.7       PEAK FLOW RATE(CFS) =      79.54

****************************************************************************
  FLOW PROCESS FROM NODE   4130.00 TO NODE   4135.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3198.50  DOWNSTREAM(FEET) =   2717.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1936.80   CHANNEL SLOPE =  0.2483
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1794 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      79.54
  FLOW VELOCITY(FEET/SEC) =  10.19 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
  TRAVEL TIME(MIN.) =   3.17   Tc(MIN.) =   27.86
  LONGEST FLOWPATH FROM NODE   4120.00 TO NODE   4135.00 =    4925.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4135.00 TO NODE   4135.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.86
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.345
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       59.64      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   59.64      SUBAREA RUNOFF(CFS) =  113.22
  EFFECTIVE AREA(ACRES) =     98.31   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       98.3       PEAK FLOW RATE(CFS) =     186.63

****************************************************************************
  FLOW PROCESS FROM NODE   4135.00 TO NODE   4140.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2717.60  DOWNSTREAM(FEET) =   2425.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1772.00   CHANNEL SLOPE =  0.1651
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1426 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     186.63
  FLOW VELOCITY(FEET/SEC) =  12.06 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.45   Tc(MIN.) =   30.31
  LONGEST FLOWPATH FROM NODE   4120.00 TO NODE   4140.00 =    6697.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4140.00 TO NODE   4140.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   30.31
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.230
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       25.08      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   25.08      SUBAREA RUNOFF(CFS) =   45.00
  EFFECTIVE AREA(ACRES) =    123.39   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      123.4       PEAK FLOW RATE(CFS) =     221.40

****************************************************************************
  FLOW PROCESS FROM NODE   4140.00 TO NODE   4140.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   30.31
  RAINFALL INTENSITY(INCH/HR) =   2.23
  AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =     123.39
  TOTAL STREAM AREA(ACRES) =     123.39
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     221.40

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
      1      287.05   34.76    2.053  0.26( 0.26) 1.00     178.0    4100.00
      2      221.40   30.31    2.230  0.24( 0.24) 1.00     123.4    4120.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
      1      496.25   30.31    2.230  0.25( 0.25) 1.00     278.5    4120.00
      2      488.88   34.76    2.053  0.25( 0.25) 1.00     301.3    4100.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     496.25    Tc(MIN.) =    30.31
  EFFECTIVE AREA(ACRES) =     278.53   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      301.3
  LONGEST FLOWPATH FROM NODE   4100.00 TO NODE   4140.00 =    9139.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4140.00 TO NODE   4155.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2425.00  DOWNSTREAM(FEET) =   2318.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   850.90   CHANNEL SLOPE =  0.1257
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1188 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     496.25
  FLOW VELOCITY(FEET/SEC) =  15.25 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.93   Tc(MIN.) =   31.24
  LONGEST FLOWPATH FROM NODE   4100.00 TO NODE   4155.00 =    9990.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4100.00 TO NODE   4155.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   31.24
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.190
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        9.33      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        2.80      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.68
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   12.13      SUBAREA RUNOFF(CFS) =   16.52
  EFFECTIVE AREA(ACRES) =    290.66   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      313.5       PEAK FLOW RATE(CFS) =     502.73

****************************************************************************
  FLOW PROCESS FROM NODE   4155.00 TO NODE   4155.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   31.24
  RAINFALL INTENSITY(INCH/HR) =   2.19
  AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27
```

```
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =     290.66
  TOTAL STREAM AREA(ACRES) =     313.48
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     502.73

****************************************************************************
  FLOW PROCESS FROM NODE   4145.00 TO NODE   4150.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   990.00
  ELEVATION DATA: UPSTREAM(FEET) =   3190.00  DOWNSTREAM(FEET) =   2810.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.880
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.060
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        8.39      0.24     1.000    88   17.88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     21.32
  TOTAL AREA(ACRES) =      8.39   PEAK FLOW RATE(CFS) =     21.32

****************************************************************************
  FLOW PROCESS FROM NODE   4150.00 TO NODE   4155.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2810.00  DOWNSTREAM(FEET) =   2318.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2172.70   CHANNEL SLOPE =  0.2262
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1721 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      21.32
  FLOW VELOCITY(FEET/SEC) =   6.43 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.63   Tc(MIN.) =   23.51
  LONGEST FLOWPATH FROM NODE   4145.00 TO NODE   4155.00 =    3162.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4155.00 TO NODE   4155.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   23.51
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.597
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.40      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       34.30      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   34.70      SUBAREA RUNOFF(CFS) =   73.52
  EFFECTIVE AREA(ACRES) =     43.09   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       43.1       PEAK FLOW RATE(CFS) =      91.35

****************************************************************************
  FLOW PROCESS FROM NODE   4155.00 TO NODE   4155.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   23.51
  RAINFALL INTENSITY(INCH/HR) =   2.60
  AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      43.09
  TOTAL STREAM AREA(ACRES) =      43.09
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      91.35

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      502.73   31.24    2.190  0.27( 0.27) 1.00     290.7    4120.00
      1      494.77   35.70    2.021  0.27( 0.27) 1.00     313.5    4100.00
      2       91.35   23.51    2.597  0.24( 0.24) 1.00      43.1    4145.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      549.86   23.51    2.597  0.26( 0.26) 1.00     261.8    4145.00
      2      578.29   31.24    2.190  0.26( 0.26) 1.00     333.8    4120.00
      3      563.79   35.70    2.021  0.26( 0.26) 1.00     356.6    4100.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     578.29    Tc(MIN.) =    31.24
  EFFECTIVE AREA(ACRES) =     333.75   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      356.6
  LONGEST FLOWPATH FROM NODE   4100.00 TO NODE   4155.00 =    9990.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4155.00 TO NODE   4160.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2318.60  DOWNSTREAM(FEET) =   2151.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2555.00   CHANNEL SLOPE =  0.0655
  CHANNEL FLOW THRU SUBAREA(CFS) =     578.29
  FLOW VELOCITY(FEET/SEC) =  21.00 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.03   Tc(MIN.) =   33.26
  LONGEST FLOWPATH FROM NODE   4100.00 TO NODE   4160.00 =   12545.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4160.00 TO NODE   4160.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   33.26
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.109
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       36.30      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        4.05      0.24     1.000    88
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        0.68      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   41.03      SUBAREA RUNOFF(CFS) =   50.34
  EFFECTIVE AREA(ACRES) =    374.78   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.32  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      397.6       PEAK FLOW RATE(CFS) =     604.27

****************************************************************************
  FLOW PROCESS FROM NODE   4160.00 TO NODE   5045.00 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      583.42   25.57    2.469  0.33( 0.33) 1.00     302.9    4145.00
      2      604.27   33.26    2.109  0.32( 0.32) 1.00     374.8    4120.00
      3      587.14   37.74    1.955  0.31( 0.31) 1.00     397.6    4100.00
  LONGEST FLOWPATH FROM NODE   4100.00 TO NODE   5045.00 =   12545.60 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      697.44   27.16    2.381  0.42( 0.42) 1.00     394.4    4080.00
      2      703.79   28.79    2.300  0.41( 0.41) 1.00     414.6    4070.00
      3      726.02   35.70    2.021  0.41( 0.41) 1.00     499.3    4025.00
      4      696.12   39.67    1.897  0.41( 0.41) 1.00     518.4    4000.00
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   5045.00 =   13723.40 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1269.31   25.57    2.469  0.38( 0.38) 1.00     674.1    4145.00
      2     1285.19   27.16    2.381  0.38( 0.38) 1.00     712.2    4080.00
      3     1295.93   28.79    2.300  0.37( 0.37) 1.00     747.6    4070.00
      4     1322.45   33.26    2.109  0.37( 0.37) 1.00     844.3    4120.00
      5     1320.96   35.70    2.021  0.37( 0.37) 1.00     886.5    4025.00
      6     1297.78   37.74    1.955  0.37( 0.37) 1.00     906.7    4100.00
      7     1262.63   39.67    1.897  0.37( 0.37) 1.00     916.0    4000.00
    TOTAL AREA(ACRES) =       916.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    1322.45  Tc(MIN.) =   33.263
  EFFECTIVE AREA(ACRES) =    844.26  AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      916.0
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   5045.00 =   13723.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5045.00 TO NODE   5045.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5045.00 TO NODE   5050.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2151.00  DOWNSTREAM(FEET) =   2123.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   213.00   CHANNEL SLOPE =  0.1315
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  NOTE: FLOW VELOCITY OF 30 FPS WAS ASSUMED IN TRAVEL TIME ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =    1322.45
  FLOW VELOCITY(FEET/SEC) =  30.00 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.12   Tc(MIN.) =   33.38
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   5050.00 =   13936.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5050.00 TO NODE   5050.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   33.38
  RAINFALL INTENSITY(INCH/HR) =   2.10
  AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.37
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =     844.26
  TOTAL STREAM AREA(ACRES) =     916.02
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    1322.45

****************************************************************************
  FLOW PROCESS FROM NODE   4050.00 TO NODE   4055.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   700.00
  ELEVATION DATA: UPSTREAM(FEET) =   2338.00  DOWNSTREAM(FEET) =   2160.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   16.896
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.166
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        3.08      0.81     1.000    51   16.90
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        0.14      0.43     1.000    77   16.90
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.79
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      6.88
  TOTAL AREA(ACRES) =      3.22   PEAK FLOW RATE(CFS) =      6.88

****************************************************************************
  FLOW PROCESS FROM NODE   4055.00 TO NODE   4060.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2160.00  DOWNSTREAM(FEET) =   2133.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   617.00   CHANNEL SLOPE =  0.0438
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0438 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       6.88
  FLOW VELOCITY(FEET/SEC) =   2.23 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.62   Tc(MIN.) =   21.51
  LONGEST FLOWPATH FROM NODE   4050.00 TO NODE   4060.00 =    1317.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4060.00 TO NODE   4060.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.51
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.739
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        7.64      0.81     1.000    51
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    7.64      SUBAREA RUNOFF(CFS) =   13.27
  EFFECTIVE AREA(ACRES) =     10.86   AREA-AVERAGED Fm(INCH/HR) =  0.80
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       10.9       PEAK FLOW RATE(CFS) =      18.92

****************************************************************************
  FLOW PROCESS FROM NODE   4060.00 TO NODE   5050.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
```

```
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   21.51
  RAINFALL INTENSITY(INCH/HR) =   2.74
  AREA-AVERAGED Fm(INCH/HR) =  0.80
  AREA-AVERAGED Fp(INCH/HR) =  0.80
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      10.86
  TOTAL STREAM AREA(ACRES) =      10.86
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      18.92

