County of San Bernardino
LAND DEVELOPMENT

PRELIMINARY
APPROVAL

THE APPROVAL OF THIS REPORT SHALL NOT BE CONSTRUED TO BE A PERMIT FOR ANY DEVELOPMENT OR SITE IMPROVEMENT

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Date: 05/13/2025 4:02:33 PM

This report has Preliminary Approval. Prior to Final Approval of the report, all outstanding comments and requirements shall be met.

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APPROVED CHECKLIST AT END OF PLAN SET

PRELIMINARY HYDROLOGY REPORT

Hume SoCal

64144 Hume Lake Road
Hume, CA 93628

Preliminary DRNSTY-2024-00009
PROJ-2024-00046

APN: 0328-071-04, 0328-071-05, 0328-071-07, 0328-071-10, 0328-121-40, 0328-121-42

April 2025

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KHA Project # 195436002

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04/17/2025

Robert Otte, PE (No. 44120) Date



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References

Hydrology Manual. San Bernardino County, August 1986.

Section 100

100.0 Introduction

Kimley-Horn and Associates has been retained to prepare a Preliminary Drainage Study for the proposed Hume SoCal development. The 258.7-acre site is located along Green Valley Lake Road and Smokey Way in unincorporated Running Springs, San Bernardino County. The project site encompasses Parcel 07 and Parcel 10 of Tentative Parcel Map 032807 and Parcels 40 and 42 of Tentative Parcel Map 032812. The APNs for the project site are 0328-071-04, 0328-071-05, 0328-071-07, 0328-071-10, 0328-121-40, and 0328-121-42.

In the proposed condition, the site parcels will be split into five (5) separate phases as described below.

Parcel 10 is split into two (2) phases, Phase 4 and Phase 5. Phase 4 includes the development of the Elementary age camp and will consist of 32 proposed buildings varying in size and use. Phase 4 also includes landscaping, concrete hardscape, parking lots, three activity quads, a pool, and an amphitheater.

Phase 5 includes the development of the Wildwood camp and will consist of 16 proposed buildings varying in size and use. Phase 5 also includes landscaping, concrete hardscape, parking lots, three activity quads, a pool, and an amphitheater.

Parcel 07 will not be split into separate phases but will be developed as Phase 1. Phase 1 includes the development of the Middle School age camp and will consist of 25 proposed buildings and 12 existing buildings, all varying in size and use. Phase 1 also includes landscaping, concrete hardscape, parking lots, seven (7) activity quads, an existing pool, an existing pond, and an existing amphitheater.

Parcel 42 will not be split into separate phases but will be developed as Phase 3. Phase 3 includes the development of the adult camp and consists of one (1) proposed building. Phase 3 also includes landscaping, concrete hardscape, and parking lots.

Parcel 40 will not be split into separate phases but will be developed as Phase 2. Phase 2 includes the High School age camp and consists of 33 proposed buildings varying in size and use. Phase 2 also includes landscaping, concrete hardscape, parking lots, six (6) activity quads, a pool, and an amphitheater.

The purpose of this report is to provide information regarding the Storm Water Management System (SWMS) design for the proposed development. This investigation was conducted to evaluate the hydrologic conditions in the existing and proposed conditions of the site and to size the appropriate stormwater mitigation.

Since the project site is NOT located within the MS Phase I boundary, this report will NOT be accompanied by a Water Quality Management Plan (WQMP). There are no proposed BMPs on site since storm water runoff is not required to be treated. There will be off-site drainage conveyed through the site through the various existing streams located within the site limits. The off-site runoff remains unchanged from the existing to the proposed and is not anticipated to cause any negative impacts downstream or to proposed infrastructure. Using the retention volume achieved from routing impervious areas to pervious areas, the proposed development is expected to generate negligible

additional run-off downstream for storms up to the 100-year condition when compared to the existing condition. There are three (3) proposed detention basins to limit the peak outflow to 90% of the pre-development flow in areas that see an increase in runoff due to the proposed development.

100.1 Project Description

The proposed project consists of a proposed Elementary age camp, Middle School age camp, High School age camp, an adult age camp, and a Wildwood camp, with associated proposed buildings, landscaping, concrete hardscape, parking lots, activity quads, pools, and amphitheater. The proposed landscaping will consist of trees, shrubs, and drought tolerant native ground cover.

Land use of the proposed site will include indoor and outdoor entertainment/activity areas, dining halls, dormitories, pools, and bathroom buildings. The proposed project will also include trash enclosures. Expected waste will include food, grease from cooking, trash, and debris.

100.2 Location

The 258.7-acre site is located along Green Valley Lake Road and Smokey Way in the unincorporated Runnings Springs, San Bernardino County. The project is bounded by Green Valley Lake Road to the east, undeveloped land to the north, west, and south.

For reference, see **Appendix A**, *Vicinity Map*.

100.3 Methodology

This Preliminary Drainage Study is intended to comply with the requirements of the San Bernardino County Hydrology Manual to assist in the proposed development of the existing site into the proposed Hume SoCal campground. The report includes existing and proposed condition hydrologic analysis to determine if the proposed development's runoff will have any impact on downstream properties.

A rational method analysis for the 10-year and 100-year events in accordance with the San Bernardino Hydrology Manual (SBC, 1986) and the 2010 Addendum was completed to calculate the peak discharges for the existing and proposed project conditions. Results from the proposed condition rational method analysis were used for the proposed condition synthetic unit hydrograph analysis.

Drainage sub-areas were delineated utilizing existing and proposed contours once all critical blueline stream locations, discharge points, and confluences were identified throughout the Hume SoCal campground. At each of these locations, sub-areas were delineated to calculate the flows traveling through each blueline stream. Initial sub-areas, less than 10 acres and with a flow path less than 1,000 feet were identified at the most upstream end of each sub-area. Each sub-area delineated was less than 640 acres as outlined in the SBC, 1986 manual. Flow lengths for each initial sub-area were considered overland flow before becoming channelized flow within the blueline streams. Time of concentrations (TCs) were determined using the Time of Concentration nomograph for initial subarea per the SBC, 1986. Peak flows for each sub-area were calculated using each of the above-mentioned characteristics and the Advanced Engineering Software (AES).

Per the 2010 San Bernardino County Hydrology Manual Addendum, arid regions within San Bernardino County should use NOAA Atlas 14 rainfall atlas and the associated data base (NOAA, 2006) or other local rainfall gauge data for hydrology studies. After review of available data, the NOAA Atlas 14 rainfall data was chosen for this. NOAA Atlas 14 also provides information for the various peak durations required to complete the hydrology analysis for the current study.

According to NOAA Atlas 14, the following are the 1 hour-storm precipitation values that have been utilized for our study:

10-year storm 1-hour intensity (inch/hour)	=	1.40
100-year storm 1-hour intensity (inch/hour)	=	2.30

Appendix G contains the site-specific tabular output from NOAA Atlas 14.

The type of soil and soil conditions are major factors affecting infiltration/detention and resultant storm water runoff. The Natural Resources Conservation Service (NRCS) has classified the on-site soil into one of the general hydrologic soil groups for comparing infiltration and runoff rates. Each group is based on properties that influence runoff, such as water infiltration rate, texture, natural discharge and moisture condition. The runoff potential is based on the amount of runoff at the end of a long duration storm that occurs after wetting and swelling of the soil not protected by vegetation. Using the United States Department of Agriculture Natural Resources Conservation Service Web Soil Survey online tool and the Stormwater Facility Mapping online tool for San Bernardino National Forest Area, it was determined the hydrologic soil group classification is B and D. Soil group B is defined as soils having a moderate infiltration rate when thoroughly wet. Soil group D is defined as soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. See **Appendix G** for the Web Soil Survey Report.

The preliminary Geotechnical Investigation from Leighton and Associates, Inc. dated December 13, 2023, was conducted for the site. See **Appendix F** for the Geotechnical Report. Since the geotechnical investigation did not include percolation testing, an infiltration rate of 0.06 in/hr was assumed based on the NRCS soils report.

In addition, antecedent moisture condition (AMC) II was used to calculate the 10-year and AMC III for the 100-year peak flows based on the 2010 San Bernardino County Hydrology Manual Addendum. The land use for the existing drainage areas was selected as natural poor cover, based on the existing conditions. The land use for the proposed drainage areas were selected based on the percent of pervious area for each of the drainage areas, as shown on **Table 1**. The combination of the soil and coverage type was used as the basis for selecting the appropriate curve numbers used to calculate the soil loss rates. See **Appendix G** Figure C-4 for curve numbers based on hydrologic soil conditions for pervious areas.

Table 1: Proposed Drainage Area Pervious Percentages

Drainage Area	Drainage Area (AC)	Percent Pervious (%)	Percent Pervious utilized in Hydrosoft (%)
DMA-1	6.13	100	90
DMA-2	15.18	94.3	90
DMA-3	85.57	91.3	90
DMA-4	2.86	99.2	90
DMA-5	16.64	92.6	90
DMA-6	2.74	100	90
DMA-7	119.78	97.1	90
DMA-8	43.54	90.0	90
DMA-9	16.90	100	90
DMA-10	18.80	97.9	90
DMA-11	22.64	93.3	90
DMA-12	18.64	83.6	80
DMA-13	5.79	99.2	90
DMA-14	4.08	100	90
DMA-15	12.90	85.4	85
DMA-16	0.86	100	90
DMA-17	13.28	88.1	85
DMA-18	25.02	98.1	90
DMA-19	10.53	81.0	80

Using the data specific to the project site, as discussed above, Advanced Engineering Software (AES) Hydrosoft package was used to complete the rational method and the synthetic unit hydrograph analyses. The results of the analyses are included in **Appendix D and E**. The basin routing results are included in **Appendix E**.

100.4 Drainage Characteristics

The site is in Zone D per the Federal Emergency Management Administration (FEMA) Flood Insurance Rate Map (FIRM) panel 06071C8000H, dated August 28, 2008. Flood Zone D is defined by FEMA as an area with possible but undetermined flood hazard. No portion of the site is located within the special flood hazard area inundated by the 100-year flood. Therefore, there is no impact to the regulatory floodplain.

For reference, see **Appendix B**, *FIRM Map.*

Three (3) perennial drainage features and four (4) ephemeral drainage features were observed within the boundaries of the project site during field explorations and delineation. These blueline streams are shown and labeled within the drainage maps included in **Appendix D and E.**

For reference, see **Appendix F,** *Reference Materials* for detailed information on the Delineation of State and Federal Jurisdictional Waters.

100.4.1 Pre-development Condition

The existing condition of the project site is predominantly vacant, with existing special development-residential buildings encompassing only a minor portion of the project area. Currently, there is an existing bridge crossing an unnamed tributary, which runs through the middle of the site, and there are a couple existing storm culverts under Green Valley Lake Road that are not anticipated to be impacted by the development of this project. Under existing conditions, storm water runoff flows in a northeast-southwest direction, discharges into several unnamed streams through the site, continues west along until ultimately discharging into Deep Creek. The existing drainage paths will be maintained for the proposed development.

The existing surrounding adjacent areas are undeveloped and remain undeveloped in the proposed condition. In the existing condition, there are some off-site flows from the east that are conveyed through several existing streams located through the site. In the proposed condition the off-site flows will continue to be conveyed through the existing streams through the site. Therefore, off-site flows entering the site are not anticipated to negatively impact the proposed development associated with the project.

Table 2 shows a summary of the pre-development flows for 10 and 100-year storm events.

Table 2: Existing Hydrology Results

Sub-basin ID	Drainage Area (AC)	Q_{10} (cfs)	Q_{100} (cfs)
DA 1 (DMA-1)	6.13	23.66	39.58
DA 1 (DMA-4)	2.86	11.12	18.60
DA 2 (DMA-2)	14.39	48.53	81.35
DA 3 (DMA 3,5,6,7,8)	281.42	733.08	1248.92
DA 4 (DMA-9)	16.90	60.93	103.94
DA 5 (DMA-10)	19.20	63.05	107.90
DA 6 (DMA-11,12,13)	80.89	219.07	373.78
DA 7 (DMA-14)	4.08	14.09	23.62
DA 8 (DMA-15)	14.57	43.52	73.10
DA 9 (DMA-16)	0.96	3.49	5.84

See **Appendix D**, *Existing Drainage Map and Calculations*.

100.4.2 Post-development Condition

The proposed development includes the construction of proposed Elementary age camp, Middle School age camp, High School age camp, an adult age camp, and a Wildwood camp. The developed area is approximately 60-acres. The proposed development is spread across all parcels within the site, Parcels 07 and 10 of Tentative Parcel Map 032807 and Parcels 40 and 42 of Tentative Parcel Map 032812. In the proposed condition, the site parcels will be split into five (5) separate phases: Phase 1 – Middle

School Age Camp, Phase 2 – High School Age Camp, Phase 3 – Adult Camp, Phase 4 – Elementary Age Camp, and Phase 5 – Wildwood Camp.

In the proposed condition, Parcel 10 is split into two phases including Phase 4 and Phase 5, Parcel 07 will not be split into separate phases but will be developed as Phase 1, Parcel 42 will not be split into separate phases but will be developed as Phase 3, and Parcel 40 will not be split into separate phases but will be developed as Phase 2. Each Phase will consist of a variety of proposed buildings varying in size and use, landscaping, concrete hardscape, parking lots, activity quads, pools, and amphitheaters. See **Appendix C** for the project Site Plan and Grading Plan.

The grading proposed for all Parcels will maintain the natural flow pattern of the existing site, draining in the south-west direction, to the maximum extent possible. Proposed grading was completed to maximize the impervious areas flowing to on-site pervious areas and promote on-site infiltration. All Parcels will continue to ultimately discharge into Deep Creek.

The post-development drainage areas are comprised of nine (9) drainage areas with 19 subareas. See **Table 3** for sub-basin and drainage area breakdown.

Drainage for DA 1, DA 4, DA 7, and DA 9 remain undeveloped in the proposed condition. Drainage for DA 2, DA 5, and DA 6 will be self-mitigating.

DA 2 includes minor proposed development associated with the Wildwood camp located in a portion of Parcel 10. Storm water runoff from this basin will sheet and concentrated flow through the proposed roadway before being collected by proposed inlets and discharged to existing vegetated landscaping before ultimately discharging into Deep Creek.

DA 3 includes several different portions of the proposed Elementary, Middle School, and Wildwood camps located within portions of Parcels 07 and 10. Storm water runoff from these basins will sheet flow off proposed buildings, through proposed vegetated landscaping before concentrating in either proposed roadway or existing streams.

DA 5 includes minor proposed development associated with the adult camp located in a portion of Parcel 42. Storm water runoff from this basin will sheet and concentrated flow through the proposed roadway before being collected by proposed inlets and discharged to existing vegetated landscaping before ultimately discharging into Deep Creek.

DA 6 includes several different portions of the proposed High School and Adult camp located within portions of Parcels 07 and 40. Storm water runoff from these basins will sheet flow off proposed buildings, through proposed vegetated landscaping before concentrating in either proposed roadway or existing streams.

DA 8 includes proposed development associated with the High School camp located in a portion of Parcel 40. Storm water runoff from these basins will sheet flow off proposed buildings, through proposed vegetated landscaping before concentrating in either proposed roadway and collected in proposed inlets and discharging to an existing stream, before ultimately discharging into Deep Creek.

When comparing the flows tributary to the outfall of DA 3 and DA 8 from the proposed condition to the existing condition, the proposed condition is expected to increase the peak flows under the 100-year storm event. The peak flows will be mitigated to 90% of the predeveloped runoff using the proposed on-site detention basins.

Table 3 shows a summary of the unmitigated post-development flows for 10 and 100-year storm events.

Table 3: Proposed Hydrology Results (unmitigated)

Sub-basin ID	Drainage Area (AC)	Q_{10} (cfs)	Q_{100} (cfs)
DA 1 (DMA-1)	6.13	23.66	39.58
DA 1 (DMA-4)	2.86	10.89	18.22
DA 2 (DMA-2)	15.18	48.53	81.35
DA 3 (DMA 3,5,6,7,8,17)	281.55	751.42	1272.58
DA 4 (DMA-9)	16.90	60.93	103.94
DA 5 (DMA-10)	18.80	60.90	104.27
DA 6 (DMA-11,12,13,18,19)	82.62	193.26	334.96
DA 7 (DMA-14)	4.08	14.09	23.62
DA 8 (DMA-15)	12.90	45.65	77.78
DA 9 (DMA-16)	0.86	3.13	5.24

See **Appendix E**, *Proposed Drainage Map and Calculations.*

Table 4 shows a summary of the post-development rational method and the synthetic unit hydrograph analyses for each sub-area.

Table 4: Summary of AES Inputs

Sub-basin ID	Upstream Node ID	Upstream Node Elevation	Downstream Node ID	Downstream Node Elevation	Flow Length (FT)	Sub-area (AC)	Land Use	Soil Type	Ap (Decimal)	Curve Number	Rainfall Intensity
DA -1	1.1	6652.19	1.2	6591.92	291.50	6.461	Residential - 0.4 Dwelling/Acre	D	0.900	91	4.477
	1.2	6591.92	1.3	6414.01	619.40	4.74	Residential - 0.4 Dwelling/Acre	D	0.900	91	4.477
DA-2	2.1	6694.25	2.2	6619.24	487.50	1.63	Residential - 0.4 Dwelling/Acre	D	0.900	91	3.936
	2.2	6619.24	2.3	6372.85	1548.50	12.76	Residential - 0.4 Dwelling/Acre	D	0.900	91	3.936
DA-4	4.1	6549.82	4.2	6358.84	451.80	2.86	Residential - 0.4 Dwelling/Acre	D	0.900	91	4.418
DA-7	7.1	7336.42	7.2	7060.88	911.20	6.53	Residential - 0.4 Dwelling/Acre	D	0.900	91	3.653
	7.2	7060.88	7.3	6472.84	4642.50	102.45	Residential - 0.4 Dwelling/Acre	D	0.900	91	3.653
	7.3	6472.84	7.4	6404.98	953.33	10.33	Residential - 0.4 Dwelling/Acre	D	0.900	91	2.980
	7.4	6404.98	17.3	6378.96	486.30	6.63	Residential - 0.4 Dwelling/Acre	D	0.900	91	2.814
DA-3	3.1	7022.75	3.2	6906.51	570.40	1.09	Residential - 0.4 Dwelling/Acre	D	0.900	91	3.921
	3.2	6906.51	3.3	6598.45	1309.60	32.62	Residential - 0.4 Dwelling/Acre	D	0.900	91	3.921
	3.3	6598.45	7.3	6472.84	1872.50	51.85	Residential - 0.4 Dwelling/Acre	D	0.900	91	3.445

Sub-basin ID	Upstream Node ID	Upstream Node Elevation	Downstream Node ID	Downstream Node Elevation	Flow Length (FT)	Sub-area (AC)	Land Use	Soil Type	Ap (Decimal)	Curve Number	Rainfall Intensity
DA-8	8.1	6760.02	8.2	6589.39	584.70	2.35	Residential - 0.4 Dwelling/Acre	D	0.900	91	4.061
	8.2	6589.10	8.3	6472.97	897.40	16.79	Residential - 0.4 Dwelling/Acre	D	0.900	91	4.061
	8.4	6711.74	8.5	6532.00	757.10	1.30	Residential - 0.4 Dwelling/Acre	D	0.900	91	3.719
	8.5	6532.00	8.3	6472.97	426.20	1.43	Residential - 0.4 Dwelling/Acre	D	0.900	91	3.719
	8.3	6472.97	7.4	6404.98	1112.00	21.66	Residential - 0.4 Dwelling/Acre	D	0.900	91	3.539
DA-17	17.1	6510.50	17.2	6452.98	886.60	3.21	Public Park	D	0.850	91	3.145
	17.2	6452.98	17.3	6378.96	393.20	1.17	Public Park	D	0.850	91	3.145
	17.3	6378.96	17.4	6355.81	386.20	2.27	Public Park	D	0.850	91	2.775
	17.4	6355.81	6.2	6352.80	100.30	0.34	Public Park	D	0.850	91	2.745
DA-5	5.1	6584.65	5.2	6467.32	696.80	3.31	Residential - 0.4 Dwelling/Acre	D	0.900	91	3.627
	5.2	6467.32	17.4	6355.81	1035.00	13.33	Residential - 0.4 Dwelling/Acre	D	0.900	91	3.627
DA-6	6.1	6435.22	6.2	6352.80	236.40	0.35	Residential - 0.4 Dwelling/Acre	D	0.900	91	4.783
	6.2	6352.80	6.3	6334.97	138.70	2.05	Residential - 0.4 Dwelling/Acre	D	0.900	91	2.735
DA-9	9.1	6647.05	9.2	6532.00	392.70	1.12	Residential - 0.4 Dwelling/Acre	B	0.900	76	4.386
	9.2	6532.00	9.3	6353.41	504.40	15.78	Residential - 0.4 Dwelling/Acre	B	0.900	76	4.386
DA-10	10.1	6650.00	10.2	6529.00	553.80	3.88	Residential - 0.4 Dwelling/Acre	B	0.900	76	3.980
	10.2	6529.00	10.3	6335.41	445.30	14.925	Residential - 0.4 Dwelling/Acre	B	0.900	76	3.980

Sub-basin ID	Upstream Node ID	Upstream Node Elevation	Downstream Node ID	Downstream Node Elevation	Flow Length (FT)	Sub-area (AC)	Land Use	Soil Type	Ap (Decimal)	Curve Number	Rainfall Intensity
DA-18	18.1	6836.40	18.2	6643.42	965.90	6.56	Residential - 0.4 Dwelling/Acre	D	0.900	91	3.431
	18.2	6643.42	18.3	6483.82	1375.10	18.46	Residential - 0.4 Dwelling/Acre	D	0.900	91	3.431
	18.3	6483.82	19.3	6474.00	125.00		~Pipe Flow~				
DA-19	19.1	6606.25	19.2	6550.33	618.10	1.90	Residential - 1 Dwelling/Acre	D	0.800	91	3.523
	19.2	6550.33	19.3	6474.00	839.90	7.34	Residential - 1 Dwelling/Acre	D	0.800	91	3.273
	19.3	6474.00	19.4	6454.00	68.50	1.29	Residential - 1 Dwelling/Acre	D	0.800	91	4.880
	19.4	6454.00	12.4	6429.97	133.80		~Pipe Flow~				
DA-12	12.1	6594.43	12.2	6485.16	999.10	4.19	Residential - 1 Dwelling/Acre	D	0.800	91	3.287
	12.2	6485.16	12.3	6411.10	1028.70	7.36	Residential - 1 Dwelling/Acre	D	0.800	91	2.965
	12.4	6429.97	12.3	6411.10	543.90	2.79	Residential - 1 Dwelling/Acre	D	0.800	91	2.999
	12.3	6411.10	11.4	6371.00	651.10	4.30	Residential - 1 Dwelling/Acre	D	0.800	91	2.965
DA-11	11.1	6651.16	11.2	6565.95	991.60	1.36	Residential - 0.4 Dwelling/Acre	B	0.900	76	3.151
	11.2	6565.95	11.3	6546.53	251.20	2.07	Residential - 0.4 Dwelling/Acre	B	0.900	76	3.056
	11.3	6546.53	11.4	6371.00	1325.20	19.22	Residential - 0.4 Dwelling/Acre	B	0.900	76	3.056
	11.4	6371.00	13.2	6369.35	54.80	0.19	Residential - 0.4 Dwelling/Acre	B	0.900	76	2.751

Sub-basin ID	Upstream Node ID	Upstream Node Elevation	Downstream Node ID	Downstream Node Elevation	Flow Length (FT)	Sub-area (AC)	Land Use	Soil Type	Ap (Decimal)	Curve Number	Rainfall Intensity
DA-13	13.1	6506.32	13.2	6369.35	852.50	4.74	Residential - 0.4 Dwelling/Acre	D	0.900	91	3.440
	13.2	6369.35	13.3	6363.20	107.90	0.86	Residential - 0.4 Dwelling/Acre	D	0.900	91	2.742
DA-14	14.1	6509.56	14.2	6270.66	671.10	4.08	Residential - 0.4 Dwelling/Acre	D	0.900	91	4.027
DA-15	15.1	6527.52	15.2	6502.01	195.50	0.35	Public Park	D	0.850	91	4.607
	15.2	6502.01	15.3	6460.41	646.00	3.87	Public Park	D	0.850	91	4.111
	15.3	6460.41	15.4	6275.97	551.20	8.68	Public Park	D	0.850	91	4.111
DA-16	16.1	6532.31	16.2	6490.00	322.00	0.86	Residential - 0.4 Dwelling/Acre	D	0.900	91	4.228

100.5 Storm Water Mitigation

Drainage for DA 1, DA 4, DA 7, and DA 9 remain undeveloped in the proposed condition. Drainage for DA 2, DA 5, and DA 6 will be self-mitigating.