  ** CONFLUENCE DATA **
   STREAM       Q       Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1269.31   25.69    2.462  0.38( 0.38) 1.00     674.1    4145.00
      1     1285.19   27.28    2.375  0.38( 0.38) 1.00     712.2    4080.00
      1     1295.93   28.90    2.294  0.37( 0.37) 1.00     747.6    4070.00
      1     1322.45   33.38    2.104  0.37( 0.37) 1.00     844.3    4120.00
      1     1320.96   35.82    2.017  0.37( 0.37) 1.00     886.5    4025.00
      1     1297.78   37.86    1.951  0.37( 0.37) 1.00     906.7    4100.00
      1     1262.63   39.79    1.894  0.37( 0.37) 1.00     916.0    4000.00
      2       18.92   21.51    2.739  0.80( 0.80) 1.00      10.9    4050.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q       Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1222.91   21.51    2.739  0.38( 0.38) 1.00     575.5    4050.00
      2     1285.53   25.69    2.462  0.38( 0.38) 1.00     685.0    4145.00
      3     1300.55   27.28    2.375  0.38( 0.38) 1.00     723.1    4080.00
      4     1310.50   28.90    2.294  0.38( 0.38) 1.00     758.4    4070.00
      5     1335.17   33.38    2.104  0.37( 0.37) 1.00     855.1    4120.00
      6     1332.83   35.82    2.017  0.37( 0.37) 1.00     897.4    4025.00
      7     1309.00   37.86    1.951  0.37( 0.37) 1.00     917.6    4100.00
      8     1273.29   39.79    1.894  0.37( 0.37) 1.00     926.9    4000.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    1335.17    Tc(MIN.) =    33.38
  EFFECTIVE AREA(ACRES) =     855.12   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      926.9
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   5050.00 =   13936.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5050.00 TO NODE   5110.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2133.00  DOWNSTREAM(FEET) =   2123.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1990.00   CHANNEL SLOPE =  0.0050
  CHANNEL FLOW THRU SUBAREA(CFS) =    1335.17
  FLOW VELOCITY(FEET/SEC) =   7.64 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.34   Tc(MIN.) =   37.72
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   5110.00 =   15926.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5110.00 TO NODE   5110.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   4280.00 TO NODE   4285.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   373.70
  ELEVATION DATA: UPSTREAM(FEET) =   2162.80  DOWNSTREAM(FEET) =   2119.00
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.347
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.354
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        6.60      0.81     1.000    51   15.35
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      15.12
  TOTAL AREA(ACRES) =      6.60   PEAK FLOW RATE(CFS) =     15.12

****************************************************************************
  FLOW PROCESS FROM NODE   4285.00 TO NODE   5110.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2119.00  DOWNSTREAM(FEET) =   2066.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   450.00   CHANNEL SLOPE =  0.1178
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      15.12
  FLOW VELOCITY(FEET/SEC) =   8.79 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.85   Tc(MIN.) =   16.20
  LONGEST FLOWPATH FROM NODE   4280.00 TO NODE   5110.00 =     823.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4285.00 TO NODE   5110.00 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       15.12   16.20    3.247  0.81( 0.81) 1.00       6.6    4280.00
  LONGEST FLOWPATH FROM NODE   4280.00 TO NODE   5110.00 =     823.70 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     1222.91   25.98    2.445  0.38( 0.38) 1.00     575.5    4050.00
      2     1285.53   30.08    2.240  0.38( 0.38) 1.00     685.0    4145.00
      3     1300.55   31.66    2.172  0.38( 0.38) 1.00     723.1    4080.00
      4     1310.50   33.27    2.108  0.38( 0.38) 1.00     758.4    4070.00
      5     1335.17   37.72    1.955  0.37( 0.37) 1.00     855.1    4120.00
      6     1332.83   40.16    1.883  0.37( 0.37) 1.00     897.4    4025.00
      7     1309.00   42.23    1.827  0.37( 0.37) 1.00     917.6    4100.00
      8     1273.29   44.20    1.778  0.37( 0.37) 1.00     926.9    4000.00
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   5110.00 =   15926.40 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q       Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1074.14   16.20    3.247  0.39( 0.39) 1.00     365.4    4280.00
      2     1233.06   25.98    2.445  0.39( 0.39) 1.00     582.1    4050.00
      3     1294.40   30.08    2.240  0.39( 0.39) 1.00     691.6    4145.00
      4     1309.00   31.66    2.172  0.39( 0.39) 1.00     729.7    4080.00
      5     1318.56   33.27    2.108  0.38( 0.38) 1.00     765.0    4070.00
      6     1342.28   37.72    1.955  0.38( 0.38) 1.00     861.7    4120.00
      7     1339.49   40.16    1.883  0.37( 0.37) 1.00     904.0    4025.00
      8     1315.32   42.23    1.827  0.37( 0.37) 1.00     924.2    4100.00
      9     1279.30   44.20    1.778  0.37( 0.37) 1.00     933.5    4000.00
    TOTAL AREA(ACRES) =       933.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     1342.28  Tc(MIN.) =   37.723
  EFFECTIVE AREA(ACRES) =    861.72  AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  1.00
```

```
  TOTAL AREA(ACRES) =      933.5
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   5110.00 =   15926.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5110.00 TO NODE   5100.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5110.00 TO NODE   5110.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   4200.00 TO NODE   4205.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   990.00
  ELEVATION DATA: UPSTREAM(FEET) =   3012.00  DOWNSTREAM(FEET) =   2621.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.773
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.071
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        6.17      0.24     1.000    88   17.77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     15.74
  TOTAL AREA(ACRES) =      6.17   PEAK FLOW RATE(CFS) =     15.74

****************************************************************************
  FLOW PROCESS FROM NODE   4205.00 TO NODE   4210.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2621.00  DOWNSTREAM(FEET) =   2192.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2518.00   CHANNEL SLOPE =  0.1704
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1452 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      15.74
  FLOW VELOCITY(FEET/SEC) =   5.34 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.85   Tc(MIN.) =   25.63
  LONGEST FLOWPATH FROM NODE   4200.00 TO NODE   4210.00 =    3508.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4210.00 TO NODE   4210.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   25.63
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.466
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        5.52      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       27.93      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   33.45      SUBAREA RUNOFF(CFS) =   64.28
  EFFECTIVE AREA(ACRES) =     39.62   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.32  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       39.6       PEAK FLOW RATE(CFS) =      76.66

****************************************************************************
  FLOW PROCESS FROM NODE   4210.00 TO NODE   4215.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2192.00  DOWNSTREAM(FEET) =   2101.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1325.00   CHANNEL SLOPE =  0.0687
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0687 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      76.66
  FLOW VELOCITY(FEET/SEC) =   6.23 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.55   Tc(MIN.) =   29.17
  LONGEST FLOWPATH FROM NODE   4200.00 TO NODE   4215.00 =    4833.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4215.00 TO NODE   4215.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   29.17
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.281
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       10.58      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        2.89      0.43     1.000    77
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        0.52      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.71
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   13.99      SUBAREA RUNOFF(CFS) =   19.79
  EFFECTIVE AREA(ACRES) =     53.61   AREA-AVERAGED Fm(INCH/HR) =  0.42
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       53.6       PEAK FLOW RATE(CFS) =      89.87

****************************************************************************
  FLOW PROCESS FROM NODE   4215.00 TO NODE   5110.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2000.00  DOWNSTREAM(FEET) =   1990.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   100.00   CHANNEL SLOPE =  0.1000
  CHANNEL FLOW THRU SUBAREA(CFS) =      89.87
  FLOW VELOCITY(FEET/SEC) =  14.54 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.11   Tc(MIN.) =   29.29
  LONGEST FLOWPATH FROM NODE   4200.00 TO NODE   5110.00 =    4933.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4215.00 TO NODE   5110.00 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       89.87   29.29    2.276  0.42( 0.42) 1.00      53.6    4200.00
  LONGEST FLOWPATH FROM NODE   4200.00 TO NODE   5110.00 =    4933.00 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     1074.14   16.20    3.247  0.39( 0.39) 1.00     365.4    4280.00
      2     1233.06   25.98    2.445  0.39( 0.39) 1.00     582.1    4050.00
      3     1294.40   30.08    2.240  0.39( 0.39) 1.00     691.6    4145.00
```

```
     4     1309.00   31.66    2.172  0.39( 0.39) 1.00     729.7    4080.00
     5     1318.56   33.27    2.108  0.38( 0.38) 1.00     765.0    4070.00
     6     1342.28   37.72    1.955  0.38( 0.38) 1.00     861.7    4120.00
     7     1339.49   40.16    1.883  0.37( 0.37) 1.00     904.0    4025.00
     8     1315.32   42.23    1.827  0.37( 0.37) 1.00     924.2    4100.00
     9     1279.30   44.20    1.778  0.37( 0.37) 1.00     933.5    4000.00
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   5110.00 =   15926.40 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1     1149.83   16.20    3.247  0.39( 0.39) 1.00     395.0    4280.00
     2     1320.07   25.98    2.445  0.39( 0.39) 1.00     629.6    4050.00
     3     1372.40   29.29    2.276  0.39( 0.39) 1.00     724.0    4200.00
     4     1382.52   30.08    2.240  0.39( 0.39) 1.00     745.2    4145.00
     5     1393.85   31.66    2.172  0.39( 0.39) 1.00     783.3    4080.00
     6     1400.33   33.27    2.108  0.39( 0.39) 1.00     818.6    4070.00
     7     1416.64   37.72    1.955  0.38( 0.38) 1.00     915.3    4120.00
     8     1410.36   40.16    1.883  0.38( 0.38) 1.00     957.6    4025.00
     9     1383.49   42.23    1.827  0.38( 0.38) 1.00     977.8    4100.00
    10     1345.08   44.20    1.778  0.38( 0.38) 1.00     987.1    4000.00
    TOTAL AREA(ACRES) =       987.1

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     1416.64  Tc(MIN.) =   37.723
  EFFECTIVE AREA(ACRES) =    915.33  AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      987.1
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   5110.00 =   15926.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5110.00 TO NODE   5110.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   5110.00 TO NODE   5110.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   37.72
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.955
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       46.00      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       28.90      0.43     1.000    77
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      D        1.20      0.14     1.000    93
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.66
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   76.10      SUBAREA RUNOFF(CFS) =   89.02
  EFFECTIVE AREA(ACRES) =    991.43   AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =     1063.2      PEAK FLOW RATE(CFS) =    1416.64
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5110.00 TO NODE   5110.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   37.72
  RAINFALL INTENSITY(INCH/HR) =   1.96
  AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.40
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =     991.43
  TOTAL STREAM AREA(ACRES) =    1063.19
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    1416.64

****************************************************************************
  FLOW PROCESS FROM NODE   4250.00 TO NODE   4255.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   990.00
  ELEVATION DATA: UPSTREAM(FEET) =   3020.00  DOWNSTREAM(FEET) =   2669.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   18.161
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.032
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        8.05      0.24     1.000    88   18.16
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     20.25
  TOTAL AREA(ACRES) =      8.05   PEAK FLOW RATE(CFS) =     20.25

****************************************************************************
  FLOW PROCESS FROM NODE   4255.00 TO NODE   4258.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2669.00  DOWNSTREAM(FEET) =   2151.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  3216.40   CHANNEL SLOPE =  0.1610
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1405 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      20.25
  FLOW VELOCITY(FEET/SEC) =   5.72 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   9.38   Tc(MIN.) =   27.54
  LONGEST FLOWPATH FROM NODE   4250.00 TO NODE   4258.00 =    4206.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4258.00 TO NODE   4258.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.54
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.362
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        4.72      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       56.71      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   61.43      SUBAREA RUNOFF(CFS) =  115.08
  EFFECTIVE AREA(ACRES) =     69.48   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       69.5       PEAK FLOW RATE(CFS) =     130.48

****************************************************************************
  FLOW PROCESS FROM NODE   4258.00 TO NODE   4260.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2151.40  DOWNSTREAM(FEET) =   2064.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1767.80   CHANNEL SLOPE =  0.0494
```

```
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0494 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     130.48
  FLOW VELOCITY(FEET/SEC) =   6.31 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.67   Tc(MIN.) =   32.21
  LONGEST FLOWPATH FROM NODE   4250.00 TO NODE   4260.00 =    5974.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4260.00 TO NODE   4260.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   32.21
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.150
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       11.79      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       10.78      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.63
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   22.57      SUBAREA RUNOFF(CFS) =   30.88
  EFFECTIVE AREA(ACRES) =     92.05   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       92.1       PEAK FLOW RATE(CFS) =     148.11

****************************************************************************
  FLOW PROCESS FROM NODE   4260.00 TO NODE   5110.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3123.00  DOWNSTREAM(FEET) =   2066.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1841.00   CHANNEL SLOPE =  0.5741
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =     148.11
  FLOW VELOCITY(FEET/SEC) =  16.91 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.81   Tc(MIN.) =   34.03
  LONGEST FLOWPATH FROM NODE   4250.00 TO NODE   5110.00 =    7815.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5110.00 TO NODE   5110.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   34.03
  RAINFALL INTENSITY(INCH/HR) =   2.08
  AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.36
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      92.05
  TOTAL STREAM AREA(ACRES) =      92.05
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     148.11

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1191.54   16.20    3.247  0.44( 0.44) 1.00     471.1    4280.00
      1     1320.07   25.98    2.445  0.42( 0.42) 1.00     705.7    4050.00
      1     1372.40   29.29    2.276  0.42( 0.42) 1.00     800.1    4200.00
      1     1382.52   30.08    2.240  0.41( 0.41) 1.00     821.3    4145.00
      1     1393.85   31.66    2.172  0.41( 0.41) 1.00     859.4    4080.00
      1     1400.33   33.27    2.108  0.41( 0.41) 1.00     894.7    4070.00
      1     1416.64   37.72    1.955  0.40( 0.40) 1.00     991.4    4120.00
      1     1410.36   40.16    1.883  0.40( 0.40) 1.00    1033.7    4025.00
      1     1383.49   42.23    1.827  0.40( 0.40) 1.00    1053.9    4100.00
      1     1345.08   44.20    1.778  0.40( 0.40) 1.00    1063.2    4000.00
      2      148.11   34.03    2.080  0.36( 0.36) 1.00      92.1    4250.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1309.94   16.20    3.247  0.43( 0.43) 1.00     515.0    4280.00
      2     1457.22   25.98    2.445  0.42( 0.42) 1.00     776.0    4050.00
      3     1514.42   29.29    2.276  0.41( 0.41) 1.00     879.3    4200.00
      4     1525.63   30.08    2.240  0.41( 0.41) 1.00     902.7    4145.00
      5     1539.03   31.66    2.172  0.41( 0.41) 1.00     945.0    4080.00
      6     1547.53   33.27    2.108  0.40( 0.40) 1.00     984.8    4070.00
      7     1551.20   34.03    2.080  0.40( 0.40) 1.00    1003.2    4250.00
      8     1553.99   37.72    1.955  0.40( 0.40) 1.00    1083.5    4120.00
      9     1541.49   40.16    1.883  0.39( 0.39) 1.00    1125.7    4025.00
     10     1509.80   42.23    1.827  0.39( 0.39) 1.00    1146.0    4100.00
     11     1467.15   44.20    1.778  0.39( 0.39) 1.00    1155.2    4000.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    1553.99    Tc(MIN.) =    37.72
  EFFECTIVE AREA(ACRES) =    1083.48   AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =     1155.2
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   5110.00 =   15926.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5110.00 TO NODE   5130.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2066.00  DOWNSTREAM(FEET) =   2022.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1880.00   CHANNEL SLOPE =  0.0234
  CHANNEL FLOW THRU SUBAREA(CFS) =    1553.99
  FLOW VELOCITY(FEET/SEC) =  17.33 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.81   Tc(MIN.) =   39.53
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   5130.00 =   17806.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   5130.00 TO NODE   5130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   39.53
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.901
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        7.00      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        8.20      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.61
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   15.20      SUBAREA RUNOFF(CFS) =   17.71
  EFFECTIVE AREA(ACRES) =   1098.68   AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =     1170.4       PEAK FLOW RATE(CFS) =    1553.99
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE   5135.00 TO NODE   5150.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1762.00
  ELEVATION DATA: UPSTREAM(FEET) =   2059.00  DOWNSTREAM(FEET) =   2008.00
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   37.749
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.954
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       28.20      0.81     1.000    51   37.75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      29.10
  TOTAL AREA(ACRES) =      28.20   PEAK FLOW RATE(CFS) =     29.10
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       28.2  TC(MIN.) =     37.75
  EFFECTIVE AREA(ACRES) =     28.20  AREA-AVERAGED Fm(INCH/HR)=  0.81
  AREA-AVERAGED Fp(INCH/HR) =  0.81  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =      29.10
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
____________________________________________________________________________
****************************************************************************
              RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
          (c) Copyright 1983-2007 Advanced Engineering Software (aes)
              Ver. 13.5  Release Date: 02/06/2007  License ID 1527

                              Analysis prepared by:



----------------------------------------------------------------------------
  FILE NAME: PRN4_100.DAT
  TIME/DATE OF STUDY: 17:53 09/22/2008
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                       --*TIME-OF-CONCENTRATION MODEL*--

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

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.4800

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 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   4000.00 TO NODE   4005.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   990.00
  ELEVATION DATA: UPSTREAM(FEET) =   4747.00  DOWNSTREAM(FEET) =   4661.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   24.060
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.561
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        6.93      0.43     1.000    77   24.06
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     13.26
  TOTAL AREA(ACRES) =      6.93   PEAK FLOW RATE(CFS) =     13.26

****************************************************************************
  FLOW PROCESS FROM NODE   4005.00 TO NODE   4010.00 IS CODE =  53
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   4661.00  DOWNSTREAM(FEET) =   4298.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1270.00   CHANNEL SLOPE =  0.2858
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1915 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      13.26
  FLOW VELOCITY(FEET/SEC) =   5.80 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.65   Tc(MIN.) =   27.71
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4010.00 =    2260.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4010.00 TO NODE   4010.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.71
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.353
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       30.30      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   30.30      SUBAREA RUNOFF(CFS) =   52.32
  EFFECTIVE AREA(ACRES) =     37.23   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       37.2       PEAK FLOW RATE(CFS) =      64.29

****************************************************************************
  FLOW PROCESS FROM NODE   4010.00 TO NODE   4015.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   4298.00  DOWNSTREAM(FEET) =   4082.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =   926.00   CHANNEL SLOPE =  0.2326
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1742 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      64.29
  FLOW VELOCITY(FEET/SEC) =   9.35 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.65   Tc(MIN.) =   29.36
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4015.00 =    3186.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4015.00 TO NODE   4015.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   29.36
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.272
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       36.17      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   36.17      SUBAREA RUNOFF(CFS) =   59.84
  EFFECTIVE AREA(ACRES) =     73.40   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       73.4       PEAK FLOW RATE(CFS) =     121.44

****************************************************************************
  FLOW PROCESS FROM NODE   4015.00 TO NODE   4020.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   4082.60  DOWNSTREAM(FEET) =   3949.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   349.00   CHANNEL SLOPE =  0.3828
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2110 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     121.44
  FLOW VELOCITY(FEET/SEC) =  12.72 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.46   Tc(MIN.) =   29.82
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4020.00 =    3535.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4020.00 TO NODE   4020.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   29.82
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.251
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       29.95      0.43     1.000    77
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        2.43      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   32.38      SUBAREA RUNOFF(CFS) =   53.39
  EFFECTIVE AREA(ACRES) =    105.78   AREA-AVERAGED Fm(INCH/HR) =  0.43
  AREA-AVERAGED Fp(INCH/HR) =  0.43  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      105.8       PEAK FLOW RATE(CFS) =     173.45

****************************************************************************
  FLOW PROCESS FROM NODE   4020.00 TO NODE   4035.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3949.00  DOWNSTREAM(FEET) =   3391.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1777.00   CHANNEL SLOPE =  0.3140
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1985 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     173.45
  FLOW VELOCITY(FEET/SEC) =  13.89 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.13   Tc(MIN.) =   31.95
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4035.00 =    5312.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4035.00 TO NODE   4035.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   31.95
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.160
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       21.90      0.43     1.000    77
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       27.92      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.32
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   49.82      SUBAREA RUNOFF(CFS) =   82.37
  EFFECTIVE AREA(ACRES) =    155.60   AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      155.6       PEAK FLOW RATE(CFS) =     247.12

****************************************************************************
  FLOW PROCESS FROM NODE   4035.00 TO NODE   4035.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   31.95
  RAINFALL INTENSITY(INCH/HR) =   2.16
  AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.40
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =     155.60
  TOTAL STREAM AREA(ACRES) =     155.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     247.12

****************************************************************************
  FLOW PROCESS FROM NODE   4025.00 TO NODE   4030.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   990.00
  ELEVATION DATA: UPSTREAM(FEET) =   4645.00  DOWNSTREAM(FEET) =   4341.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   18.690
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.980
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        3.36      0.43     1.000    77   18.69
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.43
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      7.70
  TOTAL AREA(ACRES) =      3.36   PEAK FLOW RATE(CFS) =      7.70

****************************************************************************
  FLOW PROCESS FROM NODE   4030.00 TO NODE   4035.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   4341.00  DOWNSTREAM(FEET) =   3391.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2793.50   CHANNEL SLOPE =  0.3401
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2035 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       7.70
  FLOW VELOCITY(FEET/SEC) =   4.98 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   9.34   Tc(MIN.) =   28.03
  LONGEST FLOWPATH FROM NODE   4025.00 TO NODE   4035.00 =    3783.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4035.00 TO NODE   4035.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   28.03
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.337
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       24.50      0.43     1.000    77
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       41.10      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.31
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   65.60      SUBAREA RUNOFF(CFS) =  119.65
  EFFECTIVE AREA(ACRES) =     68.96   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.32  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       69.0       PEAK FLOW RATE(CFS) =     125.40

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

```
  FLOW PROCESS FROM NODE   4035.00 TO NODE   4035.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   28.03
  RAINFALL INTENSITY(INCH/HR) =   2.34
  AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.32
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      68.96
  TOTAL STREAM AREA(ACRES) =      68.96
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     125.40

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      247.12   31.95    2.160  0.40( 0.40) 1.00     155.6    4000.00
      2      125.40   28.03    2.337  0.32( 0.32) 1.00      69.0    4025.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      363.88   28.03    2.337  0.37( 0.37) 1.00     205.5    4025.00
      2      361.56   31.95    2.160  0.37( 0.37) 1.00     224.6    4000.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     363.88    Tc(MIN.) =    28.03
  EFFECTIVE AREA(ACRES) =     205.46   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      224.6
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4035.00 =    5312.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4035.00 TO NODE   4040.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3391.00  DOWNSTREAM(FEET) =   2986.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2089.00   CHANNEL SLOPE =  0.1939
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1569 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     363.88
  FLOW VELOCITY(FEET/SEC) =  15.81 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.20   Tc(MIN.) =   30.23
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4040.00 =    7401.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4040.00 TO NODE   4040.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   30.23
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.233
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        1.30      0.43     1.000    77
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       69.93      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   71.23      SUBAREA RUNOFF(CFS) =  127.78
  EFFECTIVE AREA(ACRES) =    276.69   AREA-AVERAGED Fm(INCH/HR) =  0.34
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      295.8       PEAK FLOW RATE(CFS) =     472.49

****************************************************************************
  FLOW PROCESS FROM NODE   4040.00 TO NODE   4042.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2986.00  DOWNSTREAM(FEET) =   2437.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  3047.00   CHANNEL SLOPE =  0.1802
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1501 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     472.49
  FLOW VELOCITY(FEET/SEC) =  16.86 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.01   Tc(MIN.) =   33.24
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4042.00 =   10448.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4042.00 TO NODE   4042.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   33.24
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.109
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        1.57      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       72.50      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   74.07      SUBAREA RUNOFF(CFS) =  124.07
  EFFECTIVE AREA(ACRES) =    350.76   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.32  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      369.9       PEAK FLOW RATE(CFS) =     565.76

****************************************************************************
  FLOW PROCESS FROM NODE   4042.00 TO NODE   4045.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2437.00  DOWNSTREAM(FEET) =   2193.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  3275.40   CHANNEL SLOPE =  0.0745
  CHANNEL FLOW THRU SUBAREA(CFS) =     565.76
  FLOW VELOCITY(FEET/SEC) =  22.24 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.45   Tc(MIN.) =   35.70
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4045.00 =   13723.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4045.00 TO NODE   4045.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   35.70
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.021
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       49.24      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        3.01      0.43     1.000    77
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       27.42      0.24     1.000    88
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      D        6.86      0.14     1.000    93
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.56
```