When comparing the flows tributary to the outfall of DA 3 and DA 8 from the proposed condition to the existing condition, the proposed condition is expected to increase the peak flows under the 100-year storm event. The peak flows will be mitigated to 90% of the predeveloped runoff using the three (3) proposed on-site detention basins. Detailed design and analysis of these proposed detention basins will occur with the Final Drainage Study for the project.

Table 5: Mitigated Flow Summary

Sub-basin ID	EX Q_{10} (cfs)	EX Q_{100} (cfs)	PR Q_{10} (cfs)	PR Q_{100} (cfs)	Proposed Mitigation**
DA 1 (DMA-1)	23.66	39.58	23.66	39.58	N/A*
DA 1 (DMA-4)	11.12	18.60	10.89	18.22	N/A*
DA 2 (DMA-2)	48.53	81.35	48.53	81.35	N/A*
DA 3 (DMA 3,5,6,7,8,17)	733.08	1248.92	751.42	1272.58	Pond DMA-3 & 8
DA 4 (DMA-9)	60.93	103.94	60.93	103.94	N/A*
DA 5 (DMA-10)	63.05	107.90	60.90	104.27	N/A*
DA 6 (DMA-11,12,13,18,19)	219.07	373.78	193.26	334.96	N/A*
DA 7 (DMA-14)	14.09	23.62	14.09	23.62	N/A*
DA 8 (DMA-15)	43.52	73.10	45.65	77.78	Pond DMA-15
DA 9 (DMA-16)	3.49	5.84	3.13	5.24	N/A*

** Detention not required; no development is proposed or proposed flow decreases from existing without mitigation.*
*** Proposed pond outflow to be mitigated to 90% of the pre-development inflow. See proposed drainage map for pond locations.*

100.6 Conclusion

The development of the existing camp site into the proposed Hume SoCal campground will not create any adverse impacts downstream for storm events up to the 100-year storm. The entire site will ultimately discharge into Deep Creek.

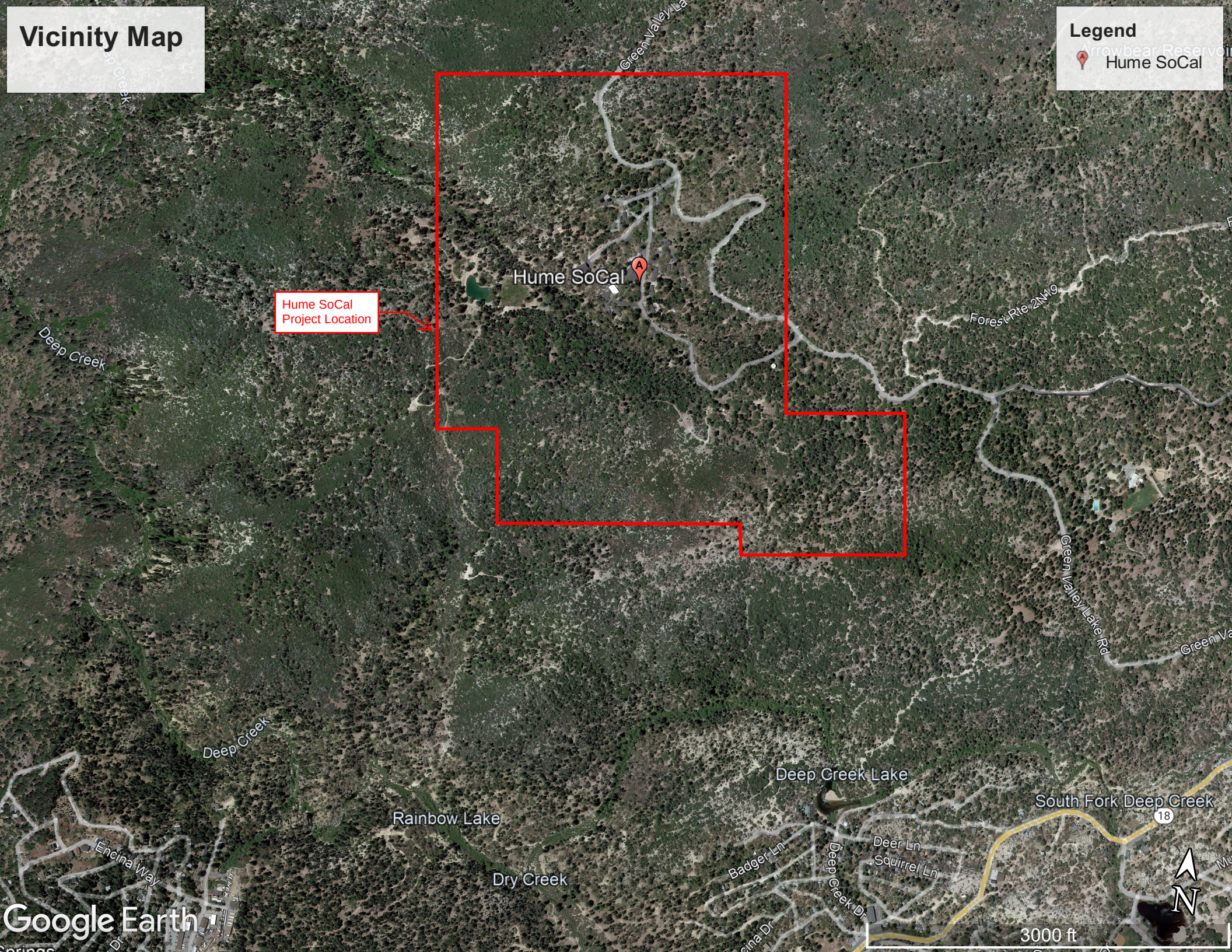
Since the project site is NOT located within the MS Phase I boundary, there are no proposed BMPs on site since storm water runoff is not required to be treated. There will be off-site drainage conveyed through the site through the various existing streams located within the site limits. The off-site runoff remains unchanged from the existing to the proposed and is not anticipated to cause any negative impacts downstream or to proposed infrastructure. Using the retention volume achieved from routing impervious areas to pervious areas, the proposed development is expected to generate negligible additional run-off downstream for storms up to the 100-year condition when compared to the existing condition. Drainage for DA 1, DA 4, DA 7, and DA 9 remain undeveloped in the proposed condition. Drainage for DA 2, DA 5, and DA 6 will be self-mitigating.

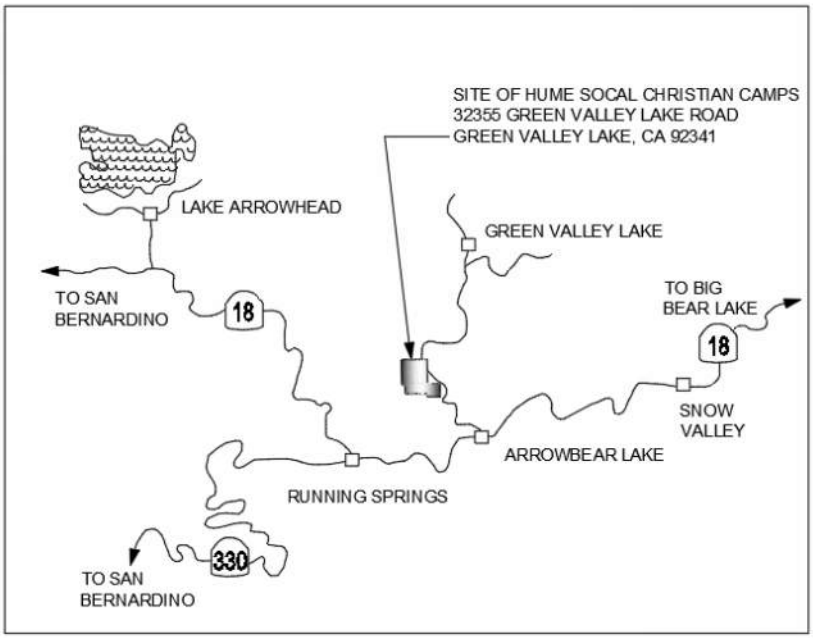
When comparing the flows tributary to the outfall of DA 3 and DA 8 from the proposed condition to the existing condition, the proposed condition is expected to increase the peak flows under the 100-year storm event. The peak flows will be mitigated to 90% of the predeveloped runoff using the three (3) proposed on-site detention basins. Detailed design and analysis of these proposed detention basins will occur with the Final Drainage Study for the project.

Appendix A

Vicinity Map

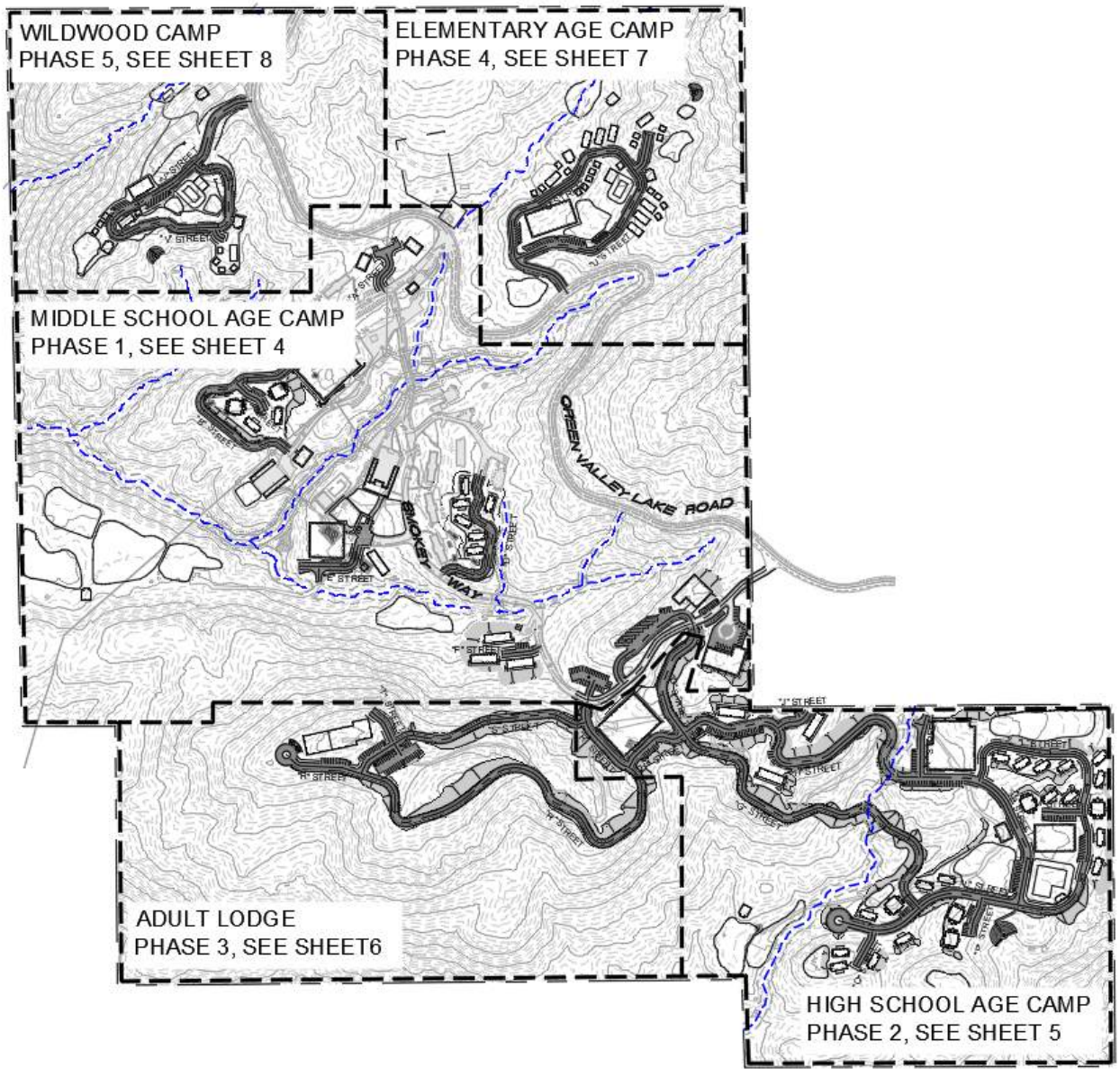
Vicinity Map





VICINITY MAP

NOT TO SCALE



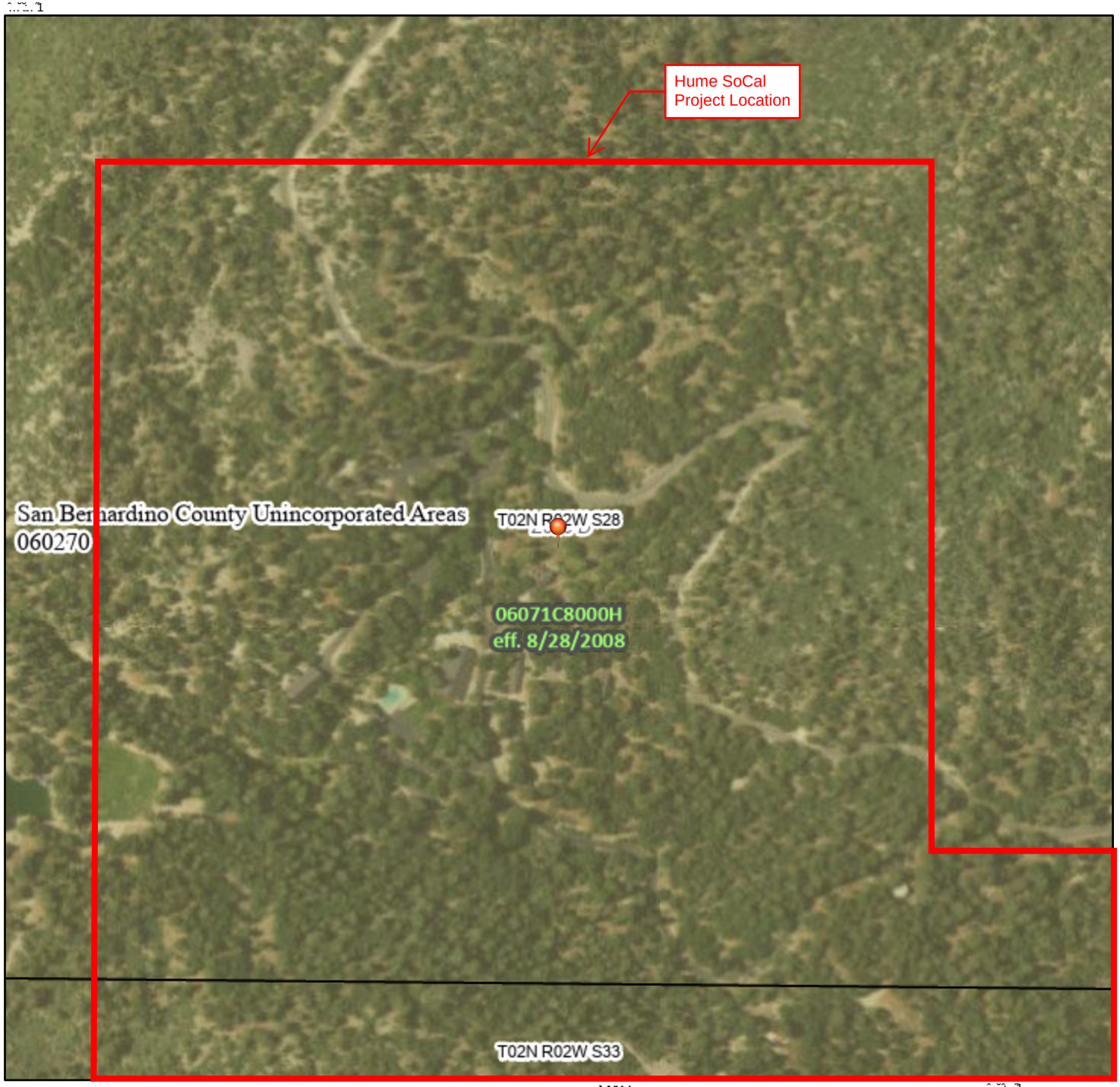
Appendix B

FEMA Map

DWR Best Available Map

1DWLRQDO)ORRG+D]DUG'DWD;6WWH

FEMA



)HHW

%DVHPDS,PDJHU\6RXUFH 86'$1DWLRQDO DS

/HJHQG

6()6$)(6(1(5$/5(6758&7,21

L:KHQRW%DVH)ORRG(OHYDWLRQ %)(
=RQH9
L:LWK%)(RUHQHUJK =RQH$(9(6$
5HGXFHG)ORRG5LVN'XH72/HYHH

$QQXDO &KDQFH)ORRG+D]DUG $UHDV
R DQQXDO FKDQFH IORRG ZDWHUV DYHUDJH
G+D WKDW HVW WKDQ RQH IRRW RU ZLWK GUDLQDJH
DUHDV R OHVV WKDQ RQH VTXDUH PLOH =RQH;

)XWXUH&RQGLWLRQV$QQXDO
&KDQFH)ORRG+D]DUG =RQH;
$UHDV ZLWK5HGXFHG)ORRG5LVNGXHWR
/HYHH6HH1RWH =RQH;
$UHDV ZLWK)ORRG5LVNGXHWR/HYHH =RQH'

$UHDV RI0LQLPDO)ORRG+D]DUG =RQH;
(IIHFWLYH%RXQGDU\
$UHDV 8QGHWHUPLQHG)ORRG+D]DUG =RQH'

&KDQQHO &OYHUW RU 6WUXFWXUH
/HYHH L'LNH RU)ORRGZDOO

&URVV6HFWLRQV ZLWK$QQXDO &KDQFH
DWHU 6XUIDFH(OHYDWLRQ
&RDVWDO 7UDQVHFW
%DVH)ORRG(OHYDWLRQ/LQH %)(
/LPLW R 6WUXFWXUH
-XULVGLFWLRQ%RXQGDU\
&RDVWDO 7UDQVHFW %DVH/LQH
3URFHVV%DVH/LQH
+GURGUDSKLF)HDWXUH

L'LWDO DWD$YDLODEOH
1R'LWDO DWD$YDLODEOH
8QPDSSHG

7KHSLQGLVSODHGRQWKHSLV DQDSSURSULDWH
SRQW VHOHFWHGEWKHXHU DQGGRHV QRW UHSUHV
DQDWKRULWDWLYHSURSHUW\ORFDWLRQ

7KLVPSFRROLHVZLWKJSV VWDQGDUGIRU WKHXHR
GLWDO IORRGPS/LI LW LVQRW YRLGV/GHVFULEHGEHORZ
7KHEDVHPS VKRZQFRROLHVZLWKJSVEDVHPS
DFFXUDWHVDQGGUG/

7KHIORRGKDUGLQRUPDWLRQLV GHULYHGLUHFWO\IURPWKH
DWKRULWDWLYHJHEVHUYLFHV SURYLGHGEJS 7KLVPS
ZVHSFRUWHGRQ DW ;3 DQGGRHV QW
UHOHFW FKDQHV RU DPGPQWV VXEVHTXHQW WR WKLVGDWH DQG
WLFI 7KHJHDGHIHFWLYHQRUPDWLRQPFKDQHRU
EHFRPVSUVHGEQHZGDWDRYHU WLFI

7KLVPSLPHLV YRLGLI WKHFHQRU RUHR WKHIOORZLQJPS
HOHPQWV GR QW DSSHDU, EDVHPSLPH\ IORRGJRQHODEHOV
OHHQG VFDOHEDU PSFUHDWLRQGDWH FRRQL W\LGHQWLILHUV
)5$DQG QWHU DQG)5$IHFWLYHGDWH DSLPHV IRU
XQPSSHGDQGXQRGHUQL}HGUHDV FDQQW EHXVHGIRU
UHJXODWRU\SUSRVHV

CALIFORNIA DEPARTMENT OF
WATER RESOURCES

Floodplain Information

Latitude: 34.22805, Longitude: -117.09846



County: (34.22805, -117.09846)

Floodplain Layer	100-YR	200-YR	500-YR
FEMA Effective	N✓	N/A	N✓
DWR Awareness	N✓	N/A	N/A
Regional/Special Studies	N✓	N/A	N✓
USACE Comp. Study	N✓	N✓	N✓

Y: The location is within the floodplain
N: The location is not within the floodplain
N/A: Data not available
✓ = Active Layer(s)

Floodplains are displayed using semi transparent colors. When viewing overlapping floodplains, the combination of multiple semi transparent colors will not match the legend colors. For accurate color representation, view floodplains individually.