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  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   86.53      SUBAREA RUNOFF(CFS) =  113.71
  EFFECTIVE AREA(ACRES) =    437.29   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      456.4       PEAK FLOW RATE(CFS) =     651.61

****************************************************************************
  FLOW PROCESS FROM NODE   4045.00 TO NODE   4045.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   35.70
  RAINFALL INTENSITY(INCH/HR) =   2.02
  AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.37
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =     437.29
  TOTAL STREAM AREA(ACRES) =     456.39
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     651.61

****************************************************************************
  FLOW PROCESS FROM NODE   4070.00 TO NODE   4075.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   984.50
  ELEVATION DATA: UPSTREAM(FEET) =   2224.50  DOWNSTREAM(FEET) =   2190.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   28.786
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.300
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.94      0.81     1.000    51   28.79
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      D        5.51      0.14     1.000    93   28.79
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     11.97
  TOTAL AREA(ACRES) =      6.45   PEAK FLOW RATE(CFS) =     11.97

****************************************************************************
  FLOW PROCESS FROM NODE   4075.00 TO NODE   4075.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   28.79
  RAINFALL INTENSITY(INCH/HR) =   2.30
  AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       6.45
  TOTAL STREAM AREA(ACRES) =       6.45
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      11.97

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      651.61   35.70    2.021  0.37( 0.37) 1.00     437.3    4025.00
      1      628.64   39.67    1.897  0.37( 0.37) 1.00     456.4    4000.00
      2       11.97   28.79    2.300  0.24( 0.24) 1.00       6.5    4070.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      625.81   28.79    2.300  0.36( 0.36) 1.00     359.1    4070.00
      2      661.97   35.70    2.021  0.36( 0.36) 1.00     443.7    4025.00
      3      638.27   39.67    1.897  0.36( 0.36) 1.00     462.8    4000.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     661.97    Tc(MIN.) =    35.70
  EFFECTIVE AREA(ACRES) =     443.74   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      462.8
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   4075.00 =   13723.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4075.00 TO NODE   4075.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   4080.00 TO NODE   4085.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   990.00
  ELEVATION DATA: UPSTREAM(FEET) =   2791.50  DOWNSTREAM(FEET) =   2560.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   19.737
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.884
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        3.84      0.81     1.000    51   19.74
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        4.07      0.24     1.000    88   19.74
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.51
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     16.87
  TOTAL AREA(ACRES) =      7.91   PEAK FLOW RATE(CFS) =     16.87

****************************************************************************
  FLOW PROCESS FROM NODE   4085.00 TO NODE   4090.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2560.00  DOWNSTREAM(FEET) =   2158.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =  4028.00   CHANNEL SLOPE =  0.0997
  CHANNEL FLOW THRU SUBAREA(CFS) =      16.87
  FLOW VELOCITY(FEET/SEC) =   9.04 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.43   Tc(MIN.) =   27.16
  LONGEST FLOWPATH FROM NODE   4080.00 TO NODE   4090.00 =    5018.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4090.00 TO NODE   4090.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.16
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.381
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       44.64      0.81     1.000    51
```

```
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        1.58      0.43     1.000    77
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        1.45      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.78
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   47.67      SUBAREA RUNOFF(CFS) =   68.76
  EFFECTIVE AREA(ACRES) =     55.58   AREA-AVERAGED Fm(INCH/HR) =  0.74
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       55.6       PEAK FLOW RATE(CFS) =      82.05

****************************************************************************
  FLOW PROCESS FROM NODE   4090.00 TO NODE   4160.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2158.60  DOWNSTREAM(FEET) =  2143.00
  FLOW LENGTH(FEET) =   715.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.26
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       82.05
  PIPE TRAVEL TIME(MIN.) =   0.78    Tc(MIN.) =   27.95
  LONGEST FLOWPATH FROM NODE   4080.00 TO NODE   4160.00 =    5733.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4090.00 TO NODE   4160.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   4100.00 TO NODE   4105.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   979.00
  ELEVATION DATA: UPSTREAM(FEET) =   4250.40  DOWNSTREAM(FEET) =   3831.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.408
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.110
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        4.97      0.43     1.000    77   17.41
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        2.44      0.24     1.000    88   17.41
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.37
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     18.28
  TOTAL AREA(ACRES) =      7.41   PEAK FLOW RATE(CFS) =     18.28

****************************************************************************
  FLOW PROCESS FROM NODE   4105.00 TO NODE   4110.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3831.00  DOWNSTREAM(FEET) =   3169.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =  3831.00   CHANNEL SLOPE =  0.1727
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1463 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      18.28
  FLOW VELOCITY(FEET/SEC) =   5.64 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  11.33   Tc(MIN.) =   28.73
  LONGEST FLOWPATH FROM NODE   4100.00 TO NODE   4110.00 =    4810.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4110.00 TO NODE   4110.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   28.73
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.302
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        8.54      0.43     1.000    77
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       47.95      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   56.49      SUBAREA RUNOFF(CFS) =  103.52
  EFFECTIVE AREA(ACRES) =     63.90   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       63.9       PEAK FLOW RATE(CFS) =     116.41

****************************************************************************
  FLOW PROCESS FROM NODE   4110.00 TO NODE   4115.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3169.40  DOWNSTREAM(FEET) =   2959.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   891.00   CHANNEL SLOPE =  0.2360
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1753 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     116.41
  FLOW VELOCITY(FEET/SEC) =  11.43 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.30   Tc(MIN.) =   30.03
  LONGEST FLOWPATH FROM NODE   4100.00 TO NODE   4115.00 =    5701.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4115.00 TO NODE   4115.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   30.03
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.242
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       47.89      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   47.89      SUBAREA RUNOFF(CFS) =   86.45
  EFFECTIVE AREA(ACRES) =    111.79   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      111.8       PEAK FLOW RATE(CFS) =     199.40

****************************************************************************
  FLOW PROCESS FROM NODE   4115.00 TO NODE   4140.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2959.10  DOWNSTREAM(FEET) =   2425.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  3438.70   CHANNEL SLOPE =  0.1553
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1377 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     199.40
  FLOW VELOCITY(FEET/SEC) =  12.12 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.73   Tc(MIN.) =   34.76
  LONGEST FLOWPATH FROM NODE   4100.00 TO NODE   4140.00 =    9139.70 FEET.

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

```
  FLOW PROCESS FROM NODE   4140.00 TO NODE   4140.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   34.76
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.053
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        3.17      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       63.00      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   66.17      SUBAREA RUNOFF(CFS) =  106.60
  EFFECTIVE AREA(ACRES) =    177.96   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      178.0       PEAK FLOW RATE(CFS) =     287.05

****************************************************************************
  FLOW PROCESS FROM NODE   4140.00 TO NODE   4140.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   34.76
  RAINFALL INTENSITY(INCH/HR) =   2.05
  AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =     177.96
  TOTAL STREAM AREA(ACRES) =     177.96
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     287.05

****************************************************************************
  FLOW PROCESS FROM NODE   4120.00 TO NODE   4125.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   995.00
  ELEVATION DATA: UPSTREAM(FEET) =   4054.00  DOWNSTREAM(FEET) =   3679.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.976
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.050
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        3.67      0.24     1.000    88   17.98
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      9.30
  TOTAL AREA(ACRES) =      3.67   PEAK FLOW RATE(CFS) =      9.30

****************************************************************************
  FLOW PROCESS FROM NODE   4125.00 TO NODE   4130.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3679.00  DOWNSTREAM(FEET) =   3198.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1993.50   CHANNEL SLOPE =  0.2410
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1770 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       9.30
  FLOW VELOCITY(FEET/SEC) =   4.95 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.71   Tc(MIN.) =   24.69
  LONGEST FLOWPATH FROM NODE   4120.00 TO NODE   4130.00 =    2988.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4130.00 TO NODE   4130.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   24.69
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.522
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       35.00      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   35.00      SUBAREA RUNOFF(CFS) =   71.99
  EFFECTIVE AREA(ACRES) =     38.67   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       38.7       PEAK FLOW RATE(CFS) =      79.54

****************************************************************************
  FLOW PROCESS FROM NODE   4130.00 TO NODE   4135.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3198.50  DOWNSTREAM(FEET) =   2717.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1936.80   CHANNEL SLOPE =  0.2483
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1794 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      79.54
  FLOW VELOCITY(FEET/SEC) =  10.19 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.17   Tc(MIN.) =   27.86
  LONGEST FLOWPATH FROM NODE   4120.00 TO NODE   4135.00 =    4925.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4135.00 TO NODE   4135.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.86
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.345
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       59.64      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   59.64      SUBAREA RUNOFF(CFS) =  113.22
  EFFECTIVE AREA(ACRES) =     98.31   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       98.3       PEAK FLOW RATE(CFS) =     186.63

****************************************************************************
  FLOW PROCESS FROM NODE   4135.00 TO NODE   4140.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2717.60  DOWNSTREAM(FEET) =   2425.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1772.00   CHANNEL SLOPE =  0.1651
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1426 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     186.63
  FLOW VELOCITY(FEET/SEC) =  12.06 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.45   Tc(MIN.) =   30.31
  LONGEST FLOWPATH FROM NODE   4120.00 TO NODE   4140.00 =    6697.30 FEET.

****************************************************************************
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```
  FLOW PROCESS FROM NODE   4140.00 TO NODE   4140.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   30.31
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.230
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       25.08      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   25.08      SUBAREA RUNOFF(CFS) =   45.00
  EFFECTIVE AREA(ACRES) =    123.39   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      123.4       PEAK FLOW RATE(CFS) =     221.40

****************************************************************************
  FLOW PROCESS FROM NODE   4140.00 TO NODE   4140.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   30.31
  RAINFALL INTENSITY(INCH/HR) =   2.23
  AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =     123.39
  TOTAL STREAM AREA(ACRES) =     123.39
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     221.40

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      287.05   34.76    2.053  0.26( 0.26) 1.00     178.0    4100.00
      2      221.40   30.31    2.230  0.24( 0.24) 1.00     123.4    4120.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      496.25   30.31    2.230  0.25( 0.25) 1.00     278.5    4120.00
      2      488.88   34.76    2.053  0.25( 0.25) 1.00     301.3    4100.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     496.25    Tc(MIN.) =    30.31
  EFFECTIVE AREA(ACRES) =     278.53   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      301.3
  LONGEST FLOWPATH FROM NODE   4100.00 TO NODE   4140.00 =    9139.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4140.00 TO NODE   4155.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2425.00  DOWNSTREAM(FEET) =   2318.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   850.90   CHANNEL SLOPE =  0.1257
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1188 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     496.25
  FLOW VELOCITY(FEET/SEC) =  15.25 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.93   Tc(MIN.) =   31.24
  LONGEST FLOWPATH FROM NODE   4100.00 TO NODE   4155.00 =    9990.60 FEET.
```

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****************************************************************************
  FLOW PROCESS FROM NODE   4100.00 TO NODE   4155.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   31.24
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.190
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        9.33      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        2.80      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.68
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   12.13      SUBAREA RUNOFF(CFS) =   16.52
  EFFECTIVE AREA(ACRES) =    290.66   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      313.5       PEAK FLOW RATE(CFS) =     502.73