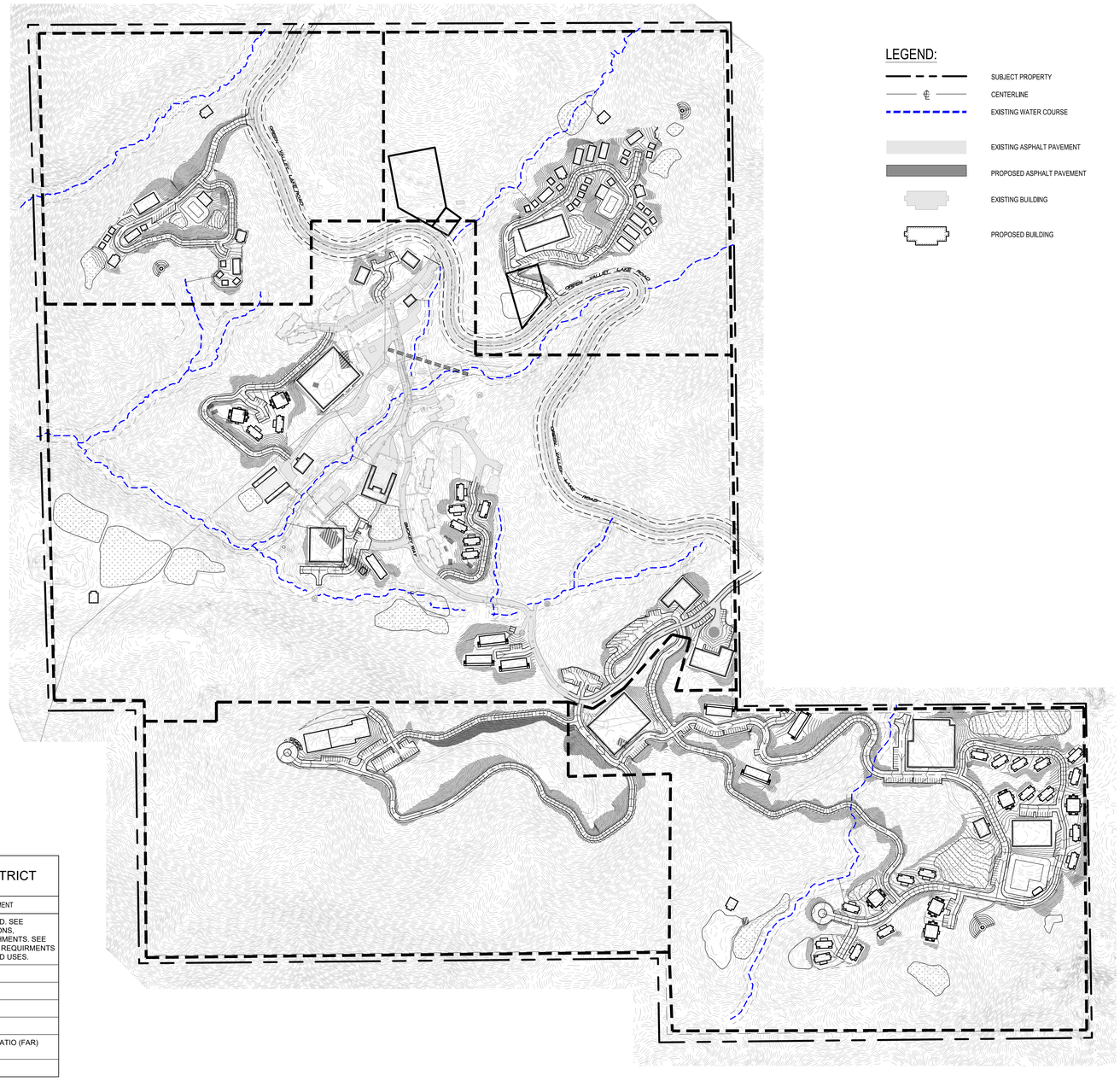
Appendix C

Reference Plans

IN THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA

SITE PLAN

BEING A PORTION OF THE EAST 1/2 OF THE SOUTHWEST 1/4 AND THE WEST 1/2 OF THE SOUTHEAST 1/4 OF SECTION 28, AND A PORTION OF THE NORTHEAST 1/4 AND THE NORTHEAST 1/4 OF THE NORTHWEST 1/4 OF SECTION 33, TOWNSHIP 2 NORTH, RANGE 2 WEST, SAN BERNARDINO BASE AND MERIDIAN, IN THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, ACCORDING TO GOVERNMENT SURVEY.



LEGEND:

- SUBJECT PROPERTY
- CENTERLINE
- EXISTING WATER COURSE
- EXISTING ASPHALT PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- EXISTING BUILDING
- PROPOSED BUILDING

REQUIRMENTS BY LAND USE ZONING DISTRICT

DEVELOPMENT FEATURE	SD SPECIAL DEVELOPMENT
SETBACKS	MINIMUM SETBACKS REQUIRED. SEE CHAPTER 83.02 FOR EXCEPTIONS, REDUCTIONS, AND ENCROACHMENTS. SEE DIVISION 5 FOR ANY SETBACK REQUIRMENTS APPLICABLE TO SPECIFIC LAND USES.
FRONT	15 FT.
SIDE - STREET SIDE	15 FT.
SIDE - INTERIOR (EACH)	10FT.
REAR	10FT.
FLOOR AREA RATIO (FAR)	MAXIMUM FLOOR AREA RATIO (FAR) ALLOWED
MAXIMUM FAR	.3:1

MIDDLE SCHOOL CAMP (PHASE 1)

DESCRIPTION	EXISTING SQ. FT.	PROPOSED SQ. FT. (EACH)	QUANTITY (EACH)	TOTAL PROPOSED SQ. FT.
DIRECTORS HOUSING	0	2,400	1	2,400
SPEAKERS HOUSING	0	2,400	1	2,400
WELCOME CENTER & RESTROOMS	825	1,248	1	2,073
MULTIPURPOSE REC/GYM	0	28500	1	28500
80-BED DORM	0	2,500	2	5000
40-BED DORM	0	1,580	8	12640
SNACK SHOP	3152	-21	1	3131
MULTIPURPOSE	5521	3,921	1	9442
RESTROOM & REC. EQUIPMENT	0	1,477	1	1477
MULTIPURPOSE CHAPEL	0	16,900	1	16900
GARAGE	450	155	1	605
STAFF HOUSING (MEDICAL)	2556	636	1	3192
DINNING	8816	6,832	1	15648
STAFF HOUSING	0	3,168	3	9504
MAINTENANCE BUILDING 1	0	11,900	1	11900
MAINTENANCE BUILDING 2	2194	7,281	1	9475
TOTALS		90877	26	134287

HIGH SCHOOL CAMP (PHASE 2)

DESCRIPTION	EXISTING SQ. FT.	PROPOSED SQ. FT. (EACH)	QUANTITY (EACH)	TOTAL PROPOSED SQ. FT.
MULTIPURPOSE REC/GYM	0	28500	1	28500
STAFF HOUSING	0	3,168	3	9504
DINING BUILDING	0	30,914	1	30914
80-BED DORM	0	2,500	5	12500
40-BED DORM	0	1,580	17	26860
MULTIPURPOSE CHAPEL	0	15,000	1	15000
SNACK BAR	0	3,131	1	3131
POOL HOUSE	0	770	1	770
OUTDOOR AMPHITHEATER (VICTORY CIRCLE)	0	3,228	1	3228
RESTROOM AND REC. EQUIPMENT	0	1,477	1	1477
TOTALS		90268	32	131884

ADULT LODGE (PHASE 3)

DESCRIPTION	EXISTING SQ. FT.	PROPOSED SQ. FT. (EACH)	QUANTITY (EACH)	TOTAL PROPOSED SQ. FT.
ADULT LODGE	0	18000	1	18000
TOTALS		18000	1	18000

ELEMENTARY (PHASE 4)

DESCRIPTION	EXISTING SQ. FT.	PROPOSED SQ. FT. (EACH)	QUANTITY (EACH)	TOTAL PROPOSED SQ. FT.
RESTROOM & SHOWERS	0	1477	2	2954
SEASONAL HOUSING PLATFORM TENT	0	480	17	8160
40-BED DORM	0	1,680	8	13440
RESTROOM AND REC EQUIPMENT	0	1,477	1	1477
OUTDOOR AMPHITHEATER (VICTORY CIRCLE)	0	3,228	1	3228
CRAFT REC PAVILION	0	579	1	579
DINING PAVILION	0	15,930	1	15930
POOL HOUSE & RESTROOMS	0	1,750	1	1750
TOTALS		26601	32	47518

WILDWOOD (PHASE 5)

DESCRIPTION	EXISTING SQ. FT.	PROPOSED SQ. FT. (EACH)	QUANTITY (EACH)	TOTAL PROPOSED SQ. FT.
RESTROOM & SHOWERS	0	1477	1	1477
SEASONAL HOUSING PLATFORM TENT	0	480	8	3840
40-BED DORM	0	1,680	2	3360
RESTROOM AND REC EQUIPMENT	0	1,477	2	2954
OUTDOOR AMPHITHEATER (VICTORY CIRCLE)	0	3,228	1	3228
DINING PAVILION	0	3,982	1	3982
POOL HOUSE & RESTROOMS	0	1,750	1	1750
TOTALS		14074	16	20591

ALL PHASES (1-5)

DESCRIPTION	EXISTING SQ. FT.	PROPOSED SQ. FT. (EACH)	TOTAL PROPOSED SQ. FT.
PHASE 1	58274	134287	192561
PHASE 2	643	131,884	132527
PHASE 3	0	18,000	18000
PHASE 4	0	47,518	47518
PHASE 5	0	20,591	20591
TOTALS		352280	411197

NORTH

GRAPHIC SCALE IN FEET
0 100 200 400

SCALE: 1" = 200' WHEN PRINTED AT FULL SIZE (30" X 42")

No.	REVISIONS	DATE	BY

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DATE	3/11/2025
SCALE	AS SHOWN
DESIGNED BY	
DRAWN BY	
	___

HUME SOCAL - GREEN VALLEY LAKE, CA
PREPARED FOR
HUME LAKE CHRISTIAN CAMPS

MUNICIPALITY CA

SITE PLAN - TPM NO. 20840
PRELIMINARY SITE PLAN
SAN BERNARDINO COUNTY

SHEET NUMBER
1
OF
6

Plotted By:Ghodrat, Christina Sheet Set:Kha Layout:1 PRELIMINARY SITE PLAN March 11, 2025 10:28:59am K:\RIV_LDEV\195435002 - Hume SoCal Project\CAD\Exhibit\General Site Plan Overview\General Site Plan.dwg
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PARKING SUMMARY - PHASE 1

PROVIDED:

STAFF HOUSING AREA	= 11 SPACES
CHAPEL	= 6 SPACES
DINING AREA	= 0 SPACES
GIRLS' CABINS AREA	= 0 SPACES
BOYS' CABINS AREA	= 9 SPACES
MULTIPURPOSE ROOM AREA	= 0 SPACES
POOL AREA	= 0 SPACES
MAINTENANCE AREA	= 44 SPACES
PARKING LOT	= 25 SPACES
BUS PARKING AREA	= 8 SPACES
TOTAL PROVIDED:	= 103 SPACES

LEGEND:

- SUBJECT PROPERTY
- CENTERLINE
- EXISTING WATER COURSE
- EXISTING ASPHALT PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- EXISTING BUILDING
- PROPOSED BUILDING

MIDDLE SCHOOL CAMP (PHASE 1)

DESCRIPTION	EXISTING SQ. FT.	PROPOSED SQ. FT. (EACH)	QUANTITY (EACH)	TOTAL PROPOSED SQ. FT.
DIRECTORS HOUSING	0	2,400	1	2,400
SPEAKERS HOUSING	0	2,400	1	2,400
WELCOME CENTER & RESTROOMS	825	1,248	1	2,073
MULTIPURPOSE REC/GYM	0	28500	1	28500
80-BED DORM	0	2,500	2	5000
40-BED DORM	0	1,580	8	12640
SNACK SHOP	3152	-21	1	3131
MULTIPURPOSE	5521	3,921	1	9442
RESTROOM & REC. EQUIPMENT	0	1,477	1	1477
MULTIPURPOSE CHAPEL	0	16,900	1	16900
GARAGE	450	155	1	605
STAFF HOUSING (MEDICAL)	2556	636	1	3192
DINNING	8816	6,832	1	15648
STAFF HOUSING	0	3,168	3	9504
MAINTENANCE BUILDING 1	0	11,900	1	11900
MAINTENANCE BUILDING 2	2194	7,281	1	9475
TOTALS		90877	26	134287

GRAPHIC SCALE IN FEET
0 40 80 160

SCALE: 1" = 80' WHEN PRINTED AT FULL SIZE (30" X 42")

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DATE 3/11/2025

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DESIGNED BY

DRAWN BY

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PREPARED FOR
HUME LAKE CHRISTIAN CAMPS

MUNICIPALITY CA

SITE PLAN - TPM NO. 20840
PH-1 MIDDLE SCHOOL
SAN BERNARDINO COUNTY

SHEET NUMBER 2 OF 6

Plotted By:Ghodrat, Christina Sheet Set:Khs Layout:2 PH-1 MIDDLE SCHOOL March 11, 2025 10:27:09am K:\RIV_LRD\119543002 - Hume SoCal Project\CADD\Exhibits\General Site Plan Overview\General Site Plan.dwg
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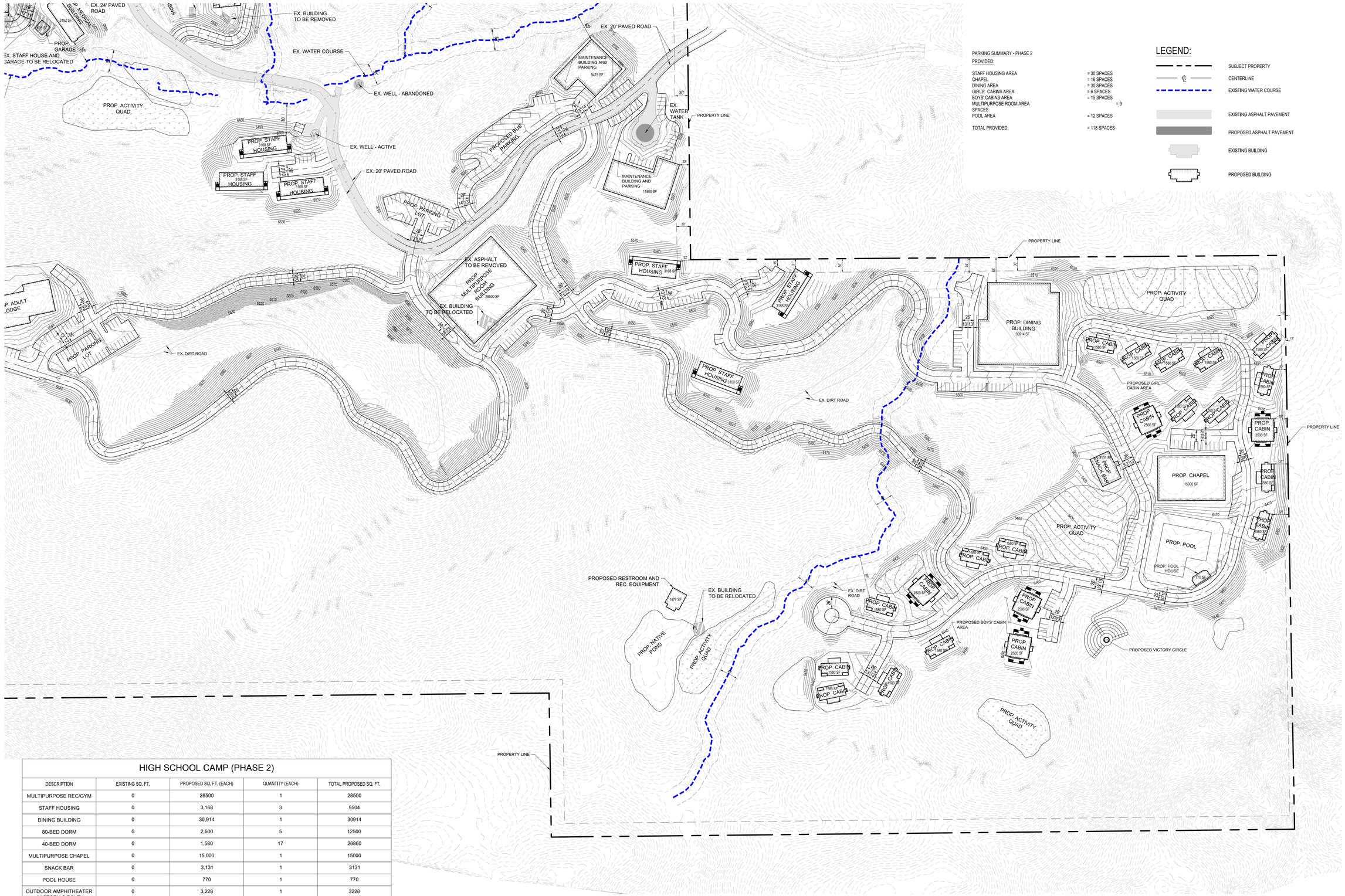

PARKING SUMMARY - PHASE 2

PROVIDED:

STAFF HOUSING AREA	= 30 SPACES
CHAPEL	= 16 SPACES
DINING AREA	= 30 SPACES
GIRLS' CABINS AREA	= 6 SPACES
BOYS' CABINS AREA	= 15 SPACES
MULTIPURPOSE ROOM AREA	= 9 SPACES
POOL AREA	= 12 SPACES
TOTAL PROVIDED:	= 118 SPACES

LEGEND:

- SUBJECT PROPERTY
- CENTERLINE
- EXISTING WATER COURSE
- EXISTING ASPHALT PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- EXISTING BUILDING
- PROPOSED BUILDING

HIGH SCHOOL CAMP (PHASE 2)

DESCRIPTION	EXISTING SQ. FT.	PROPOSED SQ. FT. (EACH)	QUANTITY (EACH)	TOTAL PROPOSED SQ. FT.
MULTIPURPOSE REC/GYM	0	28500	1	28500
STAFF HOUSING	0	3,168	3	9504
DINING BUILDING	0	30,914	1	30914
80-BED DORM	0	2,500	5	12500
40-BED DORM	0	1,580	17	26860
MULTIPURPOSE CHAPEL	0	15,000	1	15000
SNACK BAR	0	3,131	1	3131
POOL HOUSE	0	770	1	770
OUTDOOR AMPHITHEATER (VICTORY CIRCLE)	0	3,228	1	3228
RESTROOM AND REC. EQUIPMENT	0	1,477	1	1477
TOTALS		90268	32	131884

No.	REVISIONS	DATE	BY

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DATE 3/11/2025
SCALE AS SHOWN
DESIGNED BY
DRAWN BY

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PREPARED FOR
HUME LAKE CHRISTIAN CAMPS

MUNICIPALITY CA

SITE PLAN - TPM NO. 20840
PH-2 HIGH SCHOOL CAMP
SAN BERNARDINO COUNTY

SHEET NUMBER
3
OF
6

EX. WELL - ACTIVE

EX. WATER COURSE

PROP. ACTIVITY QUAD

EX. WELL - ABANDONED

EX. WELL - ACTIVE

EX. 20' PAVED ROAD

PROP. STAFF 3168 SF HOUSING

PROP. STAFF 3168 SF HOUSING

PROP. STAFF 3168 SF HOUSING

70'

PROPOSED BUS PARKING

PROP. PARKING LOT

EX. ASPHALT TO BE REMOVED

PROP MULTIPURPOSE ROOM BUILDING

28500 SF

EX. BUILDING TO BE RELOCATED

PROP. ADULT LODGE

18000 SF

PROP. PARKING LOT

EX. DIRT ROAD

PARKING SUMMARY - PHASE 3

PROVIDED:

ADULT LODGE AREA	= 24 SPACES
PARKING LOT	= 31 SPACES
TOTAL PROVIDED:	= 55 SPACES

LEGEND:

- SUBJECT PROPERTY
- CENTERLINE
- EXISTING WATER COURSE
- EXISTING ASPHALT PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- EXISTING BUILDING
- PROPOSED BUILDING

NORTH

GRAPHIC SCALE IN FEET
0 20 40 80

SCALE: 1" = 40' WHEN PRINTED AT FULL SIZE (30" X 42")

ADULT LODGE (PHASE 3)

DESCRIPTION	EXISTING SQ. FT.	PROPOSED SQ. FT. (EACH)	QUANTITY (EACH)	TOTAL PROPOSED SQ. FT.
ADULT LODGE	0	18000	1	18000
TOTALS		18000	1	18000

No.	REVISIONS	DATE	BY

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KHA PROJECT

DATE 3/11/2025

SCALE AS SHOWN

DESIGNED BY

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HUME SOCAL - GREEN VALLEY LAKE, CA
PREPARED FOR
HUME LAKE CHRISTIAN CAMPS

MUNICIPALITY CA

SITE PLAN - TPM NO. 20840
PH-3 ADULT LODGE
SAN BERNARDINO COUNTY

SHEET NUMBER 4 OF 6

Plotted By: Ghodrati, Christina Sheet Set: Kha Layout: 4 PH-3 ADULT LODGE March 11, 2025 10:28:24am K:\RIV_LDEV\195439002 - Hume SoCal Project\CAD\Exhibit\General Site Plan Overview\General Site Plan.dwg
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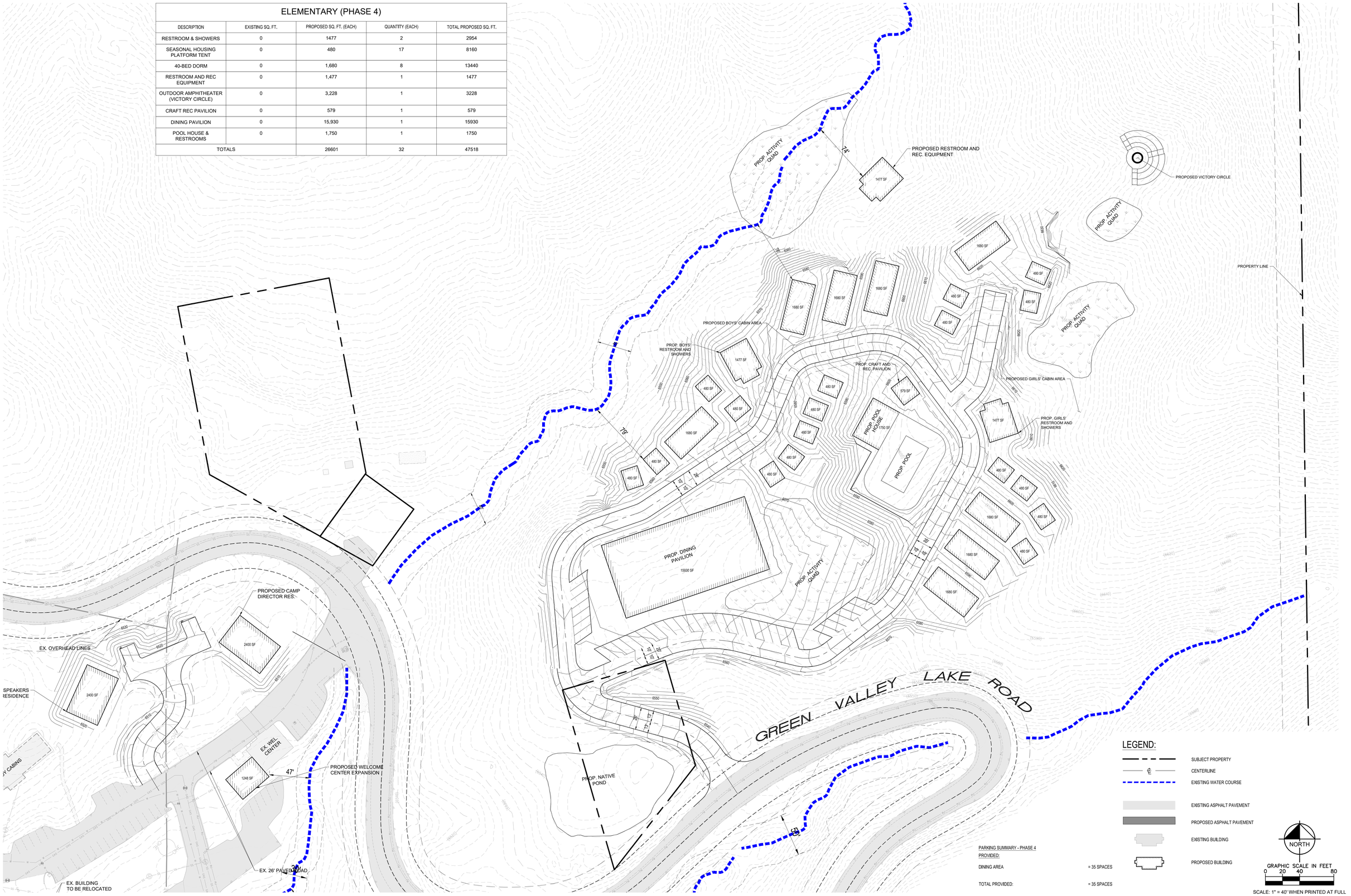
ELEMENTARY (PHASE 4)

DESCRIPTION	EXISTING SQ. FT.	PROPOSED SQ. FT. (EACH)	QUANTITY (EACH)	TOTAL PROPOSED SQ. FT.
RESTROOM & SHOWERS	0	1477	2	2954
SEASONAL HOUSING PLATFORM TENT	0	480	17	8160
40-BED DORM	0	1,680	8	13440
RESTROOM AND REC EQUIPMENT	0	1,477	1	1477
OUTDOOR AMPHITHEATER (VICTORY CIRCLE)	0	3,228	1	3228
CRAFT REC PAVILION	0	579	1	579
DINING PAVILION	0	15,930	1	15930
POOL HOUSE & RESTROOMS	0	1,750	1	1750
TOTALS		26601	32	47518



PARKING SUMMARY - PHASE 4

PROVIDED:

DINING AREA	= 35 SPACES
TOTAL PROVIDED:	= 35 SPACES

LEGEND:

- SUBJECT PROPERTY
- CENTERLINE
- EXISTING WATER COURSE
- EXISTING ASPHALT PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- EXISTING BUILDING
- PROPOSED BUILDING

NORTH

GRAPHIC SCALE IN FEET
0 20 40 80

SCALE: 1" = 40' WHEN PRINTED AT FULL SIZE (30" X 42")

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DATE 3/11/2025

SCALE AS SHOWN

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HUME SOCAL - GREEN VALLEY LAKE, CA
PREPARED FOR
HUME LAKE CHRISTIAN CAMPS

MUNICIPALITY CA

SITE PLAN - TPM NO. 20840
PH-4 ELEMENTARY AGE CAMP
SAN BERNARDINO COUNTY

SHEET NUMBER 5 OF 6

Plotted By:Ghodrati, Christina Sheet Set:Kha Layout:ES PH-4 ELEMENTARY AGE CAMP March 11, 2025 10:29:01am K:\RIV_LDEV\195435002 - Hume SoCal Project\CAD\Exhibits\General Site Plan Overview\General Site Plan.dwg
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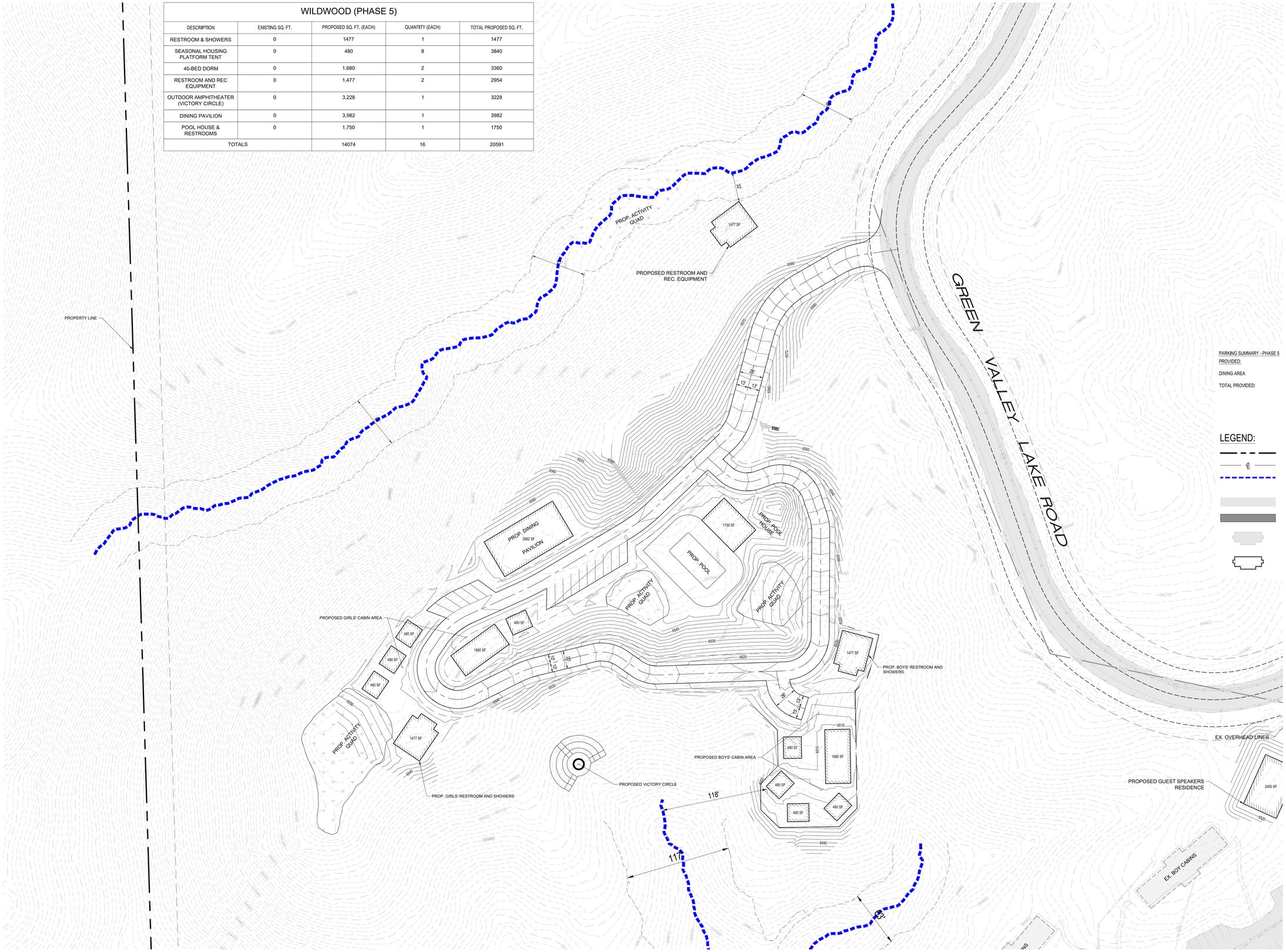
WILDWOOD (PHASE 5)

DESCRIPTION	EXISTING SQ. FT.	PROPOSED SQ. FT. (EACH)	QUANTITY (EACH)	TOTAL PROPOSED SQ. FT.
RESTROOM & SHOWERS	0	1477	1	1477
SEASONAL HOUSING PLATFORM TENT	0	480	8	3840
40-BED DORM	0	1,680	2	3360
RESTROOM AND REC EQUIPMENT	0	1,477	2	2954
OUTDOOR AMPHITHEATER (VICTORY CIRCLE)	0	3,228	1	3228
DINING PAVILION	0	3,982	1	3982
POOL HOUSE & RESTROOMS	0	1,750	1	1750
TOTALS		14074	16	20591



PARKING SUMMARY - PHASE 5

PROVIDED:

DINING AREA = 16 SPACES

TOTAL PROVIDED: = 16 SPACES

LEGEND:

- SUBJECT PROPERTY
- CENTERLINE
- EXISTING WATER COURSE
- EXISTING ASPHALT PAVEMENT
- PROPOSED ASPHALT PAVEMENT
- EXISTING BUILDING
- PROPOSED BUILDING

NORTH

GRAPHIC SCALE IN FEET

0 20 40 80

SCALE: 1" = 40' WHEN PRINTED AT FULL SIZE (30" X 42")

No.	REVISIONS	DATE	BY

Kimley»Horn

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3801 UNIVERSITY AVE # 300, RIVERSIDE, CA 92501
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HUME SOCAL - GREEN VALLEY LAKE, CA

PREPARED FOR

HUME LAKE CHRISTIAN CAMPS

MUNICIPALITY CA

SITE PLAN - TPM NO. 20840

PH-5 WILDWOOD CAMP

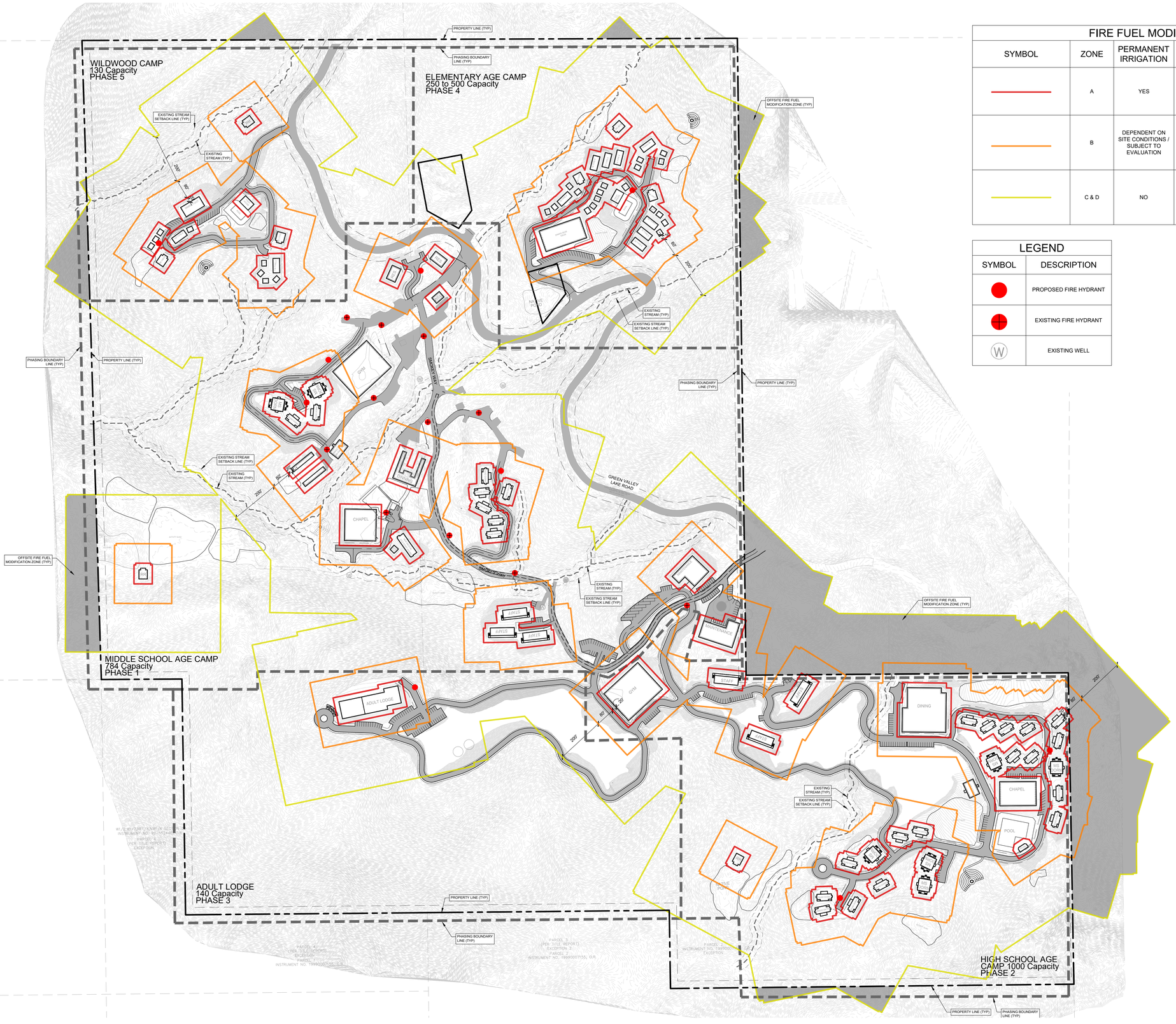
SAN BERNARDINO COUNTY

SHEET NUMBER

6

OF

6



FIRE FUEL MODIFICATION ZONE LEGEND

SYMBOL	ZONE	PERMANENT IRRIGATION	ZONE WIDTH	DESCRIPTION (SEE SHEET FM-2 FOR MORE INFORMATION)
	A	YES	EXTENDS 20' FROM BUILDINGS, STRUCTURES, DECKS, ETC.	• 20-FOOT WIDE IRRIGATED AREA OF LOW-GROWING PLANTS WITH HIGH MOISTURE CONTENT IMMEDIATELY AROUND STRUCTURES. • HELPS PREVENT DIRECT FLAME IMPINGEMENT ON THE STRUCTURE AND IS FREE OF FINE RECEPTIVE FUELS WHERE EMBERS CAN IGNITE.
	B	DEPENDENT ON SITE CONDITIONS / SUBJECT TO EVALUATION	EXTENDS 80' FROM ZONE A	• USES APPROVED PLANTINGS, TYPICALLY IRRIGATED AND SPACED TO MINIMIZE FIRE TRANSMISSION. • DESIGNED TO SLOW FIRE'S PROGRESS, REDUCES INTENSITY BY ELIMINATING CONTINUOUS FUELS, AND MAINTAINS HIGHER FUEL MOISTURE LEVELS IN IRRIGATED VEGETATION.
	C & D	NO	EXTENDS UP TO 200' FROM ZONE B	• THINNED TO REMOVE DEAD VEGETATION AND PREVENT OVERGROWTH. • DESIGNED TO SLOW THE FIRE'S PROGRESS AND REDUCE ITS INTENSITY BY DECREASING THE AVAILABILITY OF CONTINUOUS FUELS. • NATIVE VEGETATION THINNED 40% IN ZONE C AND 30% IN ZONE D.

LEGEND

SYMBOL	DESCRIPTION
	PROPOSED FIRE HYDRANT
	EXISTING FIRE HYDRANT
W	EXISTING WELL

NORTH

GRAPHIC SCALE IN FEET
0 80 160 320

SCALE: 1" = 160' WHEN PRINTED AT FULL SIZE (30" X 42")

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	___

HUME SOCAL - GREEN VALLEY LAKE, CA
PREPARED FOR
HUME LAKE CHRISTIAN CAMPS
COUNTY OF SAN BERNARDINO CA

PLA SEAL
JEROME LANDSCAPE ARCHITECTURE CORPORATION
NOT FOR CONSTRUCTION
3/31/2025
Date
3/11/2025
Date
STATE OF CALIFORNIA

PRELIMINARY FIRE FUEL MODIFICATION PLAN
TPM NO. 20840

SHEET NUMBER
FM-1

Plotted By:Ghoderdi, Christina Sheet Set:Kha Layout:FM-1 March 11, 2025 10:21:41am K:\RIV_LDEV\195430002 - Hume SoCal Project\CAD\Exhibits\Fire Fuel Modification\Fire Fuel Modification.dwg
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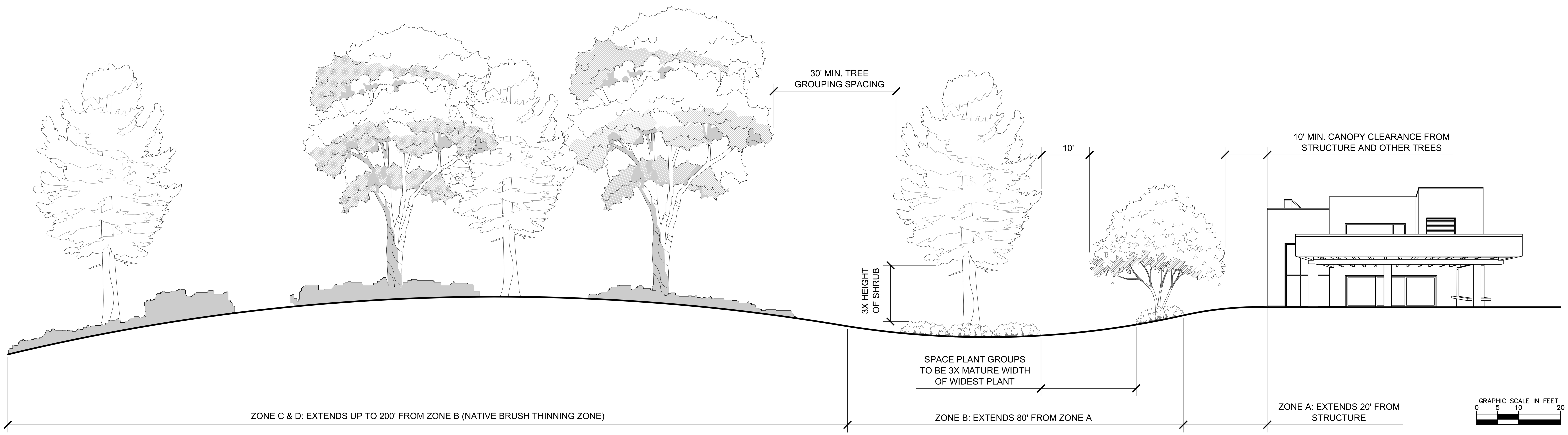
TYPICAL FIRE FUEL MODIFICATION SECTION (10-SCALE)



VERTICAL CLEARANCE

UNDERSTORY CLEARANCE:

- NEW AND EXISTING TREES, SHRUBS, AND TREE-FORM SHRUBS (NATURALLY REACHING OVER 2' IN HEIGHT), WHICH ARE BEING RETAINED WITH THE APPROVAL OF THE AGENCY HAVING JURISDICTION, SHALL BE PRUNED TO PROVIDE CLEARANCE OF THREE TIMES THE HEIGHT OF THE UNDER-STORY PLANT MATERIAL.

HORIZONTAL SEPARATION

PLANT GROUP CANOPY SPACING:

- ALL SHRUBS AND TREE-FORM SHRUBS OVER 2 FEET IN HEIGHT SHALL BE SINGLE SPECIMANS OR IN A MAXIMUM GROUPING OF 3 PLANTS. GROUPINGS SHALL BE SEPARATED BY A DISTANCE OF 3 TIMES THE WIDTH OF THE WIDEST SPECIMEN IN THE GROUP. OTHER GROUPING ARRANGEMENTS AND SPACING MAY BE ACCEPTABLE IF APPROVED BY THE SAN BERNARDINO COUNTY FIRE (SBCF).
- ALL TREES SHALL BE SINGLE SPECIMENS OR IN A MAXIMUM GROUPING OF 3. GROUPINGS SHALL BE SEPARATED BY A DISTANCE OF 30 FEET. OTHER GROUPING ARRANGEMENTS AND SPACING MY BE ACCEPTABLE IF APPROVED BY THE SBCF.
- SHRUBS AND TREE-FORM SHRUBS TALLER THAN 2 FEET IN HEIGHT SHALL BE NO CLOSER THAN 15 FEET FROM THE EDGE OF THE TREE CANOPY(S) MEASURED HORIZONTALLY TO MINIMIZE FUEL LADDER EFFECTS.

SAN BERNARDINO COUNTY MOUNTAIN AREA FIRE HAZARD ABATEMENT

- **MOUNTAIN AREA:** PORTION OF THE UNINCORPORATED AREA OF THE COUNTY OF SAN BERNARDINO LOCATED WITHIN THE FIRE SAFETY OVERLAY OF THE GENERAL PLAN, WHETHER PUBLICLY OR PRIVATELY OWNED.
- FLAMMABLE VEGETATION TO BE TREATED AND CLEARED PER THE GUIDELINES SET FORTH BELOW.
- FLAMMABLE VEGETATION WHICH CONSTITUTES A FIRE HAZARD IN THE MOUNTAIN AREA MEANS:
  - ALL FOLIAGE AND BRANCHES WITHIN 6' FROM THE GROUND ON TREES OVER 12' IN HEIGHT THAT STAND WITHIN 100' OF STRUCTURES. LIMBS SHOULD BE CUT NO LESS THAN 1/4" FROM THE TRUNK OF THE TREE TO PRESERVE THE HEALTH OF THE TREE.
  - ALL TREES THAT ARE WITHIN 30' OF STRUCTURES THAT ARE SMALLER THAN 4" IN DIAMETER THAT STAND WITHIN 10' FROM OTHER TREES (NOT TO INCLUDE LOW-ENERGY-RELEASE DECIDUOUS ORNAMENTAL TREES THAT ARE PRUNED AND FREE OF DEAD OR DAMAGED FOLIAGE).
  - ALL SHRUBS THAT ARE WITHIN 15' OF STRUCTURES THAT PRODUCE HIGH-ENERGY-RELEASE COMPONENTS AND ARE CONSIDERED HIGH FIRE FUELS, NOT TO INCLUDE LOW-ENERGY-RELEASE DECIDUOUS ORNAMENTAL PLANTS THAT ARE WELL-PRUNED, WELL-SPACED, AND FREE OF DEAD OR DAMAGED FOLIAGE.
    - HIGH-ENERGY-RELEASE SHRUBS INCLUDE, BUT ARE NOT LIMITED TO:
      - MANZANITA
      - SERVICE BERRY
      - MOUNTAIN WHITETHORN
      - SAGE
      - IRONWOOD
      - JUNIPER SHRUBS
      - SPANISH BROOM
      - ANY OTHER SPECIES AS DETERMINED BY THE COUNTY FIRE CHIEF/FIRE WARDEN OR OTHER DESIGNEE TO CONSTITUTE A FIRE HAZARD.
  - ALL HIGH-ENERGY-RELEASE SHRUBS THAT ARE SPACED TOGETHER LESS THAN DOUBLE THE HEIGHT OF THE TALLEST SHRUB AND STAND WITHIN 30' OF STRUCTURES (E.G. A 4'-TALL SHRUB SHOULD BE SPACED 8' OR MORE AWAY FROM THE NEXT SHRUB, PROVIDING THAT THE 4'-TALL SHRUB IS THE TALLEST OF THE TWO SHRUBS), NOT TO INCLUDE ORNAMENTAL PLANTS THAT ARE WELL-PRUNED, WELL-SPACED, AND FREE OF DEAD OR DAMAGED FOLIAGE.
  - PLANTING OF NATIVE, FIRE-WISE, DROUGHT-RESISTANT SPECIES IS ENCOURAGED FOR THE HEALTH OF THE FOREST.
  - LOWER FOLIAGE MEASURED AT LEAST 18" UP FROM THE GROUND AND ALL LEAF LITTER AND DEAD VEGETATION ON AND UNDER ALL SHRUBS THAT STAND WITHIN 100' OF ALL STRUCTURES.
  - DEAD BRANCHES AND LEAF LITTER IN AND UNDER ALL PLANTS, TREES, FOLIAGE, AND SHRUBS, AND ALL FLAMMABLE VEGETATION AT ALL HEIGHTS WITHIN 100' OF ALL STRUCTURES.
  - TREE LIMBS (NOT TRUNKS) LESS THAN 10' AWAY FROM CHIMNEYS AND STOVEPIPES.
  - GRASS OVER 4" IN HEIGHT.

FIRE FUEL MODIFICATION ZONE-SPECIFIC NOTES

ZONE A - IRRIGATED SETBACK ZONE

1. REMOVE ALL DEAD OR DYING VEGETATION
2. TRIM AND MAINTAIN TREE CANOPIES TO BE A MINIMUM OF 10' FROM ALL STRUCTURES AND OTHER TREES. PLEASE NOTE THAT TREES ARE GENERALLY NOT RECOMMENDED, EXCEPT FOR DWARF VARIETIES OR MATURE TREES SMALL IN STATURE.
3. REMOVE LADDER FUELS BY CREATING A SEPARATION BETWEEN LOW-LEVEL VEGETATION AND/OR TRIM LOW TREE BRANCHES.
4. REMOVE OR PRUNE VEGETATION NEAR WINDOWS.
5. REMOVE COMBUSTIBLE MATERIAL AND VEGETATION AROUND AND UNDER DECKS.
6. RELOCATE WOODPILES OR OTHER COMBUSTIBLE MATERIALS TO ZONE B.
7. REMOVE LEAF LITTER FROM YARD, ROOF, AND RAIN GUTTERS.
8. VINES AND CLIMBING PLANTS SHALL NOT BE ALLOWED ON ANY COMBUSTIBLE STRUCTURE REQUIRING REVIEW.
9. VEGETATION SHALL BE INHERENTLY FIRE-RESISTANT.
10. MAINTAIN A MINIMUM SPACING BETWEEN VEGETATION THAT IS 3X THE MATURE WIDTH OF THE PLANT.