****************************************************************************
  FLOW PROCESS FROM NODE   4155.00 TO NODE   4155.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   31.24
  RAINFALL INTENSITY(INCH/HR) =   2.19
  AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =     290.66
  TOTAL STREAM AREA(ACRES) =     313.48
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     502.73

****************************************************************************
  FLOW PROCESS FROM NODE   4145.00 TO NODE   4150.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   990.00
  ELEVATION DATA: UPSTREAM(FEET) =   3190.00  DOWNSTREAM(FEET) =   2810.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.880
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.060
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        8.39      0.24     1.000    88   17.88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     21.32
  TOTAL AREA(ACRES) =      8.39   PEAK FLOW RATE(CFS) =     21.32

****************************************************************************
  FLOW PROCESS FROM NODE   4150.00 TO NODE   4155.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2810.00  DOWNSTREAM(FEET) =   2318.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2172.70   CHANNEL SLOPE =  0.2262
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1721 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      21.32
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  FLOW VELOCITY(FEET/SEC) =   6.43 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.63   Tc(MIN.) =   23.51
  LONGEST FLOWPATH FROM NODE   4145.00 TO NODE   4155.00 =    3162.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4155.00 TO NODE   4155.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   23.51
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.597
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        0.40      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       34.30      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   34.70      SUBAREA RUNOFF(CFS) =   73.52
  EFFECTIVE AREA(ACRES) =     43.09   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       43.1       PEAK FLOW RATE(CFS) =      91.35

****************************************************************************
  FLOW PROCESS FROM NODE   4155.00 TO NODE   4155.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   23.51
  RAINFALL INTENSITY(INCH/HR) =   2.60
  AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.24
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      43.09
  TOTAL STREAM AREA(ACRES) =      43.09
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      91.35

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      502.73   31.24    2.190  0.27( 0.27) 1.00     290.7    4120.00
      1      494.77   35.70    2.021  0.27( 0.27) 1.00     313.5    4100.00
      2       91.35   23.51    2.597  0.24( 0.24) 1.00      43.1    4145.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      549.86   23.51    2.597  0.26( 0.26) 1.00     261.8    4145.00
      2      578.29   31.24    2.190  0.26( 0.26) 1.00     333.8    4120.00
      3      563.79   35.70    2.021  0.26( 0.26) 1.00     356.6    4100.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     578.29    Tc(MIN.) =    31.24
  EFFECTIVE AREA(ACRES) =     333.75   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      356.6
  LONGEST FLOWPATH FROM NODE   4100.00 TO NODE   4155.00 =    9990.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4155.00 TO NODE   4160.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2318.60  DOWNSTREAM(FEET) =   2151.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2555.00   CHANNEL SLOPE =  0.0655
  CHANNEL FLOW THRU SUBAREA(CFS) =     578.29
  FLOW VELOCITY(FEET/SEC) =  21.00 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.03   Tc(MIN.) =   33.26
  LONGEST FLOWPATH FROM NODE   4100.00 TO NODE   4160.00 =   12545.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4160.00 TO NODE   4160.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   33.26
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.109
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       36.30      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        4.05      0.24     1.000    88
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        0.68      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   41.03      SUBAREA RUNOFF(CFS) =   50.34
  EFFECTIVE AREA(ACRES) =    374.78   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.32  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      397.6       PEAK FLOW RATE(CFS) =     604.27

****************************************************************************
  FLOW PROCESS FROM NODE   4160.00 TO NODE   4160.00 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      583.42   25.57    2.469  0.33( 0.33) 1.00     302.9    4145.00
      2      604.27   33.26    2.109  0.32( 0.32) 1.00     374.8    4120.00
      3      587.14   37.74    1.955  0.31( 0.31) 1.00     397.6    4100.00
  LONGEST FLOWPATH FROM NODE   4100.00 TO NODE   4160.00 =   12545.60 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       82.05   27.95    2.341  0.74( 0.74) 1.00      55.6    4080.00
  LONGEST FLOWPATH FROM NODE   4080.00 TO NODE   4160.00 =    5733.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      664.51   25.57    2.469  0.39( 0.39) 1.00     353.7    4145.00
      2      671.92   27.95    2.341  0.39( 0.39) 1.00     380.7    4080.00
      3      674.41   33.26    2.109  0.37( 0.37) 1.00     430.4    4120.00
      4      649.39   37.74    1.955  0.37( 0.37) 1.00     453.2    4100.00
    TOTAL AREA(ACRES) =       453.2

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      674.41  Tc(MIN.) =   33.263
  EFFECTIVE AREA(ACRES) =    430.36  AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.39  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      453.2
  LONGEST FLOWPATH FROM NODE   4100.00 TO NODE   4160.00 =   12545.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4160.00 TO NODE   4160.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
```

```
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   4160.00 TO NODE   7550.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2143.00  DOWNSTREAM(FEET) =  2125.00
  FLOW LENGTH(FEET) =  1000.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  78.0 INCH PIPE IS  62.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.55
  ESTIMATED PIPE DIAMETER(INCH) =  78.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     674.41
  PIPE TRAVEL TIME(MIN.) =   0.71    Tc(MIN.) =   33.97
  LONGEST FLOWPATH FROM NODE   4100.00 TO NODE   7550.00 =   13545.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7550.00 TO NODE   7550.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   33.97
  RAINFALL INTENSITY(INCH/HR) =   2.08
  AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.37
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =     430.36
  TOTAL STREAM AREA(ACRES) =     453.18
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     674.41

****************************************************************************
  FLOW PROCESS FROM NODE   4050.00 TO NODE   4055.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   700.00
  ELEVATION DATA: UPSTREAM(FEET) =   2338.00  DOWNSTREAM(FEET) =   2160.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   16.896
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.166
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        3.08      0.81     1.000    51   16.90
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        0.14      0.43     1.000    77   16.90
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.79
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      6.88
  TOTAL AREA(ACRES) =      3.22   PEAK FLOW RATE(CFS) =      6.88

****************************************************************************
  FLOW PROCESS FROM NODE   4055.00 TO NODE   4060.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2160.00  DOWNSTREAM(FEET) =   2133.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   617.00   CHANNEL SLOPE =  0.0438
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0438 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       6.88
  FLOW VELOCITY(FEET/SEC) =   2.23 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.62   Tc(MIN.) =   21.51
  LONGEST FLOWPATH FROM NODE   4050.00 TO NODE   4060.00 =    1317.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4060.00 TO NODE   4060.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.51
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.739
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        7.64      0.81     1.000    51
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    7.64      SUBAREA RUNOFF(CFS) =   13.27
  EFFECTIVE AREA(ACRES) =     10.86   AREA-AVERAGED Fm(INCH/HR) =  0.80
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       10.9       PEAK FLOW RATE(CFS) =      18.92

****************************************************************************
  FLOW PROCESS FROM NODE   4160.00 TO NODE   4160.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.51
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.739
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        4.62      0.80     0.100    52
  COMMERCIAL                 B        1.03      0.45     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.73
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    5.65      SUBAREA RUNOFF(CFS) =   13.55
  EFFECTIVE AREA(ACRES) =     16.51   AREA-AVERAGED Fm(INCH/HR) =  0.55
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.69
  TOTAL AREA(ACRES) =       16.5       PEAK FLOW RATE(CFS) =      32.47

****************************************************************************
  FLOW PROCESS FROM NODE   4160.00 TO NODE   7550.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   21.51
  RAINFALL INTENSITY(INCH/HR) =   2.74
  AREA-AVERAGED Fm(INCH/HR) =  0.55
  AREA-AVERAGED Fp(INCH/HR) =  0.80
  AREA-AVERAGED Ap =  0.69
  EFFECTIVE STREAM AREA(ACRES) =      16.51
  TOTAL STREAM AREA(ACRES) =      16.51
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      32.47

****************************************************************************
  FLOW PROCESS FROM NODE   7540.00 TO NODE   7545.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   997.00
  ELEVATION DATA: UPSTREAM(FEET) =   2182.00  DOWNSTREAM(FEET) =   2155.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.729
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.941
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  CONDOMINIUMS               A        8.38      0.80     0.350    52   11.73
```

```
  CONDOMINIUMS               D        1.12      0.18     0.350    91   11.73
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.72
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA RUNOFF(CFS) =     31.53
  TOTAL AREA(ACRES) =      9.50   PEAK FLOW RATE(CFS) =     31.53

****************************************************************************
  FLOW PROCESS FROM NODE   7545.00 TO NODE   7550.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2155.00  DOWNSTREAM(FEET) =  2125.00
  FLOW LENGTH(FEET) =  1027.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.43
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      31.53
  PIPE TRAVEL TIME(MIN.) =   1.27    Tc(MIN.) =   13.00
  LONGEST FLOWPATH FROM NODE   7540.00 TO NODE   7550.00 =    2024.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7550.00 TO NODE   7550.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.704
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS               A       10.38      0.80     0.350    52
  CONDOMINIUMS               B        2.31      0.45     0.350    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.73
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =   12.69      SUBAREA RUNOFF(CFS) =   39.38
  EFFECTIVE AREA(ACRES) =     22.19   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.73  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =       22.2       PEAK FLOW RATE(CFS) =      68.89

****************************************************************************
  FLOW PROCESS FROM NODE   7550.00 TO NODE   7550.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.00
  RAINFALL INTENSITY(INCH/HR) =   3.70
  AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.73
  AREA-AVERAGED Ap =  0.35
  EFFECTIVE STREAM AREA(ACRES) =      22.19
  TOTAL STREAM AREA(ACRES) =      22.19
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      68.89