ZONE B - IRRIGATED ZONE

1. REDUCE THE CONTINUITY OF FUELS BY REMOVING DEAD MATERIAL AND/OR THINNING VEGETATION.
2. REMOVE LADDER FUELS BY CREATING A SEPARATION BETWEEN LOW-LEVEL VEGETATION AND/OR TRIM LOW TREE BRANCHES.
3. CUT OR MOW ANNUAL GRASS DOWN TO 4" MAX. HEIGHT.
4. TRIM AND MAINTAIN TREE CANOPIES TO BE >10' FROM STRUCTURES AND OTHER TREES.
5. MAINTAIN A MINIMUM SPACING BETWEEN VEGETATION THAT IS 3X THE MATURE WIDTH OF THE PLANT.

ZONES C & D - NATIVE BUSH THINNING ZONE

1. REMOVE DEAD AND DYING VEGETATION.
2. THIN PLANTS TO PREVENT OVERGROWTH.
3. NATIVE VEGETATION THINNED TO 40% IN ZONE C AND 30% IN ZONE D.
4. GENERAL SPACING FOR EXISTING NATIVE TREES OR GROUPS OF TREES IS 30' BETWEEN CANOPIES. THIS DISTANCE MAY VERY DEPENDING ON THE SLOPE, ARRANGEMENT OF TREES IN RELATION TO SLOPE, AND THE TREE SPECIES.

GENERAL MAINTENANCE NOTES

ROUTINE MAINTENANCE SHALL BE REGULARLY PERFORMED IN ALL ZONES. REQUIREMENTS INCLUDE ITEMS IN THE FUEL MODIFICATION GUIDELINES, ZONE-SPECIFIC NOTES, AND THOSE OUTLINED BELOW:

1. REMOVAL OR THINNING OF UNDESIRABLE COMBUSTIBLE VEGETATION AND REMOVAL OF DEAD OR DYING PLANTS TO MEET MINIMUM BRUSH CLEARING REQUIREMENTS.
2. PRUNING AND THINNING TO REDUCE THE OVERALL FUEL LOAD AND CONTINUITY OF FUELS.
3. FUEL LOADS SHALL BE REDUCED BY PRUNING LOWER BRANCEHS OF TREES AND TREE-FORM SHRUBS TO 1/3 OF THEIR HEIGHT, OR 6' FROM THE LOWEST HANGING BRANCHES TO THE GROUND, TO HELP PREVENT FIRE FROM SPREADING AND MAKE MAINTENANCE EASIER. TREES WITH UNDERSTORY PLANTS SHOULD BE LIMBED UP TO AT LEAST 3X THE HEIGHT OF THE UNDERLYING VEGETATION OR UP TO 1/3 THE HEIGHT OF THE TREE, WHICHEVER IS LESS, TO HELP PREVENT FIRE FROM SPREADING UPWARD INTO THE CROWN.
4. ACCUMULATED PLANT LITTER AND DEAD WOOD SHALL BE REMOVED. DEBRIS AND TRIMMINGS PRODUCED BY MAINTENANCE SHOULD BE REMOVED FROM THE SITE OR CHIPPED AND EVENLY DISPERSED IN THE SAME AREA TO A MAXIMUM DEPTH OF 6 INCHES.
5. ALL INVASIVE SPECIES AND THEIR PARTS SHOULD BE REMOVED FROM THE SITE.
6. MANUAL AND AUTOMATIC IRRIGATION SYSTEMS SHALL BE MAINTAINED FOR OPERATIONAL INTEGRITY AND PROGRAMMING. EFFECTIVENESS SHOULD BE REGULARLY EVALUATED TO AVOID OVER OR UNDER-WATERING

PLANT REMOVAL METHODOLOGY

ALL UNDESIRABLE SPECIES ARE TO BE COMPLETELY REMOVED FROM SITE AND DISPOSED OF PROPERLY. REMOVAL INCLUDES TRUNKS, BRANCHES, LEAVES, FLOWERS, SEED PODS, ROOTBALL, AND SURFACE ROOTS. DO NOT USE ANY OF THIS DEBRIS FOR MULCH. CARE SHOULD BE TAKEN NOT TO DISTURB ROOT SYSTEMS OF ANY ADJACENT DESIRABLE PLANTS. WORK IS TO BE DONE MANUALLY AS MUCH AS POSSIBLE TO AVOID EROSION BY HEAVY EQUIPMENT. AFTER REMOVAL OF SPECIES, LEVEL AND MANUALLY COMPACT SOIL. APPLY A LAYER OF MULCH (2" MAX.).

EXISTING TREES

ALL EXISTING TREES NOT IMPACTED BY GRADING/CONSTRUCTION SHALL REMAIN IN PLACE AND BE MAINTAINED PER THE COUNTY OF SAN BERNARDINO FIRE FUEL STANDARDS.

UNDESIRABLE PLANT SPECIES

SOME PLANTS ARE PARTICULARLY SUSCEPTIBLE TO FIRE DUE TO THEIR CHARACTERISTICS. THESE CHARACTERISTICS CAN EITHER BE PHYSICAL OR CHEMICAL. ANY VEGETATION WITH THESE CHARACTERISTICS SHALL NOT BE PLANTED. SHOULD THE SPECIES LISTED BELOW EXIST WITHIN THE PROPERTY, THEY SHOULD BE **REMOVED OR AGGRESSIVELY MAINTAINED.** REPLANTING PROHIBITED EXISTING VEGETATION THAT BECOMES DEAD OR DISEASED SHALL BE REPLACED WITH VEGETATION THAT IS NOT INDICATED BELOW.

BOTANICAL NAME:	COMMON NAME:	BOTANICAL NAME:	COMMON NAME:
Archnophoenix cunninghamiana	King Palm	Eucalyptus spp.	Eucalyptus
Archnophoenix alexandrae	King Palm	Fremontodendron	Flannel Bush
Abies spp.	Firs	Helix canariensis	English Ivy
Acacia spp.	Acacia Species	Heterothaca grandiflora	Telegraph Plant
Adenostoma fasciculatum	Chamise, Greasewood	Hordeum leporinum	Wild Barley
Adenostoma sparsifolium	Red Shank	Howea forsteriana	Sentry Palm
Agonis juniperina	Juniper Myrtle	Jubaea chilensis	Chilea Wine Palm
Agropyron repens	Quackgrass	Juniperus spp.	Juniper
Anthemis cotula	Mayweed	Lactuca serriola	Prickly Lettuce
Araucaria spp.	Monkey Puzzle Tree	Larix spp.	Larch
Arbutus menxiezii	Madrone	Larrea tridentata	Creosote Bush
Arctostaphylos spp.	Manzanita	Leptospermum spp.	Tea Tree
Arenga engleri	Formosa Sugarpalm	Livistona chinensis	Chinese Fan Palm
Artemisia spp.	Mugwort / Sagebrush	Lolium multiflorum	Ryegrass
Arundo donax	Giant Reed	Lonicera japonica	Japanese Honeysuckle
Avena fatua	Wild Oat	Mahonia spp.	Mahonia
Bambusa spp.	Bamboo	Melaleuca spp.	Melaleuca
Baccharis pilularis	Coyote Brush	Mimulus aurantiacus	Sticky Monkeyflower
Bougainvillea spp.	Bougainvillea	Miscanthus	Eulalia Grasss
Brahea spp.	Hesper Palm	Muhlenbergia	Deer Grass
Brassica spp.	Mustard	Stipa tenuissima	Mexican Feathergrass
Bromus rubens	Foxtail	Nicotania spp.	Tobacco Plant
Butia capitata	Pindo Palm	Pennisetum spp.	Fountain Grass
Callistemon spp.	Bottlebrush	Perrovskia atriplicifloria	Russian Sage
Cardaria draba	Noary Cypress	Phoenix spp.	Palm Tree
Casuarina cunninghamiana	River She-oak	Phoradendron atroplicifolia	Mistletoe
Castanopsis chrysophylla	Giant Chinquapin	Pickeringia montana	Chaparral Pea
Cedrus spp.	Cedars	Picea spp.	Spruces
Chamaecyparis spp.	False Cypress	Platycladus orientalis	Oriental Arborvitae
Chamaerops humilis	Mediterranean Fan Palms	Psudotsuga menziesii	Douglas Fir
Cinnamomum camphora	Camphora	Rhus spp.	Sumac
Cirsium vulgare	Wild Artichoke	Ricinus communis	Caster Bean Plant
Conyza canadensis	Horseweed	Rosmarinus officinalis	Rosemary
Coprosma pumila	Prostrate Coprosma	Sabal palmetto	Cabbage Palm Tree
Cortaderia jubata	Chinquapin	Sacsola austails	Russian Thistle
Cortaderia selloana	Pampas Grass	Salvia spp.	Sage
Crytomeria japonica	Japanese Crytomeria	Schinus spp.	Pepper Tree
Cupressus spp.	Cypress	Silybum marianum	Milk Thistle
Cynara cardunculus	Artichoke Thistle	Taxus spp.	Yew
Cystisus scoparius	Scotch Broom	Thuja spp.	Arborvitae
Dodonea viscose	Hopseed Bush	Trachycarpus	Palm Tree
Eriodictyon californicum	Yerba Santa	Washingtonia spp.	Fan Palm
Eriogonum spp.	Buckwheat		

RECOMMENDED IGNITION-RESISTANT PLANT MATERIAL FOR PROJECT LANDSCAPE AREAS

THE FIRE RESISTANCE OF ALL PLANTS CAN BE IMPROVED THROUGH APPROPRIATE IRRIGATION FREQUENCIES AND PLANT SPACING. MINIMIZE THE USE OF EVERGREEN SHRUBS AND TREES WITHIN 20' OF INHABITABLE STRUCTURES, AS THEY OFTEN CONTAIN OILS, RESINS, AND WAXES THAT CAUSE THESE PLANTS TO BURN WITH GREAT INTENSITY. USE ORNAMENTAL GRASSES AND BERRIES SPARINGLY, AS THEY CAN ALSO BE HIGHLY FLAMMABLE.

TREES

BOTANICAL NAME:	COMMON NAME:	ZONE:
Acer palmatum	Japanese Maple	A
Acer negundo	Box Elder	B
Aesculus californica	California Buckeye	B
Alnus rhombifolia	White Alder	B
Cercis occidentalis	Western Redbud	A
Chilopsis linearis	Desert Willow	A
Platanus racemosa	California Sycamore	B
Quercus spp.	Oak Tree	B

SHRUBS

BOTANICAL NAME:	COMMON NAME:	ZONE:
Achillea spp.	Yarrow	A
Agastache spp.	Hummingbird Mint	A
Carissa spp.	Natal Plum	A
Cistus spp.	Rockrose	B
Cotoneaster spp.	Cotoneaster	B
Dietes bicolor	Fortnight Lily	A
Hesperaloe parviflora	Red Yucca	B
Heuchera spp.	Coral Bells	A
Lavandula spp.	Lavender	A
Lupinus spp.	Lupine	B

GROUNDCOVER

BOTANICAL NAME:	COMMON NAME:	ZONE:
Arctostaphylos uva-ursi	Bearberry	B
Ceratostigma plumbaginoides	Dwarf plubmago	A
Ribes spp.	Currant	A
Rubus leucodermis	Whitebark raspberry	B

**ALL PROPOSED PLANT MATERIAL NOT INCLUDED IN THIS PLANT LIST SHALL BE APPROVED BY THE SAN BERNARDINO COUNTY FIRE DEPARTMENT.*

No.	REVISIONS	DATE	BY

Kimley»Horn

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HUME LAKE CHRISTIAN CAMPS
COUNTY OF SAN BERNARDINO CA

PLA SEAL
LICENSED LANDSCAPE ARCHITECT Matthew Durham License 5840 NOT FOR CONSTRUCTION Signature 3/31/2025 Renewal Date 3/11/2025 Date STATE OF CALIFORNIA

PRELIMINARY FIRE FUEL MODIFICATION PLAN
TPM NO. 20840

SHEET NUMBER
FM-2

Plotted By:Ghobrial, Christina Sheet Set:Kha Layout:FM-2 March 11, 2025 10:21:43am K:\RIV_LDEV\195436002 - Hume SoCal Project\CAD\Exhibits\Fire Fuel Modification\Fire Fuel Modification.dwg
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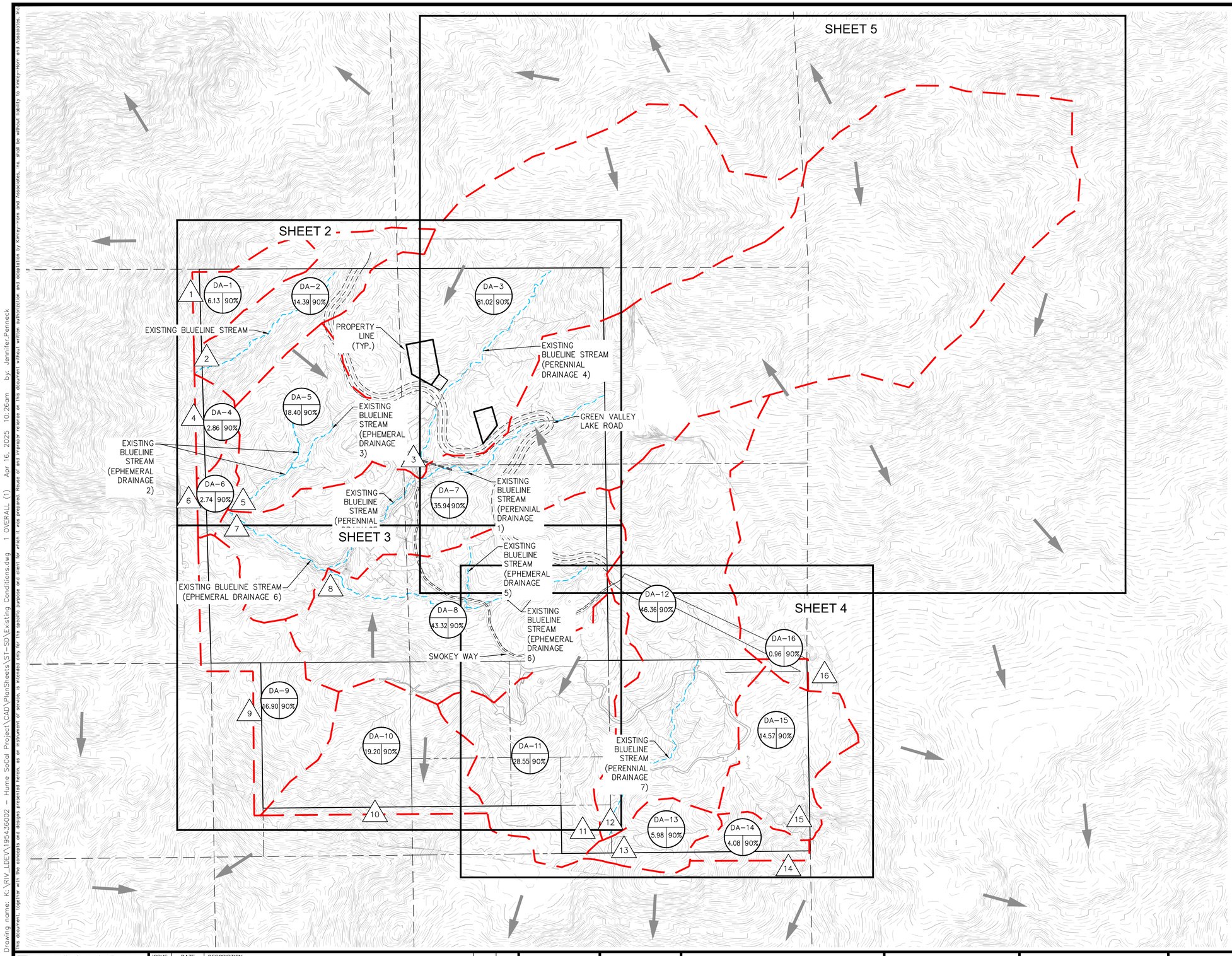
Appendix D

Existing Drainage Map and Calculations



LEGEND

- PROPERTY BOUNDARY
- (XXXX) EXISTING MAJOR CONTOURS
- (XXXX) EXISTING MINOR CONTOURS
- EXISTING BLUELINE STREAM
- EXISTING DRAINAGEWAY
- EXISTING BLUELINE STREAM SETBACK
- EXISTING ROAD
- EXISTING DRAINAGE EASEMENT
- EXISTING DMA BOUNDARY
- DA-3 / B / C — A = SUBAREA ID; B = SUBAREA ACREAGE; C = PERCENT PERVIOUS (%)
- 1 — DMA DESIGN POINT
- EXISTING FLOW ARROW

NOTES:

1. REFER TO HUME SOCAL CAMPGROUND DELINEATION OF STATE AND FEDERAL JURISDICTIONAL WATERS REPORT FOR ADDITIONAL INFORMATION ON ALL DRAINAGEWAYS.
2. FOR BASINS THAT HAVE A PERVIOUS PERCENTAGE GREATER THAN OR EQUAL TO 90%, A 90% PERVIOUS VALUE WAS UTILIZED.

NORTH

GRAPHIC SCALE IN FEET
0 150 300 600

Drawing name: K:\RIV_LDEV\195436002 - Hume SoCal Project\CAD\PlanSheets\ST-SD\Existing Conditions.dwg 1 OVERALL (1) Apr 16, 2025 10:26am by: Jennifer Penneck
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ISSUE	DATE	DESCRIPTION

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SNM — CHECKED BY
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HUME SOCAL - GREEN VALLEY LAKE, CA
PREPARED FOR
HUME LAKE
EXISTING DRAINAGE MAP OVERVIEW

SHEET 1 OF SHEETS 5
CITY PROJECT NO.

Drawing name: K:\RIV_LDEV\195436002 – Hume SoCal Project\CAD\PlanSheets\ST-SD\Existing Conditions.dwg DRN MAP 1 (2) Apr 16, 2025 10:26am by: Jennifer.Penneck
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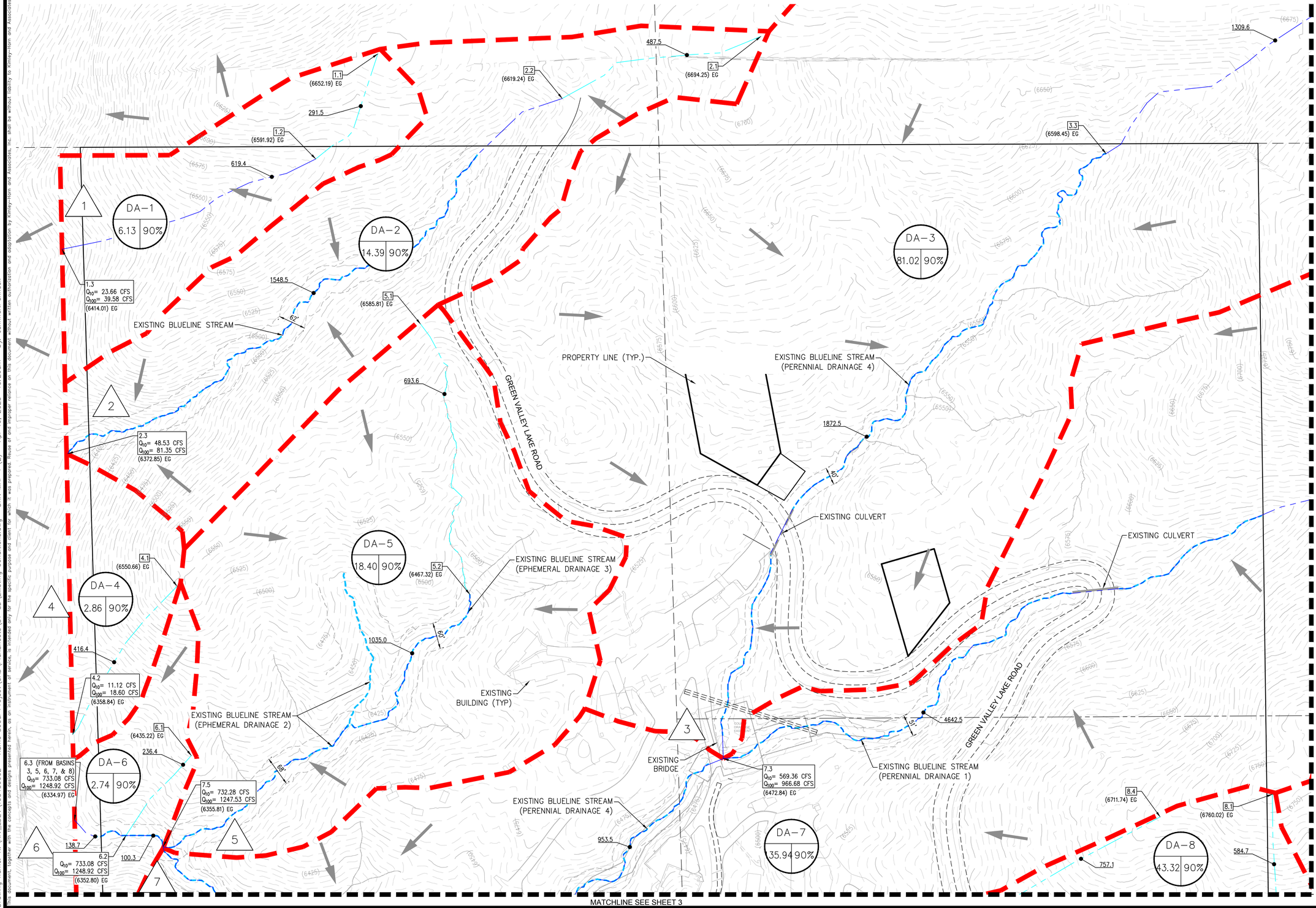

MATCHLINE SEE SHEET 5

MATCHLINE SEE SHEET 3

LEGEND

- PROPERTY BOUNDARY
- EXISTING MAJOR CONTOURS
- EXISTING MINOR CONTOURS
- EXISTING BLUELINE STREAM
- EXISTING DRAINAGEWAY
- EXISTING BLUELINE STREAM SETBACK
- EXISTING ROAD
- EXISTING DRAINAGE EASEMENT
- EXISTING DMA BOUNDARY
- OVERLAND FLOW PATH
- CHANNELIZED FLOW PATH
- A = SUBAREA ID
- B = SUBAREA ACREAGE
- C = PERCENT PERVIOUS (%)
- DMA DESIGN POINT
- EXISTING FLOW ARROW
- NODE ID AND ELEVATION

NOTES:

1. REFER TO HUME SOCAL CAMPGROUND DELINEATION OF STATE AND FEDERAL JURISDICTIONAL WATERS REPORT FOR ADDITIONAL INFORMATION ON ALL DRAINAGEWAYS.
2. FOR BASINS THAT HAVE A PERVIOUS PERCENTAGE GREATER THAN OR EQUAL TO 90%, A 90% PERVIOUS VALUE WAS UTILIZED.