  ** CONFLUENCE DATA **
   STREAM       Q       Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      664.51   26.28    2.429  0.39( 0.39) 1.00     353.7    4145.00
      1      671.92   28.65    2.306  0.39( 0.39) 1.00     380.7    4080.00
      1      674.41   33.97    2.082  0.37( 0.37) 1.00     430.4    4120.00
      1      649.39   38.45    1.933  0.37( 0.37) 1.00     453.2    4100.00
      2       32.47   21.51    2.739  0.80( 0.55) 0.69      16.5    4050.00
      3       68.89   13.00    3.704  0.73( 0.26) 0.35      22.2    7540.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q       Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      631.55   13.00    3.704  0.42( 0.38) 0.92     207.2    7540.00
      2      708.68   21.51    2.739  0.41( 0.39) 0.94     328.3    4050.00
      3      735.79   26.28    2.429  0.41( 0.39) 0.95     392.4    4145.00
      4      738.91   28.65    2.306  0.40( 0.39) 0.95     419.4    4080.00
      5      733.61   33.97    2.082  0.39( 0.37) 0.96     469.1    4120.00
      6      703.39   38.45    1.933  0.38( 0.37) 0.96     491.9    4100.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     738.91    Tc(MIN.) =    28.65
  EFFECTIVE AREA(ACRES) =     419.37   AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =      491.9
  LONGEST FLOWPATH FROM NODE   4100.00 TO NODE   7550.00 =   13545.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7550.00 TO NODE   7550.00 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      631.55   13.00    3.704  0.42( 0.38) 0.92     207.2    7540.00
      2      708.68   21.51    2.739  0.41( 0.39) 0.94     328.3    4050.00
      3      735.79   26.28    2.429  0.41( 0.39) 0.95     392.4    4145.00
      4      738.91   28.65    2.306  0.40( 0.39) 0.95     419.4    4080.00
      5      733.61   33.97    2.082  0.39( 0.37) 0.96     469.1    4120.00
      6      703.39   38.45    1.933  0.38( 0.37) 0.96     491.9    4100.00
  LONGEST FLOWPATH FROM NODE   4100.00 TO NODE   7550.00 =   13545.60 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      625.81   28.79    2.300  0.36( 0.36) 1.00     359.1    4070.00
      2      661.97   35.70    2.021  0.36( 0.36) 1.00     443.7    4025.00
      3      638.27   39.67    1.897  0.36( 0.36) 1.00     462.8    4000.00
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   7550.00 =   13723.40 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q       Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1119.32   13.00    3.704  0.39( 0.37) 0.95     369.4    7540.00
      2     1282.42   21.51    2.739  0.39( 0.38) 0.97     596.7    4050.00
      3     1345.20   26.28    2.429  0.39( 0.38) 0.97     720.2    4145.00
      4     1363.89   28.65    2.306  0.38( 0.38) 0.97     776.8    4080.00
      5     1364.59   28.79    2.300  0.38( 0.37) 0.97     779.7    4070.00
      6     1386.54   33.97    2.082  0.38( 0.37) 0.98     891.6    4120.00
      7     1383.92   35.70    2.021  0.38( 0.37) 0.98     921.6    4025.00
      8     1348.95   38.45    1.933  0.37( 0.37) 0.98     948.8    4100.00
      9     1325.52   39.67    1.897  0.37( 0.37) 0.98     954.7    4000.00
    TOTAL AREA(ACRES) =       954.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     1386.54  Tc(MIN.) =   33.970
  EFFECTIVE AREA(ACRES) =    891.63  AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =      954.7
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   7550.00 =   13723.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7550.00 TO NODE   7550.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   7550.00 TO NODE   7550.00 IS CODE =  10
----------------------------------------------------------------------------
```

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

******************************************************************************
  FLOW PROCESS FROM NODE   4200.00 TO NODE   4205.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   990.00
  ELEVATION DATA: UPSTREAM(FEET) =   3012.00  DOWNSTREAM(FEET) =   2621.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.773
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.071
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        6.17      0.24     1.000    88   17.77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      15.74
  TOTAL AREA(ACRES) =      6.17   PEAK FLOW RATE(CFS) =     15.74

******************************************************************************
  FLOW PROCESS FROM NODE   4205.00 TO NODE   4210.00 IS CODE =  53
------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2621.00  DOWNSTREAM(FEET) =   2192.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2518.00   CHANNEL SLOPE =  0.1704
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1452 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      15.74
  FLOW VELOCITY(FEET/SEC) =   5.34 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.85   Tc(MIN.) =   25.63
  LONGEST FLOWPATH FROM NODE   4200.00 TO NODE   4210.00 =    3508.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE   4210.00 TO NODE   4210.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   25.63
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.466
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        5.52      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       27.93      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   33.45      SUBAREA RUNOFF(CFS) =   64.28
  EFFECTIVE AREA(ACRES) =     39.62   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.32  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       39.6       PEAK FLOW RATE(CFS) =      76.66

******************************************************************************
  FLOW PROCESS FROM NODE   4210.00 TO NODE   4215.00 IS CODE =  53
------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2192.00  DOWNSTREAM(FEET) =   2101.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1325.00   CHANNEL SLOPE =  0.0687
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0687 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      76.66
  FLOW VELOCITY(FEET/SEC) =   6.23 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.55   Tc(MIN.) =   29.17
  LONGEST FLOWPATH FROM NODE   4200.00 TO NODE   4215.00 =    4833.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE   4215.00 TO NODE   4215.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   29.17
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.281
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       10.58      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B        2.89      0.43     1.000    77
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        0.52      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.71
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   13.99      SUBAREA RUNOFF(CFS) =   19.79
  EFFECTIVE AREA(ACRES) =     53.61   AREA-AVERAGED Fm(INCH/HR) =  0.42
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       53.6       PEAK FLOW RATE(CFS) =      89.87

******************************************************************************
  FLOW PROCESS FROM NODE   4280.00 TO NODE   4215.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   29.17
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.281
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        6.60      0.81     1.000    51
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.81
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    6.60      SUBAREA RUNOFF(CFS) =    8.75
  EFFECTIVE AREA(ACRES) =     60.21   AREA-AVERAGED Fm(INCH/HR) =  0.46
  AREA-AVERAGED Fp(INCH/HR) =  0.46  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       60.2       PEAK FLOW RATE(CFS) =      98.62

******************************************************************************
  FLOW PROCESS FROM NODE   4215.00 TO NODE   4260.00 IS CODE =  31
------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2100.00  DOWNSTREAM(FEET) =  2064.00
  FLOW LENGTH(FEET) =  1124.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.47
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      98.62
  PIPE TRAVEL TIME(MIN.) =   1.01    Tc(MIN.) =   30.19
  LONGEST FLOWPATH FROM NODE   4200.00 TO NODE   4260.00 =    5957.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE   4260.00 TO NODE   4260.00 IS CODE =   1
------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   30.19
  RAINFALL INTENSITY(INCH/HR) =   2.23
```

```
  AREA-AVERAGED Fm(INCH/HR) =  0.46
  AREA-AVERAGED Fp(INCH/HR) =  0.46
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      60.21
  TOTAL STREAM AREA(ACRES) =      60.21
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      98.62

****************************************************************************
  FLOW PROCESS FROM NODE   4250.00 TO NODE   4255.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   990.00
  ELEVATION DATA: UPSTREAM(FEET) =   3020.00  DOWNSTREAM(FEET) =   2669.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   18.161
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.032
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C        8.05      0.24     1.000    88   18.16
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.24
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     20.25
  TOTAL AREA(ACRES) =      8.05   PEAK FLOW RATE(CFS) =     20.25

****************************************************************************
  FLOW PROCESS FROM NODE   4255.00 TO NODE   4258.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2669.00  DOWNSTREAM(FEET) =   2151.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  3216.40   CHANNEL SLOPE =  0.1610
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1405 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      20.25
  FLOW VELOCITY(FEET/SEC) =   5.72 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   9.38   Tc(MIN.) =   27.54
  LONGEST FLOWPATH FROM NODE   4250.00 TO NODE   4258.00 =    4206.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4258.00 TO NODE   4258.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.54
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.362
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A        4.72      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      C       56.71      0.24     1.000    88
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   61.43      SUBAREA RUNOFF(CFS) =  115.08
  EFFECTIVE AREA(ACRES) =     69.48   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       69.5       PEAK FLOW RATE(CFS) =     130.48

****************************************************************************
  FLOW PROCESS FROM NODE   4258.00 TO NODE   4260.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   2151.40  DOWNSTREAM(FEET) =   2064.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1767.80   CHANNEL SLOPE =  0.0494
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0494 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     130.48
  FLOW VELOCITY(FEET/SEC) =   6.31 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.67   Tc(MIN.) =   32.21
  LONGEST FLOWPATH FROM NODE   4250.00 TO NODE   4260.00 =    5974.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4260.00 TO NODE   4260.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   32.21
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.150
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      A       11.79      0.81     1.000    51
  NATURAL GOOD COVER
  "CHAPARRAL,BROADLEAF"      B       10.78      0.43     1.000    77
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.63
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   22.57      SUBAREA RUNOFF(CFS) =   30.88
  EFFECTIVE AREA(ACRES) =     92.05   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       92.1       PEAK FLOW RATE(CFS) =     148.11

****************************************************************************
  FLOW PROCESS FROM NODE   4260.00 TO NODE   4260.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   32.21
  RAINFALL INTENSITY(INCH/HR) =   2.15
  AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.36
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      92.05
  TOTAL STREAM AREA(ACRES) =      92.05
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     148.11

  ** CONFLUENCE DATA **
   STREAM        Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
      1       98.62   30.19    2.235  0.46( 0.46) 1.00      60.2    4200.00
      2      148.11   32.21    2.150  0.36( 0.36) 1.00      92.1    4250.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM        Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
      1      244.05   30.19    2.235  0.40( 0.40) 1.00     146.5    4200.00
      2      241.99   32.21    2.150  0.40( 0.40) 1.00     152.3    4250.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     244.05    Tc(MIN.) =    30.19
  EFFECTIVE AREA(ACRES) =     146.48   AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      152.3
  LONGEST FLOWPATH FROM NODE   4250.00 TO NODE   4260.00 =    5974.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   4260.00 TO NODE   7535.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2064.00  DOWNSTREAM(FEET) =  2055.00
  FLOW LENGTH(FEET) =   904.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  47.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.69
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     244.05
  PIPE TRAVEL TIME(MIN.) =   1.03    Tc(MIN.) =   31.21
  LONGEST FLOWPATH FROM NODE   4250.00 TO NODE   7535.00 =    6878.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7535.00 TO NODE   7535.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   7500.00 TO NODE   7505.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   996.00
  ELEVATION DATA: UPSTREAM(FEET) =   2125.00  DOWNSTREAM(FEET) =   2094.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.402
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.008
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  CONDOMINIUMS              B        9.22      0.45      0.350    76   11.40
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.45
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA RUNOFF(CFS) =     31.95
  TOTAL AREA(ACRES) =      9.22   PEAK FLOW RATE(CFS) =     31.95

****************************************************************************
  FLOW PROCESS FROM NODE   7505.00 TO NODE   7505.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2094.00  DOWNSTREAM(FEET) =  2083.90
  FLOW LENGTH(FEET) =   450.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.98
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      31.95
  PIPE TRAVEL TIME(MIN.) =   0.63    Tc(MIN.) =   12.03
  LONGEST FLOWPATH FROM NODE   7500.00 TO NODE   7505.10 =    1446.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7505.10 TO NODE   7505.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.03
  RAINFALL INTENSITY(INCH/HR) =   3.88
  AREA-AVERAGED Fm(INCH/HR) =  0.16
  AREA-AVERAGED Fp(INCH/HR) =  0.45
  AREA-AVERAGED Ap =  0.35
  EFFECTIVE STREAM AREA(ACRES) =       9.22
  TOTAL STREAM AREA(ACRES) =        9.22
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      31.95
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   7515.00 TO NODE   7520.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   800.00
  ELEVATION DATA: UPSTREAM(FEET) =   2113.00  DOWNSTREAM(FEET) =   2097.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.455
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.997
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  CONDOMINIUMS               A        8.27      0.80      0.350    52   11.45
  CONDOMINIUMS               B        2.04      0.45      0.350    76   11.45
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.73
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA RUNOFF(CFS) =     34.73
  TOTAL AREA(ACRES) =     10.31   PEAK FLOW RATE(CFS) =     34.73

****************************************************************************
  FLOW PROCESS FROM NODE   7520.00 TO NODE   7505.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2097.30  DOWNSTREAM(FEET) =  2083.90
  FLOW LENGTH(FEET) =   350.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.28
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      34.73
  PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =   11.84
  LONGEST FLOWPATH FROM NODE   7515.00 TO NODE   7505.10 =    1150.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7505.10 TO NODE   7505.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.84
  RAINFALL INTENSITY(INCH/HR) =   3.92
  AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.73
  AREA-AVERAGED Ap =  0.35
  EFFECTIVE STREAM AREA(ACRES) =      10.31
  TOTAL STREAM AREA(ACRES) =      10.31
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      34.73

  ** CONFLUENCE DATA **
   STREAM        Q       Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       31.95   12.03    3.882  0.45( 0.16) 0.35       9.2    7500.00
      2       34.73   11.84    3.919  0.73( 0.25) 0.35      10.3    7515.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM        Q       Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       66.48   11.84    3.919  0.60( 0.21) 0.35      19.4    7515.00
      2       66.32   12.03    3.882  0.60( 0.21) 0.35      19.5    7500.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      66.48    Tc(MIN.) =    11.84
```

```
  EFFECTIVE AREA(ACRES) =      19.38   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.60  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =       19.5
  LONGEST FLOWPATH FROM NODE   7500.00 TO NODE   7505.10 =    1446.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7505.10 TO NODE   7510.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2083.90  DOWNSTREAM(FEET) =  2059.70
  FLOW LENGTH(FEET) =  1050.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.79
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      66.48
  PIPE TRAVEL TIME(MIN.) =   1.18    Tc(MIN.) =   13.02
  LONGEST FLOWPATH FROM NODE   7500.00 TO NODE   7510.00 =    2496.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7510.00 TO NODE   7510.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.02
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.702
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  CONDOMINIUMS               A        5.47      0.80     0.350    52
  CONDOMINIUMS               B       10.57      0.45     0.350    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.57
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA AREA(ACRES) =   16.04      SUBAREA RUNOFF(CFS) =   50.56
  EFFECTIVE AREA(ACRES) =     35.42   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.59  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =       35.6       PEAK FLOW RATE(CFS) =     111.48

****************************************************************************
  FLOW PROCESS FROM NODE   7510.00 TO NODE   7510.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.02
  RAINFALL INTENSITY(INCH/HR) =   3.70
  AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.59
  AREA-AVERAGED Ap =  0.35
  EFFECTIVE STREAM AREA(ACRES) =      35.42
  TOTAL STREAM AREA(ACRES) =      35.57
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     111.48

****************************************************************************
  FLOW PROCESS FROM NODE   7521.00 TO NODE   7525.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   500.00
  ELEVATION DATA: UPSTREAM(FEET) =   2097.30  DOWNSTREAM(FEET) =   2064.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.434
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.181
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  CONDOMINIUMS               A       11.43      0.80     0.350    52    7.43
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.350
  SUBAREA RUNOFF(CFS) =     50.43
  TOTAL AREA(ACRES) =     11.43   PEAK FLOW RATE(CFS) =     50.43

****************************************************************************
  FLOW PROCESS FROM NODE   7525.00 TO NODE   7510.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2064.00  DOWNSTREAM(FEET) =  2059.70
  FLOW LENGTH(FEET) =   550.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.17
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      50.43
  PIPE TRAVEL TIME(MIN.) =   1.00    Tc(MIN.) =    8.43
  LONGEST FLOWPATH FROM NODE   7521.00 TO NODE   7510.00 =    1050.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7510.00 TO NODE   7510.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.43
  RAINFALL INTENSITY(INCH/HR) =   4.80
  AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.80
  AREA-AVERAGED Ap =  0.35
  EFFECTIVE STREAM AREA(ACRES) =      11.43
  TOTAL STREAM AREA(ACRES) =      11.43
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      50.43

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
      1      111.48   13.02    3.702  0.59( 0.20) 0.35      35.4    7515.00
      1      110.91   13.21    3.669  0.58( 0.20) 0.35      35.6    7500.00
      2       50.43    8.43    4.804  0.80( 0.28) 0.35      11.4    7521.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)        (ACRES)    NODE
      1      145.39    8.43    4.804  0.66( 0.23) 0.35      34.4    7521.00
      2      149.63   13.02    3.702  0.64( 0.22) 0.35      46.9    7515.00
      3      148.70   13.21    3.669  0.64( 0.22) 0.35      47.0    7500.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     149.63    Tc(MIN.) =    13.02
  EFFECTIVE AREA(ACRES) =      46.85   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.64  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =      47.0
  LONGEST FLOWPATH FROM NODE   7500.00 TO NODE   7510.00 =    2496.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7510.00 TO NODE   7510.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2062.00  DOWNSTREAM(FEET) =  2059.70
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  31.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.12
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     149.63
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   13.11
  LONGEST FLOWPATH FROM NODE   7500.00 TO NODE   7510.00 =    2596.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7535.00 TO NODE   7535.00 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      145.39    8.53    4.771  0.66( 0.23) 0.35      34.4    7521.00
      2      149.63   13.11    3.686  0.64( 0.22) 0.35      46.9    7515.00
      3      148.70   13.31    3.653  0.64( 0.22) 0.35      47.0    7500.00
  LONGEST FLOWPATH FROM NODE   7500.00 TO NODE   7535.00 =    2596.00 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      244.05   31.21    2.190  0.40( 0.40) 1.00     146.5    4200.00
      2      241.99   33.24    2.110  0.40( 0.40) 1.00     152.3    4250.00
  LONGEST FLOWPATH FROM NODE   4250.00 TO NODE   7535.00 =    6878.20 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      308.32    8.53    4.771  0.46( 0.32) 0.70      74.4    7521.00
      2      337.90   13.11    3.686  0.45( 0.32) 0.72     108.4    7515.00
      3      337.88   13.31    3.653  0.45( 0.33) 0.72     109.4    7500.00
      4      329.34   31.21    2.190  0.43( 0.36) 0.84     193.5    4200.00
      5      323.77   33.24    2.110  0.42( 0.36) 0.85     199.3    4250.00
    TOTAL AREA(ACRES) =       199.3

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      337.90  Tc(MIN.) =   13.112
  EFFECTIVE AREA(ACRES) =    108.38  AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.45  AREA-AVERAGED Ap =  0.72
  TOTAL AREA(ACRES) =      199.3
  LONGEST FLOWPATH FROM NODE   4250.00 TO NODE   7535.00 =    6878.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7535.00 TO NODE   7535.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   7535.00 TO NODE   7535.00 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      308.32    8.53    4.771  0.46( 0.32) 0.70      74.4    7521.00
      2      337.90   13.11    3.686  0.45( 0.32) 0.72     108.4    7515.00
      3      337.88   13.31    3.653  0.45( 0.33) 0.72     109.4    7500.00
      4      329.34   31.21    2.190  0.43( 0.36) 0.84     193.5    4200.00
      5      323.77   33.24    2.110  0.42( 0.36) 0.85     199.3    4250.00
  LONGEST FLOWPATH FROM NODE   4250.00 TO NODE   7535.00 =    6878.20 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     1119.32   13.00    3.704  0.39( 0.37) 0.95     369.4    7540.00
      2     1282.42   21.51    2.739  0.39( 0.38) 0.97     596.7    4050.00
      3     1345.20   26.28    2.429  0.39( 0.38) 0.97     720.2    4145.00
      4     1363.89   28.65    2.306  0.38( 0.38) 0.97     776.8    4080.00
      5     1364.59   28.79    2.300  0.38( 0.37) 0.97     779.7    4070.00
      6     1386.54   33.97    2.082  0.38( 0.37) 0.98     891.6    4120.00
      7     1383.92   35.70    2.021  0.38( 0.37) 0.98     921.6    4025.00
      8     1348.95   38.45    1.933  0.37( 0.37) 0.98     948.8    4100.00
      9     1325.52   39.67    1.897  0.37( 0.37) 0.98     954.7    4000.00
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   7535.00 =   13723.40 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1277.54    8.53    4.771  0.40( 0.36) 0.89     316.7    7521.00
      2     1456.51   13.00    3.704  0.40( 0.36) 0.90     477.0    7540.00
      3     1459.30   13.11    3.686  0.40( 0.36) 0.90     480.7    7515.00
      4     1463.01   13.31    3.653  0.40( 0.36) 0.90     487.0    7500.00
      5     1616.39   21.51    2.739  0.40( 0.37) 0.93     744.6    4050.00
      6     1676.90   26.28    2.429  0.39( 0.37) 0.94     890.5    4145.00
      7     1694.46   28.65    2.306  0.39( 0.37) 0.95     958.2    4080.00
      8     1695.09   28.79    2.300  0.39( 0.37) 0.95     961.7    4070.00
      9     1704.21   31.21    2.190  0.39( 0.37) 0.95    1025.6    4200.00
     10     1707.20   33.24    2.110  0.39( 0.37) 0.95    1075.0    4250.00
     11     1705.23   33.97    2.082  0.38( 0.37) 0.95    1090.9    4120.00
     12     1691.31   35.70    2.021  0.38( 0.37) 0.96    1120.9    4025.00
     13     1640.06   38.45    1.933  0.38( 0.36) 0.96    1148.1    4100.00
     14     1609.99   39.67    1.897  0.38( 0.36) 0.96    1154.0    4000.00
    TOTAL AREA(ACRES) =      1154.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     1707.20  Tc(MIN.) =   33.237
  EFFECTIVE AREA(ACRES) =   1075.05  AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.93
  TOTAL AREA(ACRES) =     1154.0
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   7535.00 =   13723.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7535.00 TO NODE   7535.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   7535.00 TO NODE   7535.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE   7530.00 TO NODE   7580.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   625.00
  ELEVATION DATA: UPSTREAM(FEET) =   2059.00  DOWNSTREAM(FEET) =   2029.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.353
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.215
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        6.53      0.80     0.100    52    7.35
  COMMERCIAL                 B        0.58      0.45     0.100    76    7.35
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.77
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =     32.88
  TOTAL AREA(ACRES) =      7.11   PEAK FLOW RATE(CFS) =     32.88

****************************************************************************
  FLOW PROCESS FROM NODE   7575.00 TO NODE   7580.00 IS CODE =  82
----------------------------------------------------------------------------
```

```
  >>>>>ADD SUBAREA RUNOFF TO MAINLINE, AT MAINLINE Tc,<<<<<
  >>>>>(AND COMPUTE INITIAL SUBAREA RUNOFF)<<<<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   520.00
  ELEVATION DATA: UPSTREAM(FEET) =   2046.50  DOWNSTREAM(FEET) =   2029.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.680
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.951
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                A        2.77      0.80     0.850    52   11.68
  PUBLIC PARK                B        2.33      0.45     0.850    76   11.68
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.64
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    5.10   INITIAL SUBAREA RUNOFF(CFS) =   15.64

  ** ADD SUBAREA RUNOFF TO MAINLINE AT MAINLINE Tc:
  MAINLINE Tc(MIN.) =    7.35
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.215