NORTH

GRAPHIC SCALE IN FEET
0 50 100 200

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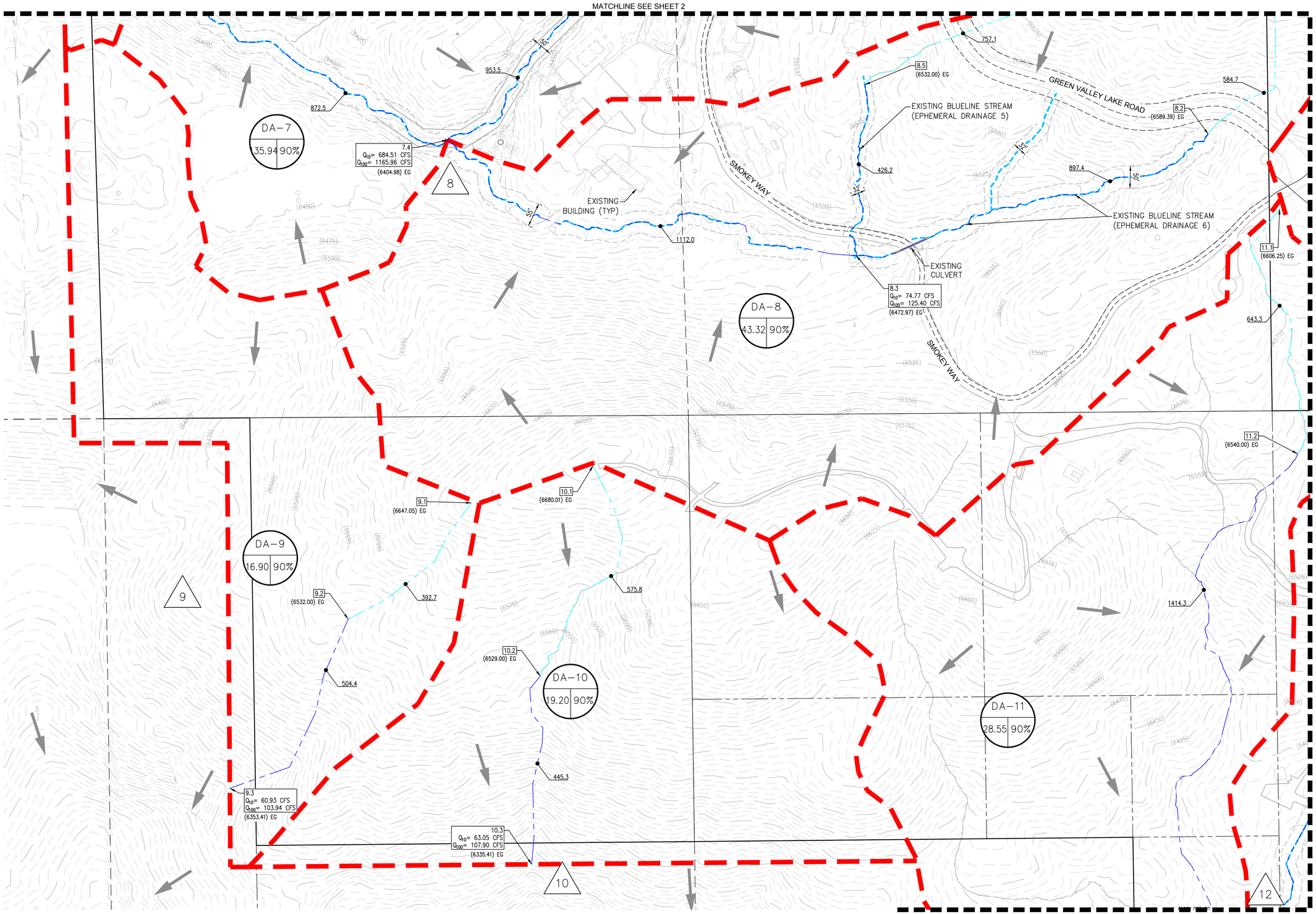
HUME SOCAL - GREEN VALLEY LAKE, CA
PREPARED FOR
HUME LAKE
EXISTING DRAINAGE MAP

SHEET 2
OF
SHEETS 5
CITY PROJECT NO.



LEGEND

- PROPERTY BOUNDARY
- EXISTING MAJOR CONTOURS
- EXISTING MINOR CONTOURS
- EXISTING BLUELINE STREAM
- EXISTING DRAINAGEWAY
- EXISTING BLUELINE STREAM SETBACK
- EXISTING ROAD
- EXISTING DRAINAGE EASEMENT
- EXISTING DMA BOUNDARY
- OVERLAND FLOW PATH
- CHANNELIZED FLOW PATH
- A = SUBAREA ID
- B = SUBAREA ACREAGE
- C = PERCENT PERVIOUS (%)
- DMA DESIGN POINT
- EXISTING FLOW ARROW
- NODE ID AND ELEVATION

NOTES:

1. REFER TO HUME SOCAL CAMPGROUND DELINEATION OF STATE AND FEDERAL JURISDICTIONAL WATERS REPORT FOR ADDITIONAL INFORMATION ON ALL DRAINAGEWAYS.
2. FOR BASINS THAT HAVE A PERVIOUS PERCENTAGE GREATER THAN OR EQUAL TO 90%, A 90% PERVIOUS VALUE WAS UTILIZED.

NORTH

GRAPHIC SCALE IN FEET
0 50 100 200

Drawing name: K:\RIV_LDEV\195436002 - Hume SoCal Project\CAD\PlanSheets\ST-SD\Existing Conditions.dwg DRN MAP 1 (3) Apr 16, 2025 10:26am by: Jennifer.Penneck

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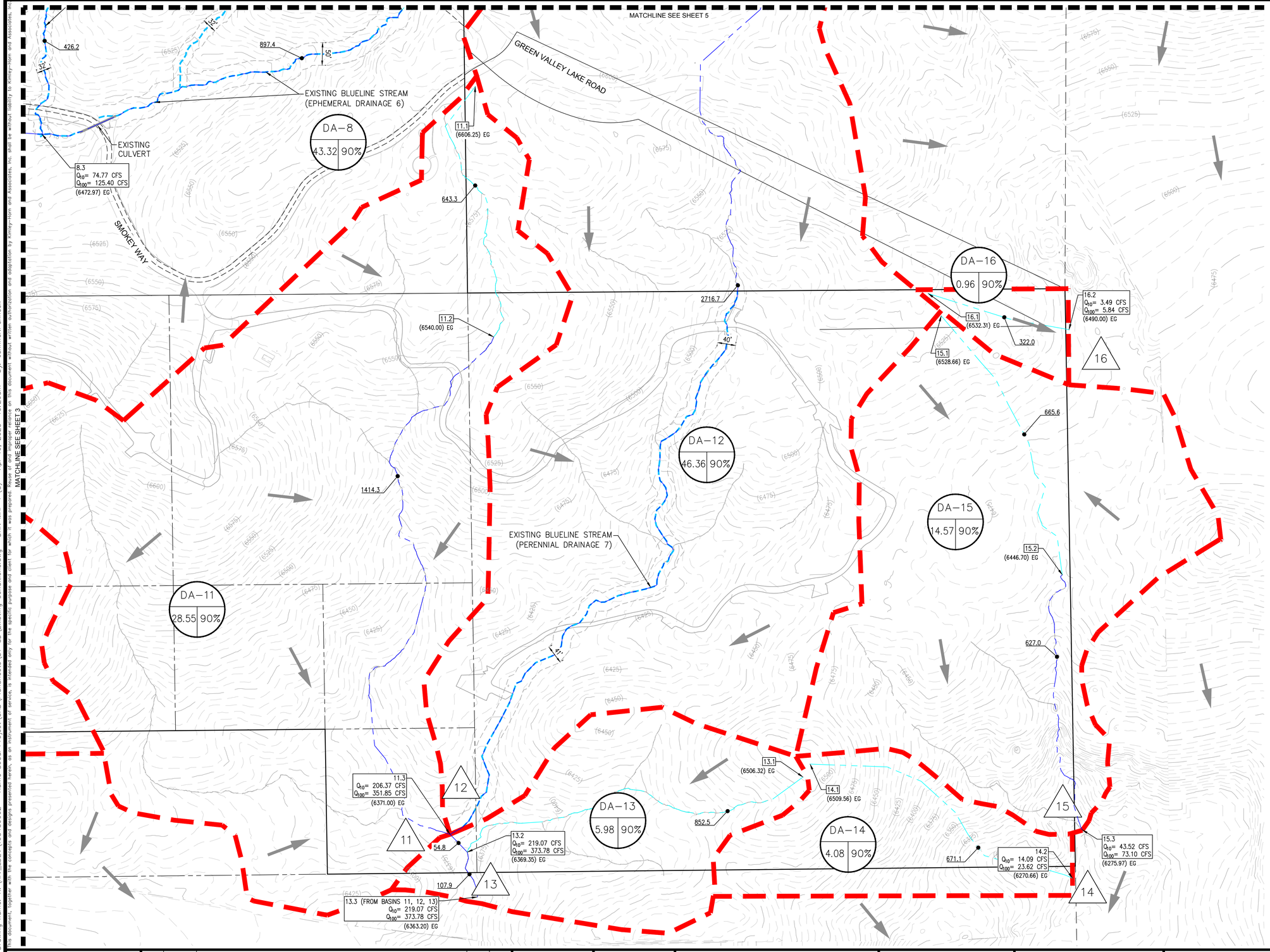
HUME SOCAL - GREEN VALLEY LAKE, CA
PREPARED FOR
HUME LAKE
EXISTING DRAINAGE MAP

SHEET 3 OF 5 SHEETS
CITY PROJECT NO.



LEGEND

- PROPERTY BOUNDARY
- EXISTING MAJOR CONTOURS
- EXISTING MINOR CONTOURS
- EXISTING BLUELINE STREAM
- EXISTING DRAINAGEWAY
- EXISTING BLUELINE STREAM SETBACK
- EXISTING ROAD
- EXISTING DRAINAGE EASEMENT
- EXISTING DMA BOUNDARY
- OVERLAND FLOW PATH
- CHANNELIZED FLOW PATH
- A = SUBAREA ID
- B = SUBAREA ACREAGE
- C = PERCENT PERVIOUS (%)
- DMA DESIGN POINT
- EXISTING FLOW ARROW
- NODE ID AND ELEVATION

NOTES:

1. REFER TO HUME SOCAL CAMPGROUND DELINEATION OF STATE AND FEDERAL JURISDICTIONAL WATERS REPORT FOR ADDITIONAL INFORMATION ON ALL DRAINAGEWAYS.
2. FOR BASINS THAT HAVE A PERVIOUS PERCENTAGE GREATER THAN OR EQUAL TO 90%, A 90% PERVIOUS VALUE WAS UTILIZED.

NORTH

GRAPHIC SCALE IN FEET 0 50 100 200

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EXISTING DRAINAGE MAP

SHEET 4 OF 5 SHEETS
CITY PROJECT NO.

Drawing name: K:\RIV_LDEV\195436002 - Hume SoCal Project\CAD\PlanSheets\ST-SD\Existing Conditions.dwg DRN MAP 1 (5) Apr 16, 2025 10:26am by: Jennifer.Penneck
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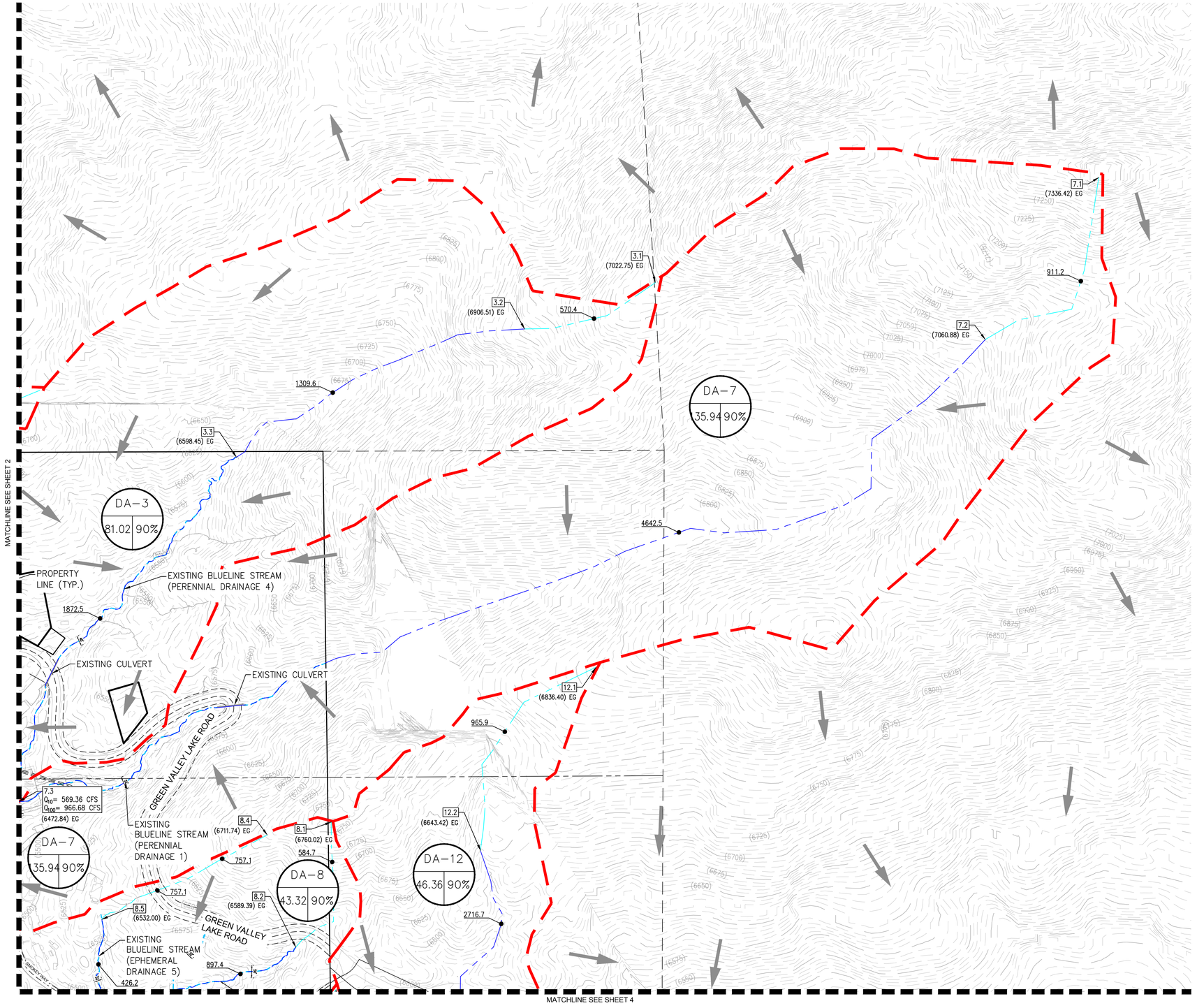

LEGEND

- PROPERTY BOUNDARY
- (XXXX) EXISTING MAJOR CONTOURS
- (XXXX) EXISTING MINOR CONTOURS
- EXISTING BLUELINE STREAM
- EXISTING DRAINAGEWAY
- EXISTING BLUELINE STREAM SETBACK
- EXISTING ROAD
- EXISTING DRAINAGE EASEMENT
- EXISTING DMA BOUNDARY
- OVERLAND FLOW PATH
- CHANNELIZED FLOW PATH
- A / B / C — A = SUBAREA ID; B = SUBAREA ACREAGE; C = PERCENT PERVIOUS (%)
- 1 — DMA DESIGN POINT
- EXISTING FLOW ARROW
- X.X (XXXX)EG — NODE ID AND ELEVATION

NOTES:

1. REFER TO HUME SOCAL CAMPGROUND DELINEATION OF STATE AND FEDERAL JURISDICTIONAL WATERS REPORT FOR ADDITIONAL INFORMATION ON ALL DRAINAGEWAYS.
2. FOR BASINS THAT HAVE A PERVIOUS PERCENTAGE GREATER THAN OR EQUAL TO 90%, A 90% PERVIOUS VALUE WAS UTILIZED.

NORTH

GRAPHIC SCALE IN FEET
0 100 200 400

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HUME SOCAL - GREEN VALLEY LAKE, CA
PREPARED FOR
HUME LAKE
EXISTING DRAINAGE MAP

SHEET 5
OF SHEETS 5
CITY PROJECT NO.

Existing 10-year

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        (c) Copyright 1983-2011 Advanced Engineering Software (aes)
            Ver. 18.0  Release Date: 07/01/2011  License ID 1499

                          Analysis prepared by:
```

Kimley-Horn

```
 ************************* DESCRIPTION OF STUDY *************************
* Hume SoCal                                                            *
* Existing 10 year - 24 hour Conditions                                 *
* San Bernardino County, CA                                             *
 ************************************************************************

  FILE NAME: HUMEEX.DAT
  TIME/DATE OF STUDY: 15:15 01/25/2024
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED TABLED RAINFALL USED*
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)    5.00;  4.880
   2)   10.00;  3.500
   3)   15.00;  2.820
   4)   30.00;  1.980
   5)   60.00;  1.400
   6)  120.00;  1.050
   7)  180.00;  0.907
   8)  360.00;  0.711
   9)  720.00;  0.532
  *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      1.10 TO NODE      1.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   291.50
  ELEVATION DATA: UPSTREAM(FEET) =   6652.19  DOWNSTREAM(FEET) =   6591.92

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.461
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.477
  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
  ".4 DWELLING/ACRE"         D        1.39      0.21     0.900    91    6.46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      5.36
  TOTAL AREA(ACRES) =      1.39   PEAK FLOW RATE(CFS) =      5.36

****************************************************************************
  FLOW PROCESS FROM NODE      1.20 TO NODE      1.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.46
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.477
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D        4.74      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =    4.74      SUBAREA RUNOFF(CFS) =   18.29
  EFFECTIVE AREA(ACRES) =      6.13   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =        6.1       PEAK FLOW RATE(CFS) =      23.66

****************************************************************************
  FLOW PROCESS FROM NODE      1.20 TO NODE      1.30 IS CODE =  53
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6591.92  DOWNSTREAM(FEET) =   6414.01
  CHANNEL LENGTH THRU SUBAREA(FEET) =   619.40   CHANNEL SLOPE =  0.2872
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1918 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      23.66
  FLOW VELOCITY(FEET/SEC) =   7.03 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.47   Tc(MIN.) =    7.93
  LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.30 =     910.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      2.10 TO NODE      2.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   487.50
  ELEVATION DATA: UPSTREAM(FEET) =   6694.25  DOWNSTREAM(FEET) =   6619.24

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.420
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.936
  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
  ".4 DWELLING/ACRE"         D        1.63      0.21     0.900    91    8.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      5.50
  TOTAL AREA(ACRES) =      1.63   PEAK FLOW RATE(CFS) =      5.50

****************************************************************************
  FLOW PROCESS FROM NODE      2.20 TO NODE      2.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =    8.42
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.936
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D       12.76      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   12.76      SUBAREA RUNOFF(CFS) =   43.03
  EFFECTIVE AREA(ACRES) =     14.39   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
```

```
  TOTAL AREA(ACRES) =       14.4       PEAK FLOW RATE(CFS) =      48.53

****************************************************************************
  FLOW PROCESS FROM NODE      2.20 TO NODE      2.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6619.24  DOWNSTREAM(FEET) =   6372.85
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1548.50   CHANNEL SLOPE =  0.1591
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1396 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      48.53
  FLOW VELOCITY(FEET/SEC) =   7.62 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.39   Tc(MIN.) =   11.81
  LONGEST FLOWPATH FROM NODE      2.10 TO NODE      2.30 =    2036.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.10 TO NODE      4.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   416.40
  ELEVATION DATA: UPSTREAM(FEET) =   6550.66  DOWNSTREAM(FEET) =   6358.84

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.348
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.508
  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.)
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D        2.86      0.21     0.900    91    6.35
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =     11.12
  TOTAL AREA(ACRES) =      2.86   PEAK FLOW RATE(CFS) =     11.12

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   911.20
  ELEVATION DATA: UPSTREAM(FEET) =   7336.42  DOWNSTREAM(FEET) =   7060.88

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.446
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.653
```

```
  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
  ".4 DWELLING/ACRE"         D        6.53      0.21     0.900    91    9.45
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =     20.36
  TOTAL AREA(ACRES) =      6.53   PEAK FLOW RATE(CFS) =     20.36

****************************************************************************
  FLOW PROCESS FROM NODE      7.20 TO NODE      7.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.45
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.653
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D      107.14      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =  107.14      SUBAREA RUNOFF(CFS) =  334.00
  EFFECTIVE AREA(ACRES) =    113.67   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      113.7       PEAK FLOW RATE(CFS) =     354.36

****************************************************************************
  FLOW PROCESS FROM NODE      7.20 TO NODE      7.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   7060.88  DOWNSTREAM(FEET) =   6472.84
  CHANNEL LENGTH THRU SUBAREA(FEET) =  4642.50   CHANNEL SLOPE =  0.1267
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1194 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     354.36
  FLOW VELOCITY(FEET/SEC) =  13.67 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.66   Tc(MIN.) =   15.11
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      7.30 =    5553.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.30 TO NODE      7.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
```

```
  TIME OF CONCENTRATION(MIN.) =   15.11
  RAINFALL INTENSITY(INCH/HR) =   2.81
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =     113.67
  TOTAL STREAM AREA(ACRES) =     113.67
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     354.36

****************************************************************************
  FLOW PROCESS FROM NODE      3.10 TO NODE      3.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   570.40
  ELEVATION DATA: UPSTREAM(FEET) =   7022.75  DOWNSTREAM(FEET) =   6906.51

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.476
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.921
  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
  ".4 DWELLING/ACRE"         D        1.09      0.21     0.900    91    8.48
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      3.66
  TOTAL AREA(ACRES) =      1.09   PEAK FLOW RATE(CFS) =      3.66

****************************************************************************
  FLOW PROCESS FROM NODE      3.20 TO NODE      3.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.48
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.921
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         B       32.62      0.42     0.900    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   32.62      SUBAREA RUNOFF(CFS) =  103.93
  EFFECTIVE AREA(ACRES) =     33.71   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       33.7       PEAK FLOW RATE(CFS) =     107.59

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

```
 FLOW PROCESS FROM NODE      3.20 TO NODE      3.30 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   6906.51  DOWNSTREAM(FEET) =   6598.45
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1309.60   CHANNEL SLOPE =  0.2352
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .1751 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =     107.59
 FLOW VELOCITY(FEET/SEC) =  11.13 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.96   Tc(MIN.) =   10.44
 LONGEST FLOWPATH FROM NODE      3.10 TO NODE      3.30 =    1880.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      3.30 TO NODE      3.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.44
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.441
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 ".4 DWELLING/ACRE"         B       47.30      0.42     0.900    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
 SUBAREA AREA(ACRES) =   47.30      SUBAREA RUNOFF(CFS) =  130.26
 EFFECTIVE AREA(ACRES) =     81.01   AREA-AVERAGED Fm(INCH/HR) =  0.38
 AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.90
 TOTAL AREA(ACRES) =       81.0       PEAK FLOW RATE(CFS) =     223.28

****************************************************************************
 FLOW PROCESS FROM NODE      3.30 TO NODE      7.30 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   6598.45  DOWNSTREAM(FEET) =   6472.84
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1872.50   CHANNEL SLOPE =  0.0671
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0671 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =     223.28
 FLOW VELOCITY(FEET/SEC) =   8.78 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   3.55   Tc(MIN.) =   13.99
 LONGEST FLOWPATH FROM NODE      3.10 TO NODE      7.30 =    3752.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.30 TO NODE      7.30 IS CODE =   1
----------------------------------------------------------------------------
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.99
  RAINFALL INTENSITY(INCH/HR) =   2.96
  AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.42
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =      81.01
  TOTAL STREAM AREA(ACRES) =      81.01
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     223.28

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      354.36   15.11    2.814  0.21( 0.19) 0.90     113.7       7.10
      2      223.28   13.99    2.957  0.42( 0.38) 0.90      81.0       3.10

  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      569.36   13.99    2.957  0.30( 0.27) 0.90     186.3       3.10
      2      565.23   15.11    2.814  0.30( 0.27) 0.90     194.7       7.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     569.36    Tc(MIN.) =    13.99
  EFFECTIVE AREA(ACRES) =     186.28   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      194.7
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      7.30 =    5553.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.30 TO NODE      7.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.99
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.957
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"          D       10.63      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   10.63      SUBAREA RUNOFF(CFS) =   26.48
```

```
  EFFECTIVE AREA(ACRES) =    196.91   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      205.3       PEAK FLOW RATE(CFS) =     569.36
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      7.30 TO NODE      7.40 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6472.84  DOWNSTREAM(FEET) =   6404.98
  CHANNEL LENGTH THRU SUBAREA(FEET) =   953.53   CHANNEL SLOPE =  0.0712
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0712 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     569.36
  FLOW VELOCITY(FEET/SEC) =  12.36 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.29   Tc(MIN.) =   15.28
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      7.40 =    6507.23 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.40 TO NODE      7.40 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE      8.10 TO NODE      8.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   584.70
  ELEVATION DATA: UPSTREAM(FEET) =   6760.02  DOWNSTREAM(FEET) =   6589.39

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.967
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.061
  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
  ".4 DWELLING/ACRE"          D        2.35      0.21     0.900    91    7.97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      8.19
  TOTAL AREA(ACRES) =      2.35   PEAK FLOW RATE(CFS) =      8.19

****************************************************************************
  FLOW PROCESS FROM NODE      8.20 TO NODE      8.20 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =    7.97
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.061
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D       16.46      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   16.46      SUBAREA RUNOFF(CFS) =   57.36
  EFFECTIVE AREA(ACRES) =     18.81   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       18.8       PEAK FLOW RATE(CFS) =      65.55

********************************************************************************
  FLOW PROCESS FROM NODE      8.20 TO NODE      8.30 IS CODE =  53
--------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6589.39  DOWNSTREAM(FEET) =   6472.97
  CHANNEL LENGTH THRU SUBAREA(FEET) =   897.40   CHANNEL SLOPE =  0.1297
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1215 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      65.55
  FLOW VELOCITY(FEET/SEC) =   7.86 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.90   Tc(MIN.) =    9.87
  LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.30 =    1482.10 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE      8.30 TO NODE      8.30 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.87
  RAINFALL INTENSITY(INCH/HR) =   3.54
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =      18.81
  TOTAL STREAM AREA(ACRES) =      18.81
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      65.55

********************************************************************************
  FLOW PROCESS FROM NODE      8.40 TO NODE      8.50 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   757.10
  ELEVATION DATA: UPSTREAM(FEET) =   6711.74  DOWNSTREAM(FEET) =   6532.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.206
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.719
  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
  ".4 DWELLING/ACRE"         D        1.36      0.21     0.900    91    9.21
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      4.32
  TOTAL AREA(ACRES) =      1.36   PEAK FLOW RATE(CFS) =      4.32

****************************************************************************
  FLOW PROCESS FROM NODE      8.50 TO NODE      8.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.21
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.719
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D        1.69      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =    1.69      SUBAREA RUNOFF(CFS) =    5.37
  EFFECTIVE AREA(ACRES) =      3.05   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =       9.69

****************************************************************************
  FLOW PROCESS FROM NODE      8.50 TO NODE      8.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6532.00  DOWNSTREAM(FEET) =   6472.97
  CHANNEL LENGTH THRU SUBAREA(FEET) =   426.20   CHANNEL SLOPE =  0.1385
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1273 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       9.69
  FLOW VELOCITY(FEET/SEC) =   4.26 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.67   Tc(MIN.) =   10.88
  LONGEST FLOWPATH FROM NODE      8.40 TO NODE      8.30 =    1183.30 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      8.30 TO NODE      8.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.88
  RAINFALL INTENSITY(INCH/HR) =   3.38
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =       3.05
  TOTAL STREAM AREA(ACRES) =       3.05
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.69

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       65.55    9.87    3.536  0.21( 0.19) 0.90      18.8       8.10
      2        9.69   10.88    3.381  0.21( 0.19) 0.90       3.1       8.40

  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       74.77    9.87    3.536  0.21( 0.19) 0.90      21.6       8.10
      2       72.21   10.88    3.381  0.21( 0.19) 0.90      21.9       8.40

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      74.77    Tc(MIN.) =     9.87
  EFFECTIVE AREA(ACRES) =      21.58   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       21.9
  LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.30 =    1482.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.30 TO NODE      8.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.87
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.536
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
```

```
  ".4 DWELLING/ACRE"         D       21.46      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   21.46      SUBAREA RUNOFF(CFS) =   64.64
  EFFECTIVE AREA(ACRES) =     43.04   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       43.3       PEAK FLOW RATE(CFS) =     129.64

****************************************************************************
  FLOW PROCESS FROM NODE      8.30 TO NODE      7.40 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6472.97  DOWNSTREAM(FEET) =   6404.98
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1112.00   CHANNEL SLOPE =  0.0611
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0611 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     129.64
  FLOW VELOCITY(FEET/SEC) =   7.00 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.65   Tc(MIN.) =   12.52
  LONGEST FLOWPATH FROM NODE      8.10 TO NODE      7.40 =    2594.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.40 TO NODE      7.40 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      129.64   12.52    3.157  0.21( 0.19) 0.90      43.0       8.10
      2      124.45   13.56    3.016  0.21( 0.19) 0.90      43.3       8.40
  LONGEST FLOWPATH FROM NODE      8.10 TO NODE      7.40 =    2594.10 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      569.36   15.28    2.805  0.30( 0.27) 0.90     196.9       3.10
      2      565.23   16.40    2.742  0.29( 0.26) 0.90     205.3       7.10
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      7.40 =    6507.23 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      661.11   12.52    3.157  0.28( 0.25) 0.90     204.4       8.10
      2      671.93   13.56    3.016  0.28( 0.25) 0.90     218.1       8.40
      3      684.51   15.28    2.805  0.28( 0.25) 0.90     240.2       3.10
      4      677.62   16.40    2.742  0.28( 0.25) 0.90     248.6       7.10
    TOTAL AREA(ACRES) =       248.6
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      684.51  Tc(MIN.) =   15.276
  EFFECTIVE AREA(ACRES) =    240.23  AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      248.6
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      7.40 =    6507.23 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.40 TO NODE      7.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.28
  *  10 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
  RESIDENTIAL
  ".4 DWELLING/ACRE"         B       11.64      0.42     0.900    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   11.64      SUBAREA RUNOFF(CFS) =   25.39
  EFFECTIVE AREA(ACRES) =    251.87   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      260.3       PEAK FLOW RATE(CFS) =     684.51
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      7.40 TO NODE      7.50 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6404.98  DOWNSTREAM(FEET) =   6355.81
  CHANNEL LENGTH THRU SUBAREA(FEET) =   872.50   CHANNEL SLOPE =  0.0564
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0564 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     684.51
  FLOW VELOCITY(FEET/SEC) =  11.69 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.24   Tc(MIN.) =   16.52
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      7.50 =    7379.73 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.50 TO NODE      7.50 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.52
```

```
  RAINFALL INTENSITY(INCH/HR) =   2.73
  AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =     251.87
  TOTAL STREAM AREA(ACRES) =     260.27
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     684.51

****************************************************************************
  FLOW PROCESS FROM NODE      5.10 TO NODE      5.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   693.60
  ELEVATION DATA: UPSTREAM(FEET) =   6585.81  DOWNSTREAM(FEET) =   6467.32

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.494
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.640
  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
  ".4 DWELLING/ACRE"         D        4.02      0.21     0.900    91    9.49
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =     12.48
  TOTAL AREA(ACRES) =      4.02   PEAK FLOW RATE(CFS) =     12.48

****************************************************************************
  FLOW PROCESS FROM NODE      5.20 TO NODE      5.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.49
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.640
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D       14.38      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   14.38      SUBAREA RUNOFF(CFS) =   44.66
  EFFECTIVE AREA(ACRES) =     18.40   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       18.4       PEAK FLOW RATE(CFS) =      57.14

****************************************************************************
  FLOW PROCESS FROM NODE      5.20 TO NODE      7.50 IS CODE =  53
```

```
------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6467.32  DOWNSTREAM(FEET) =   6355.81
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1035.00   CHANNEL SLOPE =  0.1077
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1058 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      57.14
  FLOW VELOCITY(FEET/SEC) =   7.01 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.46   Tc(MIN.) =   11.96
  LONGEST FLOWPATH FROM NODE      5.10 TO NODE      7.50 =    1728.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.50 TO NODE      7.50 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.) =   11.96
  RAINFALL INTENSITY(INCH/HR) =   3.23
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =      18.40
  TOTAL STREAM AREA(ACRES) =      18.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      57.14

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      661.11   13.78    2.986  0.29( 0.26) 0.90     216.0       8.10
      1      671.93   14.81    2.846  0.29( 0.26) 0.90     229.7       8.40
      1      684.51   16.52    2.735  0.29( 0.26) 0.90     251.9       3.10
      1      677.62   17.64    2.672  0.28( 0.26) 0.90     260.3       7.10
      2       57.14   11.96    3.234  0.21( 0.19) 0.90      18.4       5.10

  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      682.94   11.96    3.234  0.28( 0.25) 0.90     205.9       5.10
      2      713.60   13.78    2.986  0.28( 0.25) 0.90     234.4       8.10
      3      721.78   14.81    2.846  0.28( 0.25) 0.90     248.1       8.40
      4      732.28   16.52    2.735  0.28( 0.25) 0.90     270.3       3.10
      5      724.21   17.64    2.672  0.28( 0.25) 0.90     278.7       7.10
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     732.28    Tc(MIN.) =    16.52
  EFFECTIVE AREA(ACRES) =     270.27   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      278.7
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      7.50 =    7379.73 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.50 TO NODE      7.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.52
  *  10 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
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D        0.34      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =    0.34      SUBAREA RUNOFF(CFS) =    0.78
  EFFECTIVE AREA(ACRES) =    270.61   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      279.0       PEAK FLOW RATE(CFS) =     732.28
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      7.50 TO NODE      6.20 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6355.81  DOWNSTREAM(FEET) =   6352.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   100.30   CHANNEL SLOPE =  0.0300
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0300 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     732.28
  FLOW VELOCITY(FEET/SEC) =   8.73 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.19   Tc(MIN.) =   16.71
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      6.20 =    7480.03 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.20 TO NODE      6.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.71
  RAINFALL INTENSITY(INCH/HR) =   2.72
```

```
  AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.28
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =     270.61
  TOTAL STREAM AREA(ACRES) =     279.01
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     732.28

****************************************************************************
  FLOW PROCESS FROM NODE      6.10 TO NODE      6.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   236.40
  ELEVATION DATA: UPSTREAM(FEET) =   6435.22  DOWNSTREAM(FEET) =   6352.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.352
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.783
  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
  ".4 DWELLING/ACRE"         D        0.35      0.21     0.900    91    5.35
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      1.45
  TOTAL AREA(ACRES) =      0.35   PEAK FLOW RATE(CFS) =      1.45

****************************************************************************
  FLOW PROCESS FROM NODE      6.20 TO NODE      6.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.35
  RAINFALL INTENSITY(INCH/HR) =   4.78
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =       0.35
  TOTAL STREAM AREA(ACRES) =       0.35
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.45

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      682.94   12.15    3.207  0.28( 0.25) 0.90     206.2       5.10
      1      713.60   13.97    2.960  0.28( 0.25) 0.90     234.8       8.10
```

```
     1      721.78   15.00    2.820  0.28( 0.25) 0.90     248.5       8.40
     1      732.28   16.71    2.724  0.28( 0.25) 0.90     270.6       3.10
     1      724.21   17.84    2.661  0.28( 0.25) 0.90     279.0       7.10
     2        1.45    5.35    4.783  0.21( 0.19) 0.90       0.3       6.10

  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      462.53    5.35    4.783  0.28( 0.25) 0.90      91.2       6.10
     2      683.89   12.15    3.207  0.28( 0.25) 0.90     206.6       5.10
     3      714.48   13.97    2.960  0.28( 0.25) 0.90     235.1       8.10
     4      722.61   15.00    2.820  0.28( 0.25) 0.90     248.8       8.40
     5      733.08   16.71    2.724  0.28( 0.25) 0.90     271.0       3.10
     6      724.99   17.84    2.661  0.28( 0.25) 0.90     279.4       7.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     733.08    Tc(MIN.) =    16.71
  EFFECTIVE AREA(ACRES) =     270.96   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      279.4
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      6.20 =    7480.03 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.20 TO NODE      6.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.71
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.724
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D        2.05      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =    2.05      SUBAREA RUNOFF(CFS) =    4.68
  EFFECTIVE AREA(ACRES) =    273.01   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      281.4       PEAK FLOW RATE(CFS) =     733.08
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      6.20 TO NODE      6.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   6352.80  DOWNSTREAM(FEET) =   6334.97
  CHANNEL LENGTH THRU SUBAREA(FEET) =   138.70   CHANNEL SLOPE =  0.1285
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1207 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     733.08
  FLOW VELOCITY(FEET/SEC) =  17.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.13   Tc(MIN.) =   16.84
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      6.30 =    7618.73 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      9.10 TO NODE      9.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   392.70
  ELEVATION DATA: UPSTREAM(FEET) =   6647.05  DOWNSTREAM(FEET) =   6532.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.789
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.386
  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
  ".4 DWELLING/ACRE"         B        1.12      0.42     0.900    76    6.79
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      4.04
  TOTAL AREA(ACRES) =      1.12   PEAK FLOW RATE(CFS) =      4.04

****************************************************************************
  FLOW PROCESS FROM NODE      9.20 TO NODE      9.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.79
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.386
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         B       15.78      0.42     0.900    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   15.78      SUBAREA RUNOFF(CFS) =   56.89
  EFFECTIVE AREA(ACRES) =     16.90   AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       16.9       PEAK FLOW RATE(CFS) =      60.93

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

```
 FLOW PROCESS FROM NODE      9.20 TO NODE      9.30 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   6532.00  DOWNSTREAM(FEET) =   6353.41
 CHANNEL LENGTH THRU SUBAREA(FEET) =   504.40   CHANNEL SLOPE =  0.3541
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .2060 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =      60.93
 FLOW VELOCITY(FEET/SEC) =   9.99 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.84   Tc(MIN.) =    7.63
 LONGEST FLOWPATH FROM NODE      9.10 TO NODE      9.30 =     897.10 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     10.10 TO NODE     10.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   575.80
 ELEVATION DATA: UPSTREAM(FEET) =   6680.01  DOWNSTREAM(FEET) =   6529.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.089
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.027
 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
 ".4 DWELLING/ACRE"         B        3.91      0.42     0.900    76    8.09
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
 SUBAREA RUNOFF(CFS) =     12.83
 TOTAL AREA(ACRES) =      3.91   PEAK FLOW RATE(CFS) =     12.83

****************************************************************************
 FLOW PROCESS FROM NODE     10.20 TO NODE     10.20 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    8.09
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.027
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 ".4 DWELLING/ACRE"         B       15.30      0.42     0.900    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
 SUBAREA AREA(ACRES) =   15.30      SUBAREA RUNOFF(CFS) =   50.22
```

```
  EFFECTIVE AREA(ACRES) =     19.21   AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       19.2       PEAK FLOW RATE(CFS) =      63.05

****************************************************************************
  FLOW PROCESS FROM NODE     10.20 TO NODE     10.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6529.00  DOWNSTREAM(FEET) =   6335.41
  CHANNEL LENGTH THRU SUBAREA(FEET) =   445.30   CHANNEL SLOPE =  0.4347
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2182 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      63.05
  FLOW VELOCITY(FEET/SEC) =  10.40 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.71   Tc(MIN.) =    8.80
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     10.30 =    1021.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.10 TO NODE     11.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   643.30
  ELEVATION DATA: UPSTREAM(FEET) =   6606.25  DOWNSTREAM(FEET) =   6540.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.194
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.474
  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
  ".4 DWELLING/ACRE"          B        2.55      0.42     0.900    76   10.19
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      7.11
  TOTAL AREA(ACRES) =      2.55   PEAK FLOW RATE(CFS) =      7.11

****************************************************************************
  FLOW PROCESS FROM NODE     11.20 TO NODE     11.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.19
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.474
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  RESIDENTIAL
  ".4 DWELLING/ACRE"         B       25.99      0.42     0.900    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   25.99      SUBAREA RUNOFF(CFS) =   72.35
  EFFECTIVE AREA(ACRES) =     28.54   AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       28.5       PEAK FLOW RATE(CFS) =      79.46

****************************************************************************
  FLOW PROCESS FROM NODE     11.20 TO NODE     11.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6540.00  DOWNSTREAM(FEET) =   6371.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1414.30   CHANNEL SLOPE =  0.1195
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1146 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      79.46
  FLOW VELOCITY(FEET/SEC) =   8.14 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.90   Tc(MIN.) =   13.09
  LONGEST FLOWPATH FROM NODE     11.10 TO NODE     11.30 =    2057.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.30 TO NODE     11.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.09
  RAINFALL INTENSITY(INCH/HR) =   3.08
  AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.42
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =      28.54
  TOTAL STREAM AREA(ACRES) =      28.54
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      79.46

****************************************************************************
  FLOW PROCESS FROM NODE     12.10 TO NODE     12.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   965.90
  ELEVATION DATA: UPSTREAM(FEET) =   6836.40  DOWNSTREAM(FEET) =   6643.42

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.505
```

```
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.431
  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
  ".4 DWELLING/ACRE"         D        6.55      0.21     0.900    91   10.50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =     19.11
  TOTAL AREA(ACRES) =      6.55   PEAK FLOW RATE(CFS) =     19.11

****************************************************************************
  FLOW PROCESS FROM NODE     12.20 TO NODE     12.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.431
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D       39.80      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   39.80      SUBAREA RUNOFF(CFS) =  116.14
  EFFECTIVE AREA(ACRES) =     46.35   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       46.3       PEAK FLOW RATE(CFS) =     135.25

****************************************************************************
  FLOW PROCESS FROM NODE     12.20 TO NODE     11.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6643.42  DOWNSTREAM(FEET) =   6371.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2716.70   CHANNEL SLOPE =  0.1003
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1002 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     135.25
  FLOW VELOCITY(FEET/SEC) =   9.08 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.98   Tc(MIN.) =   15.49
  LONGEST FLOWPATH FROM NODE     12.10 TO NODE     11.30 =    3682.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.30 TO NODE     11.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
```

```
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   15.49
  RAINFALL INTENSITY(INCH/HR) =   2.79
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =      46.35
  TOTAL STREAM AREA(ACRES) =      46.35
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     135.25

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       79.46   13.09    3.080  0.42( 0.38) 0.90      28.5      11.10
      2      135.25   15.49    2.793  0.21( 0.19) 0.90      46.3      12.10

  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      206.37   13.09    3.080  0.30( 0.27) 0.90      67.7      11.10
      2      206.26   15.49    2.793  0.29( 0.26) 0.90      74.9      12.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     206.37    Tc(MIN.) =    13.09
  EFFECTIVE AREA(ACRES) =      67.72   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       74.9
  LONGEST FLOWPATH FROM NODE     12.10 TO NODE     11.30 =    3682.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.30 TO NODE     11.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.09
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.080
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"          D        0.19      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    0.49
  EFFECTIVE AREA(ACRES) =     67.91   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       75.1       PEAK FLOW RATE(CFS) =     206.37
```

```
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     11.30 TO NODE     13.20 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6371.00  DOWNSTREAM(FEET) =   6369.35
  CHANNEL LENGTH THRU SUBAREA(FEET) =    54.80   CHANNEL SLOPE =  0.0301
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0301 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     206.37
  FLOW VELOCITY(FEET/SEC) =   5.73 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.16   Tc(MIN.) =   13.25
  LONGEST FLOWPATH FROM NODE     12.10 TO NODE     13.20 =    3737.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.20 TO NODE     13.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.25
  RAINFALL INTENSITY(INCH/HR) =   3.06
  AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =      67.91
  TOTAL STREAM AREA(ACRES) =      75.08
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     206.37

****************************************************************************
  FLOW PROCESS FROM NODE     13.10 TO NODE     13.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   852.50
  ELEVATION DATA: UPSTREAM(FEET) =   6506.32  DOWNSTREAM(FEET) =   6369.35

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.438
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.440
  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
  ".4 DWELLING/ACRE"         D        4.92      0.21     0.900    91   10.44
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =     14.40
  TOTAL AREA(ACRES) =      4.92   PEAK FLOW RATE(CFS) =     14.40

****************************************************************************
  FLOW PROCESS FROM NODE     13.20 TO NODE     13.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.44
  RAINFALL INTENSITY(INCH/HR) =   3.44
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =       4.92
  TOTAL STREAM AREA(ACRES) =       4.92
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      14.40

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      206.37   13.25    3.058  0.30( 0.27) 0.90      67.9      11.10
      1      206.26   15.65    2.784  0.29( 0.26) 0.90      75.1      12.10
      2       14.40   10.44    3.440  0.21( 0.19) 0.90       4.9      13.10

  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      199.27   10.44    3.440  0.29( 0.26) 0.90      58.4      13.10
      2      219.07   13.25    3.058  0.29( 0.26) 0.90      72.8      11.10
      3      217.75   15.65    2.784  0.29( 0.26) 0.90      80.0      12.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     219.07    Tc(MIN.) =    13.25
  EFFECTIVE AREA(ACRES) =      72.83   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       80.0
  LONGEST FLOWPATH FROM NODE     12.10 TO NODE     13.20 =    3737.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.20 TO NODE     13.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.25
```

```
  *  10 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
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D        0.86      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =    0.86      SUBAREA RUNOFF(CFS) =    2.22
  EFFECTIVE AREA(ACRES) =     73.69   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       80.9       PEAK FLOW RATE(CFS) =     219.07
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     13.20 TO NODE     13.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6369.35  DOWNSTREAM(FEET) =   6363.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   107.90   CHANNEL SLOPE =  0.0570
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0570 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     219.07
  FLOW VELOCITY(FEET/SEC) =   8.05 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.22   Tc(MIN.) =   13.47
  LONGEST FLOWPATH FROM NODE     12.10 TO NODE     13.30 =    3845.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.10 TO NODE     14.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   671.10
  ELEVATION DATA: UPSTREAM(FEET) =   6509.56  DOWNSTREAM(FEET) =   6270.66

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.090
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.027
  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
  ".4 DWELLING/ACRE"         D        4.08      0.21     0.900    91    8.09
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =     14.09
  TOTAL AREA(ACRES) =      4.08   PEAK FLOW RATE(CFS) =     14.09
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     15.10 TO NODE     15.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   665.60
  ELEVATION DATA: UPSTREAM(FEET) =   6528.66  DOWNSTREAM(FEET) =   6446.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.971
  *  10 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.)
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D        5.64      0.21     0.900    91    9.97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =     16.85
  TOTAL AREA(ACRES) =      5.64   PEAK FLOW RATE(CFS) =     16.85

****************************************************************************
  FLOW PROCESS FROM NODE     15.20 TO NODE     15.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.97
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.508
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D        8.93      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =    8.93      SUBAREA RUNOFF(CFS) =   26.67
  EFFECTIVE AREA(ACRES) =     14.57   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       14.6       PEAK FLOW RATE(CFS) =      43.52

****************************************************************************
  FLOW PROCESS FROM NODE     15.20 TO NODE     15.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6446.70  DOWNSTREAM(FEET) =   6275.97
  CHANNEL LENGTH THRU SUBAREA(FEET) =   627.00   CHANNEL SLOPE =  0.2723
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1874 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
  CHANNEL FLOW THRU SUBAREA(CFS) =      43.52
  FLOW VELOCITY(FEET/SEC) =   8.52 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.23   Tc(MIN.) =   11.20
  LONGEST FLOWPATH FROM NODE     15.10 TO NODE     15.30 =    1292.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     16.10 TO NODE     16.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   322.00
  ELEVATION DATA: UPSTREAM(FEET) =   6532.31  DOWNSTREAM(FEET) =   6490.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.361
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.228
  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
  ".4 DWELLING/ACRE"         D        0.96      0.21     0.900    91    7.36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      3.49
  TOTAL AREA(ACRES) =      0.96   PEAK FLOW RATE(CFS) =      3.49
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.0  TC(MIN.) =      7.36
  EFFECTIVE AREA(ACRES) =      0.96  AREA-AVERAGED Fm(INCH/HR)=  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap = 0.900
  PEAK FLOW RATE(CFS)   =       3.49
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Existing 100-year