  SUBAREA AREA(ACRES) =    5.10      SUBAREA RUNOFF(CFS) =   21.45
  EFFECTIVE AREA(ACRES) =     12.21   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.66  AREA-AVERAGED Ap =  0.41
  TOTAL AREA(ACRES) =       12.2       PEAK FLOW RATE(CFS) =      54.33

****************************************************************************
  FLOW PROCESS FROM NODE   7570.00 TO NODE   7580.00 IS CODE =  82
----------------------------------------------------------------------------
  >>>>>ADD SUBAREA RUNOFF TO MAINLINE, AT MAINLINE Tc,<<<<<
  >>>>>(AND COMPUTE INITIAL SUBAREA RUNOFF)<<<<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   454.00
  ELEVATION DATA: UPSTREAM(FEET) =   2034.00  DOWNSTREAM(FEET) =   2029.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.046
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.537
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                A        3.84      0.80     0.850    52   14.05
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    3.84   INITIAL SUBAREA RUNOFF(CFS) =    9.89

  ** ADD SUBAREA RUNOFF TO MAINLINE AT MAINLINE Tc:
  MAINLINE Tc(MIN.) =    7.35
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.215
  SUBAREA AREA(ACRES) =    3.84      SUBAREA RUNOFF(CFS) =   15.69
  EFFECTIVE AREA(ACRES) =     16.05   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.71  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =       16.0       PEAK FLOW RATE(CFS) =      70.01

****************************************************************************
  FLOW PROCESS FROM NODE   7580.00 TO NODE   7585.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2029.50  DOWNSTREAM(FEET) =   2017.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00   CHANNEL SLOPE =  0.0125
  CHANNEL BASE(FEET) =    8.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00

          ==>>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.
```

```
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.546
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                A       10.35      0.80     0.850    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      88.16
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   8.82
  AVERAGE FLOW DEPTH(FEET) =   1.00   TRAVEL TIME(MIN.) =   1.89
  Tc(MIN.) =    9.24
  SUBAREA AREA(ACRES) =    10.35       SUBAREA RUNOFF(CFS) =   36.05
  EFFECTIVE AREA(ACRES) =     26.40     AREA-AVERAGED Fm(INCH/HR) =   0.49
  AREA-AVERAGED Fp(INCH/HR) =   0.76  AREA-AVERAGED Ap =   0.65
  TOTAL AREA(ACRES) =       26.4         PEAK FLOW RATE(CFS) =      96.40

          ==>>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) =  1.00   FLOW VELOCITY(FEET/SEC.) =   9.64

  ==>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH

  LONGEST FLOWPATH FROM NODE   7530.00 TO NODE   7585.00 =    1625.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7585.00 TO NODE   7585.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2018.20  DOWNSTREAM(FEET) =  2017.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  31.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.63
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      96.40
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =    9.37
  LONGEST FLOWPATH FROM NODE   7530.00 TO NODE   7585.00 =    1725.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7585.00 TO NODE   7585.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.37
  RAINFALL INTENSITY(INCH/HR) =   4.51
  AREA-AVERAGED Fm(INCH/HR) =  0.49
  AREA-AVERAGED Fp(INCH/HR) =  0.76
  AREA-AVERAGED Ap =  0.65
  EFFECTIVE STREAM AREA(ACRES) =      26.40
  TOTAL STREAM AREA(ACRES) =      26.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      96.40

****************************************************************************
  FLOW PROCESS FROM NODE   7560.00 TO NODE   7565.00 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) =   2039.70  DOWNSTREAM(FEET) =   2018.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
```

```
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.629
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.101
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        8.73      0.80     0.100    52    7.63
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =     39.45
  TOTAL AREA(ACRES) =      8.73   PEAK FLOW RATE(CFS) =     39.45

****************************************************************************
  FLOW PROCESS FROM NODE   7565.00 TO NODE   7585.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2018.00  DOWNSTREAM(FEET) =  2017.00
  FLOW LENGTH(FEET) =   430.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.50
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      39.45
  PIPE TRAVEL TIME(MIN.) =   1.30    Tc(MIN.) =    8.93
  LONGEST FLOWPATH FROM NODE   7560.00 TO NODE   7585.00 =    1030.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7585.00 TO NODE   7585.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.93
  RAINFALL INTENSITY(INCH/HR) =   4.64
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.80
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       8.73
  TOTAL STREAM AREA(ACRES) =       8.73
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      39.45

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       96.40    9.37    4.508  0.76( 0.49) 0.65      26.4    7530.00
      2       39.45    8.93    4.641  0.80( 0.08) 0.10       8.7    7560.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      134.33    8.93    4.641  0.76( 0.38) 0.51      33.9    7560.00
      2      134.70    9.37    4.508  0.76( 0.39) 0.51      35.1    7530.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     134.70    Tc(MIN.) =     9.37
  EFFECTIVE AREA(ACRES) =      35.13   AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.76  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =       35.1
  LONGEST FLOWPATH FROM NODE   7530.00 TO NODE   7585.00 =    1725.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7585.00 TO NODE   7595.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2017.00  DOWNSTREAM(FEET) =  2016.00
  FLOW LENGTH(FEET) =   350.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  48.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.88
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     134.70
  PIPE TRAVEL TIME(MIN.) =   0.74    Tc(MIN.) =   10.12
  LONGEST FLOWPATH FROM NODE   7530.00 TO NODE   7595.00 =    2075.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7595.00 TO NODE   7595.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.12
  RAINFALL INTENSITY(INCH/HR) =   4.31
  AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.76
  AREA-AVERAGED Ap =  0.51
  EFFECTIVE STREAM AREA(ACRES) =      35.13
  TOTAL STREAM AREA(ACRES) =       35.13
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     134.70

****************************************************************************
  FLOW PROCESS FROM NODE   7590.00 TO NODE   7595.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   800.00
  ELEVATION DATA: UPSTREAM(FEET) =   2035.10  DOWNSTREAM(FEET) =   2016.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.301
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.529
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        4.47      0.80     0.100    52    9.30
  COMMERCIAL                 B        3.84      0.45     0.100    76    9.30
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.64
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =     33.40
  TOTAL AREA(ACRES) =      8.31   PEAK FLOW RATE(CFS) =     33.40

****************************************************************************
  FLOW PROCESS FROM NODE   7595.00 TO NODE   7595.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2018.00  DOWNSTREAM(FEET) =  2016.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.88
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      33.40
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    9.44
  LONGEST FLOWPATH FROM NODE   7590.00 TO NODE   7595.00 =     900.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7595.00 TO NODE   7595.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.44
```

```
  RAINFALL INTENSITY(INCH/HR) =   4.49
  AREA-AVERAGED Fm(INCH/HR) =  0.06
  AREA-AVERAGED Fp(INCH/HR) =  0.64
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       8.31
  TOTAL STREAM AREA(ACRES) =       8.31
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      33.40

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      134.33    9.67    4.424  0.76( 0.38) 0.51      33.9    7560.00
      1      134.70   10.12    4.307  0.76( 0.39) 0.51      35.1    7530.00
      2       33.40    9.44    4.489  0.64( 0.06) 0.10       8.3    7590.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      166.62    9.44    4.489  0.75( 0.32) 0.43      41.4    7590.00
      2      167.24    9.67    4.424  0.75( 0.32) 0.43      42.2    7560.00
      3      166.73   10.12    4.307  0.75( 0.33) 0.43      43.4    7530.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     167.24    Tc(MIN.) =     9.67
  EFFECTIVE AREA(ACRES) =      42.19   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.43
  TOTAL AREA(ACRES) =       43.4
  LONGEST FLOWPATH FROM NODE   7530.00 TO NODE   7595.00 =    2075.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   7595.00 TO NODE   7595.00 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      166.62    9.44    4.489  0.75( 0.32) 0.43      41.4    7590.00
      2      167.24    9.67    4.424  0.75( 0.32) 0.43      42.2    7560.00
      3      166.73   10.12    4.307  0.75( 0.33) 0.43      43.4    7530.00
  LONGEST FLOWPATH FROM NODE   7530.00 TO NODE   7595.00 =    2075.00 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     1277.54    8.53    4.771  0.40( 0.36) 0.89     316.7    7521.00
      2     1456.51   13.00    3.704  0.40( 0.36) 0.90     477.0    7540.00
      3     1459.30   13.11    3.686  0.40( 0.36) 0.90     480.7    7515.00
      4     1463.01   13.31    3.653  0.40( 0.36) 0.90     487.0    7500.00
      5     1616.39   21.51    2.739  0.40( 0.37) 0.93     744.6    4050.00
      6     1676.90   26.28    2.429  0.39( 0.37) 0.94     890.5    4145.00
      7     1694.46   28.65    2.306  0.39( 0.37) 0.95     958.2    4080.00
      8     1695.09   28.79    2.300  0.39( 0.37) 0.95     961.7    4070.00
      9     1704.21   31.21    2.190  0.39( 0.37) 0.95    1025.6    4200.00
     10     1707.20   33.24    2.110  0.39( 0.37) 0.95    1075.0    4250.00
     11     1705.23   33.97    2.082  0.38( 0.37) 0.95    1090.9    4120.00
     12     1691.31   35.70    2.021  0.38( 0.37) 0.96    1120.9    4025.00
     13     1640.06   38.45    1.933  0.38( 0.36) 0.96    1148.1    4100.00
     14     1609.99   39.67    1.897  0.38( 0.36) 0.96    1154.0    4000.00
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   7595.00 =   13723.40 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1438.24    8.53    4.771  0.42( 0.36) 0.84     354.0    7521.00
      2     1480.69    9.44    4.489  0.42( 0.36) 0.84     390.8    7590.00
      3     1490.56    9.67    4.424  0.42( 0.36) 0.85     399.9    7560.00
      4     1507.76   10.12    4.307  0.42( 0.36) 0.85     417.0    7530.00
      5     1598.01   13.00    3.704  0.42( 0.36) 0.86     520.4    7540.00
      6     1600.02   13.11    3.686  0.42( 0.36) 0.86     524.1    7515.00
      7     1602.38   13.31    3.653  0.42( 0.36) 0.86     530.4    7500.00
      8     1717.44   21.51    2.739  0.41( 0.37) 0.90     788.1    4050.00
      9     1764.98   26.28    2.429  0.40( 0.37) 0.92     933.9    4145.00
     10     1777.39   28.65    2.306  0.40( 0.37) 0.92    1001.7    4080.00
     11     1777.76   28.79    2.300  0.40( 0.37) 0.92    1005.2    4070.00
     12     1782.31   31.21    2.190  0.40( 0.37) 0.93    1069.0    4200.00
     13     1781.91   33.24    2.110  0.39( 0.37) 0.93    1118.5    4250.00
     14     1778.79   33.97    2.082  0.39( 0.36) 0.93    1134.3    4120.00
     15     1762.31   35.70    2.021  0.39( 0.36) 0.94    1164.3    4025.00
     16     1707.37   38.45    1.933  0.39( 0.36) 0.94    1191.5    4100.00
     17     1675.80   39.67    1.897  0.39( 0.36) 0.94    1197.4    4000.00
   TOTAL AREA(ACRES) =      1197.4

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     1782.31  Tc(MIN.) =   31.215
  EFFECTIVE AREA(ACRES) =   1069.04  AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.93
  TOTAL AREA(ACRES) =     1197.4
  LONGEST FLOWPATH FROM NODE   4000.00 TO NODE   7595.00 =   13723.40 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =     1197.4  Tc(MIN.) =     31.21
  EFFECTIVE AREA(ACRES) =   1069.04  AREA-AVERAGED Fm(INCH/HR)=  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap = 0.930
  PEAK FLOW RATE(CFS)   =    1782.31

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1438.24    8.53    4.771  0.42( 0.36) 0.84     354.0    7521.00
      2     1480.69    9.44    4.489  0.42( 0.36) 0.84     390.8    7590.00
      3     1490.56    9.67    4.424  0.42( 0.36) 0.85     399.9    7560.00
      4     1507.76   10.12    4.307  0.42( 0.36) 0.85     417.0    7530.00
      5     1598.01   13.00    3.704  0.42( 0.36) 0.86     520.4    7540.00
      6     1600.02   13.11    3.686  0.42( 0.36) 0.86     524.1    7515.00
      7     1602.38   13.31    3.653  0.42( 0.36) 0.86     530.4    7500.00
      8     1717.44   21.51    2.739  0.41( 0.37) 0.90     788.1    4050.00
      9     1764.98   26.28    2.429  0.40( 0.37) 0.92     933.9    4145.00
     10     1777.39   28.65    2.306  0.40( 0.37) 0.92    1001.7    4080.00
     11     1777.76   28.79    2.300  0.40( 0.37) 0.92    1005.2    4070.00
     12     1782.31   31.21    2.190  0.40( 0.37) 0.93    1069.0    4200.00
     13     1781.91   33.24    2.110  0.39( 0.37) 0.93    1118.5    4250.00
     14     1778.79   33.97    2.082  0.39( 0.36) 0.93    1134.3    4120.00
     15     1762.31   35.70    2.021  0.39( 0.36) 0.94    1164.3    4025.00
     16     1707.37   38.45    1.933  0.39( 0.36) 0.94    1191.5    4100.00
     17     1675.80   39.67    1.897  0.39( 0.36) 0.94    1197.4    4000.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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Appendix VI

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