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        (c) Copyright 1983-2011 Advanced Engineering Software (aes)
            Ver. 18.0  Release Date: 07/01/2011  License ID 1499

                          Analysis prepared by:
```

Kimley-Horn

```
 ************************* DESCRIPTION OF STUDY *************************
* Hume SoCal                                                            *
* Existing 100 year - 24 hour Conditions                                *
* San Bernardino County, CA                                             *
 ************************************************************************

  FILE NAME: HUMEEX.DAT
  TIME/DATE OF STUDY: 15:01 01/25/2024
==========================================================================
  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 TABLED RAINFALL USED*
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)    5.00;  8.030
   2)   10.00;  5.750
   3)   15.00;  4.640
   4)   30.00;  3.260
   5)   60.00;  2.300
   6)  120.00;  1.740
   7)  180.00;  1.510
   8)  360.00;  1.190
   9)  720.00;  0.881
  *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      1.10 TO NODE      1.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   291.50
  ELEVATION DATA: UPSTREAM(FEET) =   6652.19  DOWNSTREAM(FEET) =   6591.92

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.461
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  7.364
  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
  ".4 DWELLING/ACRE"         D        1.39      0.21     0.900    91    6.46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      8.98
  TOTAL AREA(ACRES) =      1.39   PEAK FLOW RATE(CFS) =      8.98

****************************************************************************
  FLOW PROCESS FROM NODE      1.20 TO NODE      1.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.46
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  7.364
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D        4.74      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =    4.74      SUBAREA RUNOFF(CFS) =   30.61
  EFFECTIVE AREA(ACRES) =      6.13   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =        6.1       PEAK FLOW RATE(CFS) =      39.58

****************************************************************************
  FLOW PROCESS FROM NODE      1.20 TO NODE      1.30 IS CODE =  53
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6591.92  DOWNSTREAM(FEET) =   6414.01
  CHANNEL LENGTH THRU SUBAREA(FEET) =   619.40   CHANNEL SLOPE =  0.2872
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1918 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      39.58
  FLOW VELOCITY(FEET/SEC) =   8.35 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.24   Tc(MIN.) =    7.70
  LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.30 =     910.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      2.10 TO NODE      2.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   487.50
  ELEVATION DATA: UPSTREAM(FEET) =   6694.25  DOWNSTREAM(FEET) =   6619.24

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.420
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.471
  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
  ".4 DWELLING/ACRE"          D        1.63      0.21     0.900    91    8.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      9.22
  TOTAL AREA(ACRES) =      1.63   PEAK FLOW RATE(CFS) =      9.22

****************************************************************************
  FLOW PROCESS FROM NODE      2.20 TO NODE      2.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =    8.42
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.471
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"          D       12.76      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   12.76      SUBAREA RUNOFF(CFS) =   72.14
  EFFECTIVE AREA(ACRES) =     14.39   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
```

```
  TOTAL AREA(ACRES) =       14.4       PEAK FLOW RATE(CFS) =      81.35

****************************************************************************
  FLOW PROCESS FROM NODE      2.20 TO NODE      2.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6619.24  DOWNSTREAM(FEET) =   6372.85
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1548.50   CHANNEL SLOPE =  0.1591
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1396 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      81.35
  FLOW VELOCITY(FEET/SEC) =   9.05 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.85   Tc(MIN.) =   11.27
  LONGEST FLOWPATH FROM NODE      2.10 TO NODE      2.30 =    2036.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.10 TO NODE      4.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   416.40
  ELEVATION DATA: UPSTREAM(FEET) =   6550.66  DOWNSTREAM(FEET) =   6358.84

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.348
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  7.415
  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
  ".4 DWELLING/ACRE"          D        2.86      0.21     0.900    91    6.35
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =     18.60
  TOTAL AREA(ACRES) =      2.86   PEAK FLOW RATE(CFS) =     18.60

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   911.20
  ELEVATION DATA: UPSTREAM(FEET) =   7336.42  DOWNSTREAM(FEET) =   7060.88

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.446
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.003
```

```
  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.)
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D        6.53      0.21     0.900    91    9.45
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =     34.17
  TOTAL AREA(ACRES) =      6.53   PEAK FLOW RATE(CFS) =     34.17

****************************************************************************
  FLOW PROCESS FROM NODE      7.20 TO NODE      7.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.45
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.003
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D      107.14      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =  107.14      SUBAREA RUNOFF(CFS) =  560.57
  EFFECTIVE AREA(ACRES) =    113.67   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      113.7       PEAK FLOW RATE(CFS) =     594.74

****************************************************************************
  FLOW PROCESS FROM NODE      7.20 TO NODE      7.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   7060.88  DOWNSTREAM(FEET) =   6472.84
  CHANNEL LENGTH THRU SUBAREA(FEET) =  4642.50   CHANNEL SLOPE =  0.1267
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1194 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     594.74
  FLOW VELOCITY(FEET/SEC) =  16.24 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.76   Tc(MIN.) =   14.21
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      7.30 =    5553.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.30 TO NODE      7.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
```

```
  TIME OF CONCENTRATION(MIN.) =   14.21
  RAINFALL INTENSITY(INCH/HR) =   4.82
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =     113.67
  TOTAL STREAM AREA(ACRES) =     113.67
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     594.74

****************************************************************************
  FLOW PROCESS FROM NODE      3.10 TO NODE      3.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   570.40
  ELEVATION DATA: UPSTREAM(FEET) =   7022.75  DOWNSTREAM(FEET) =   6906.51

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.476
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.445
  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
  ".4 DWELLING/ACRE"         D        1.09      0.21     0.900    91    8.48
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      6.14
  TOTAL AREA(ACRES) =      1.09   PEAK FLOW RATE(CFS) =      6.14

****************************************************************************
  FLOW PROCESS FROM NODE      3.20 TO NODE      3.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.48
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.445
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         B       32.62      0.42     0.900    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   32.62      SUBAREA RUNOFF(CFS) =  178.04
  EFFECTIVE AREA(ACRES) =     33.71   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       33.7       PEAK FLOW RATE(CFS) =     184.18

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

```
  FLOW PROCESS FROM NODE      3.20 TO NODE      3.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6906.51  DOWNSTREAM(FEET) =   6598.45
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1309.60   CHANNEL SLOPE =  0.2352
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1751 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     184.18
  FLOW VELOCITY(FEET/SEC) =  13.31 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.64   Tc(MIN.) =   10.12
  LONGEST FLOWPATH FROM NODE      3.10 TO NODE      3.30 =    1880.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.30 TO NODE      3.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.12
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.724
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"          B       47.30      0.42     0.900    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   47.30      SUBAREA RUNOFF(CFS) =  227.48
  EFFECTIVE AREA(ACRES) =     81.01   AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       81.0       PEAK FLOW RATE(CFS) =     389.79

****************************************************************************
  FLOW PROCESS FROM NODE      3.30 TO NODE      7.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6598.45  DOWNSTREAM(FEET) =   6472.84
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1872.50   CHANNEL SLOPE =  0.0671
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0671 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     389.79
  FLOW VELOCITY(FEET/SEC) =  10.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.95   Tc(MIN.) =   13.07
  LONGEST FLOWPATH FROM NODE      3.10 TO NODE      7.30 =    3752.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.30 TO NODE      7.30 IS CODE =   1
----------------------------------------------------------------------------
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.07
  RAINFALL INTENSITY(INCH/HR) =   5.07
  AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.42
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =      81.01
  TOTAL STREAM AREA(ACRES) =      81.01
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     389.79

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      594.74   14.21    4.815  0.21( 0.19) 0.90     113.7       7.10
      2      389.79   13.07    5.069  0.42( 0.38) 0.90      81.0       3.10

  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      966.68   13.07    5.069  0.30( 0.27) 0.90     185.5       3.10
      2      963.44   14.21    4.815  0.30( 0.27) 0.90     194.7       7.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     966.68    Tc(MIN.) =    13.07
  EFFECTIVE AREA(ACRES) =     185.53   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      194.7
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      7.30 =    5553.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.30 TO NODE      7.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.07
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.069
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"          D       10.63      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   10.63      SUBAREA RUNOFF(CFS) =   46.69
```

```
  EFFECTIVE AREA(ACRES) =    196.16   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      205.3       PEAK FLOW RATE(CFS) =     966.68
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      7.30 TO NODE      7.40 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6472.84  DOWNSTREAM(FEET) =   6404.98
  CHANNEL LENGTH THRU SUBAREA(FEET) =   953.53   CHANNEL SLOPE =  0.0712
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0712 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     966.68
  FLOW VELOCITY(FEET/SEC) =  14.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.08   Tc(MIN.) =   14.15
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      7.40 =    6507.23 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.40 TO NODE      7.40 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE      8.10 TO NODE      8.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   584.70
  ELEVATION DATA: UPSTREAM(FEET) =   6760.02  DOWNSTREAM(FEET) =   6589.39

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.967
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.677
  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
  ".4 DWELLING/ACRE"          D        2.35      0.21     0.900    91    7.97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =     13.72
  TOTAL AREA(ACRES) =      2.35   PEAK FLOW RATE(CFS) =     13.72

****************************************************************************
  FLOW PROCESS FROM NODE      8.20 TO NODE      8.20 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =    7.97
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.677
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D       16.46      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   16.46      SUBAREA RUNOFF(CFS) =   96.12
  EFFECTIVE AREA(ACRES) =     18.81   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       18.8       PEAK FLOW RATE(CFS) =     109.84

********************************************************************************
  FLOW PROCESS FROM NODE      8.20 TO NODE      8.30 IS CODE =  53
--------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6589.39  DOWNSTREAM(FEET) =   6472.97
  CHANNEL LENGTH THRU SUBAREA(FEET) =   897.40   CHANNEL SLOPE =  0.1297
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1215 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     109.84
  FLOW VELOCITY(FEET/SEC) =   9.33 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.60   Tc(MIN.) =    9.57
  LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.30 =    1482.10 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE      8.30 TO NODE      8.30 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.57
  RAINFALL INTENSITY(INCH/HR) =   5.95
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =      18.81
  TOTAL STREAM AREA(ACRES) =      18.81
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     109.84

********************************************************************************
  FLOW PROCESS FROM NODE      8.40 TO NODE      8.50 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   757.10
  ELEVATION DATA: UPSTREAM(FEET) =   6711.74  DOWNSTREAM(FEET) =   6532.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.206
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.112
  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
  ".4 DWELLING/ACRE"         D        1.36      0.21     0.900    91    9.21
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      7.25
  TOTAL AREA(ACRES) =      1.36   PEAK FLOW RATE(CFS) =      7.25

****************************************************************************
  FLOW PROCESS FROM NODE      8.50 TO NODE      8.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.21
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.112
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D        1.69      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =    1.69      SUBAREA RUNOFF(CFS) =    9.01
  EFFECTIVE AREA(ACRES) =      3.05   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =      16.26

****************************************************************************
  FLOW PROCESS FROM NODE      8.50 TO NODE      8.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6532.00  DOWNSTREAM(FEET) =   6472.97
  CHANNEL LENGTH THRU SUBAREA(FEET) =   426.20   CHANNEL SLOPE =  0.1385
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1273 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      16.26
  FLOW VELOCITY(FEET/SEC) =   5.06 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.40   Tc(MIN.) =   10.61
  LONGEST FLOWPATH FROM NODE      8.40 TO NODE      8.30 =    1183.30 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      8.30 TO NODE      8.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.61
  RAINFALL INTENSITY(INCH/HR) =   5.61
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =       3.05
  TOTAL STREAM AREA(ACRES) =       3.05
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      16.26

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      109.84    9.57    5.946  0.21( 0.19) 0.90      18.8       8.10
      2       16.26   10.61    5.614  0.21( 0.19) 0.90       3.1       8.40

  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      125.40    9.57    5.946  0.21( 0.19) 0.90      21.6       8.10
      2      119.76   10.61    5.614  0.21( 0.19) 0.90      21.9       8.40

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     125.40    Tc(MIN.) =     9.57
  EFFECTIVE AREA(ACRES) =      21.56   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       21.9
  LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.30 =    1482.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.30 TO NODE      8.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.57
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.946
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
```

```
  ".4 DWELLING/ACRE"         D       21.46      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   21.46      SUBAREA RUNOFF(CFS) =  111.20
  EFFECTIVE AREA(ACRES) =     43.02   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       43.3       PEAK FLOW RATE(CFS) =     222.92

****************************************************************************
  FLOW PROCESS FROM NODE      8.30 TO NODE      7.40 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6472.97  DOWNSTREAM(FEET) =   6404.98
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1112.00   CHANNEL SLOPE =  0.0611
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0611 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     222.92
  FLOW VELOCITY(FEET/SEC) =   8.38 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.21   Tc(MIN.) =   11.78
  LONGEST FLOWPATH FROM NODE      8.10 TO NODE      7.40 =    2594.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.40 TO NODE      7.40 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      222.92   11.78    5.355  0.21( 0.19) 0.90      43.0       8.10
      2      211.52   12.86    5.115  0.21( 0.19) 0.90      43.3       8.40
  LONGEST FLOWPATH FROM NODE      8.10 TO NODE      7.40 =    2594.10 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      966.68   14.15    4.830  0.30( 0.27) 0.90     196.2       3.10
      2      963.44   15.29    4.613  0.29( 0.26) 0.90     205.3       7.10
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      7.40 =    6507.23 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1120.63   11.78    5.355  0.28( 0.25) 0.90     206.4       8.10
      2     1145.36   12.86    5.115  0.28( 0.25) 0.90     221.7       8.40
      3     1165.96   14.15    4.830  0.28( 0.25) 0.90     239.5       3.10
      4     1153.43   15.29    4.613  0.28( 0.25) 0.90     248.6       7.10
    TOTAL AREA(ACRES) =       248.6
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     1165.96  Tc(MIN.) =   14.145
  EFFECTIVE AREA(ACRES) =    239.48  AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      248.6
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      7.40 =    6507.23 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.40 TO NODE      7.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.15
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.830
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         B       11.64      0.42     0.900    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   11.64      SUBAREA RUNOFF(CFS) =   46.61
  EFFECTIVE AREA(ACRES) =    251.12   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      260.3       PEAK FLOW RATE(CFS) =    1165.96
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      7.40 TO NODE      7.50 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6404.98  DOWNSTREAM(FEET) =   6355.81
  CHANNEL LENGTH THRU SUBAREA(FEET) =   872.50   CHANNEL SLOPE =  0.0564
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0564 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    1165.96
  FLOW VELOCITY(FEET/SEC) =  13.96 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.04   Tc(MIN.) =   15.19
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      7.50 =    7379.73 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.50 TO NODE      7.50 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.) =   15.19
```

```
  RAINFALL INTENSITY(INCH/HR) =   4.62
  AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =     251.12
  TOTAL STREAM AREA(ACRES) =     260.27
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    1165.96

****************************************************************************
  FLOW PROCESS FROM NODE      5.10 TO NODE      5.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   693.60
  ELEVATION DATA: UPSTREAM(FEET) =   6585.81  DOWNSTREAM(FEET) =   6467.32

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.494
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.981
  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
  ".4 DWELLING/ACRE"         D        4.02      0.21     0.900    91    9.49
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =     20.95
  TOTAL AREA(ACRES) =      4.02   PEAK FLOW RATE(CFS) =     20.95

****************************************************************************
  FLOW PROCESS FROM NODE      5.20 TO NODE      5.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.49
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.981
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D       14.38      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   14.38      SUBAREA RUNOFF(CFS) =   74.96
  EFFECTIVE AREA(ACRES) =     18.40   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       18.4       PEAK FLOW RATE(CFS) =      95.91

****************************************************************************
  FLOW PROCESS FROM NODE      5.20 TO NODE      7.50 IS CODE =  53
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6467.32  DOWNSTREAM(FEET) =   6355.81
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1035.00   CHANNEL SLOPE =  0.1077
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1058 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      95.91
  FLOW VELOCITY(FEET/SEC) =   8.33 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.07   Tc(MIN.) =   11.57
  LONGEST FLOWPATH FROM NODE      5.10 TO NODE      7.50 =    1728.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.50 TO NODE      7.50 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.) =   11.57
  RAINFALL INTENSITY(INCH/HR) =   5.40
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =      18.40
  TOTAL STREAM AREA(ACRES) =      18.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      95.91

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1120.63   12.84    5.120  0.29( 0.26) 0.90     218.0       8.10
      1     1145.36   13.91    4.882  0.29( 0.26) 0.90     233.3       8.40
      1     1165.96   15.19    4.623  0.29( 0.26) 0.90     251.1       3.10
      1     1153.43   16.34    4.517  0.28( 0.26) 0.90     260.3       7.10
      2       95.91   11.57    5.402  0.21( 0.19) 0.90      18.4       5.10

  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     1164.21   11.57    5.402  0.28( 0.25) 0.90     214.9       5.10
      2     1211.35   12.84    5.120  0.28( 0.25) 0.90     236.4       8.10
      3     1231.71   13.91    4.882  0.28( 0.25) 0.90     251.7       8.40
      4     1247.53   15.19    4.623  0.28( 0.25) 0.90     269.5       3.10
      5     1233.05   16.34    4.517  0.28( 0.25) 0.90     278.7       7.10
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    1247.53    Tc(MIN.) =    15.19
  EFFECTIVE AREA(ACRES) =     269.52   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      278.7
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      7.50 =    7379.73 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.50 TO NODE      7.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.19
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.623
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D        0.34      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =    0.34      SUBAREA RUNOFF(CFS) =    1.36
  EFFECTIVE AREA(ACRES) =    269.86   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      279.0       PEAK FLOW RATE(CFS) =    1247.53
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      7.50 TO NODE      6.20 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6355.81  DOWNSTREAM(FEET) =   6352.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   100.30   CHANNEL SLOPE =  0.0300
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0300 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    1247.53
  FLOW VELOCITY(FEET/SEC) =  10.42 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.16   Tc(MIN.) =   15.35
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      6.20 =    7480.03 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.20 TO NODE      6.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   15.35
  RAINFALL INTENSITY(INCH/HR) =   4.61
```

```
  AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.28
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =     269.86
  TOTAL STREAM AREA(ACRES) =     279.01
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    1247.53

****************************************************************************
  FLOW PROCESS FROM NODE      6.10 TO NODE      6.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   236.40
  ELEVATION DATA: UPSTREAM(FEET) =   6435.22  DOWNSTREAM(FEET) =   6352.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.352
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  7.870
  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
  ".4 DWELLING/ACRE"         D        0.35      0.21     0.900    91    5.35
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      2.42
  TOTAL AREA(ACRES) =      0.35   PEAK FLOW RATE(CFS) =      2.42

****************************************************************************
  FLOW PROCESS FROM NODE      6.20 TO NODE      6.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.35
  RAINFALL INTENSITY(INCH/HR) =   7.87
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =       0.35
  TOTAL STREAM AREA(ACRES) =       0.35
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.42

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1164.21   11.73    5.366  0.28( 0.25) 0.90     215.2       5.10
      1     1211.35   13.00    5.084  0.28( 0.25) 0.90     236.8       8.10
```

```
     1     1231.71   14.07    4.846  0.28( 0.25) 0.90     252.1       8.40
     1     1247.53   15.35    4.608  0.28( 0.25) 0.90     269.9       3.10
     1     1233.05   16.50    4.502  0.28( 0.25) 0.90     279.0       7.10
     2        2.42    5.35    7.870  0.21( 0.19) 0.90       0.3       6.10

  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      793.62    5.35    7.870  0.28( 0.25) 0.90      98.5       6.10
      2     1165.84   11.73    5.366  0.28( 0.25) 0.90     215.5       5.10
      3     1212.89   13.00    5.084  0.28( 0.25) 0.90     237.1       8.10
      4     1233.17   14.07    4.846  0.28( 0.25) 0.90     252.4       8.40
      5     1248.92   15.35    4.608  0.28( 0.25) 0.90     270.2       3.10
      6     1234.41   16.50    4.502  0.28( 0.25) 0.90     279.4       7.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    1248.92    Tc(MIN.) =    15.35
  EFFECTIVE AREA(ACRES) =     270.21   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      279.4
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      6.20 =    7480.03 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.20 TO NODE      6.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.35
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.608
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D        2.05      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =    2.05      SUBAREA RUNOFF(CFS) =    8.15
  EFFECTIVE AREA(ACRES) =    272.26   AREA-AVERAGED Fm(INCH/HR) =  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      281.4       PEAK FLOW RATE(CFS) =    1248.92
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      6.20 TO NODE      6.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   6352.80  DOWNSTREAM(FEET) =   6334.97
  CHANNEL LENGTH THRU SUBAREA(FEET) =   138.70   CHANNEL SLOPE =  0.1285
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1207 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    1248.92
  FLOW VELOCITY(FEET/SEC) =  20.90 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.11   Tc(MIN.) =   15.46
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      6.30 =    7618.73 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      9.10 TO NODE      9.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   392.70
  ELEVATION DATA: UPSTREAM(FEET) =   6647.05  DOWNSTREAM(FEET) =   6532.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.789
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  7.214
  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
  ".4 DWELLING/ACRE"         B        1.12      0.42     0.900    76    6.79
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      6.89
  TOTAL AREA(ACRES) =      1.12   PEAK FLOW RATE(CFS) =      6.89

****************************************************************************
  FLOW PROCESS FROM NODE      9.20 TO NODE      9.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.79
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  7.214
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         B       15.78      0.42     0.900    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   15.78      SUBAREA RUNOFF(CFS) =   97.05
  EFFECTIVE AREA(ACRES) =     16.90   AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       16.9       PEAK FLOW RATE(CFS) =     103.94

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

```
 FLOW PROCESS FROM NODE      9.20 TO NODE      9.30 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   6532.00  DOWNSTREAM(FEET) =   6353.41
 CHANNEL LENGTH THRU SUBAREA(FEET) =   504.40   CHANNEL SLOPE =  0.3541
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .2060 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =     103.94
 FLOW VELOCITY(FEET/SEC) =  11.93 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.70   Tc(MIN.) =    7.49
 LONGEST FLOWPATH FROM NODE      9.10 TO NODE      9.30 =     897.10 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     10.10 TO NODE     10.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   575.80
 ELEVATION DATA: UPSTREAM(FEET) =   6680.01  DOWNSTREAM(FEET) =   6529.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.089
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.621
 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
 ".4 DWELLING/ACRE"         B        3.91      0.42     0.900    76    8.09
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
 SUBAREA RUNOFF(CFS) =     21.96
 TOTAL AREA(ACRES) =      3.91   PEAK FLOW RATE(CFS) =     21.96

****************************************************************************
 FLOW PROCESS FROM NODE     10.20 TO NODE     10.20 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    8.09
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.621
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 ".4 DWELLING/ACRE"         B       15.30      0.42     0.900    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
 SUBAREA AREA(ACRES) =   15.30      SUBAREA RUNOFF(CFS) =   85.94
```

```
  EFFECTIVE AREA(ACRES) =     19.21   AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       19.2       PEAK FLOW RATE(CFS) =     107.90

****************************************************************************
  FLOW PROCESS FROM NODE     10.20 TO NODE     10.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6529.00  DOWNSTREAM(FEET) =   6335.41
  CHANNEL LENGTH THRU SUBAREA(FEET) =   445.30   CHANNEL SLOPE =  0.4347
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2182 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     107.90
  FLOW VELOCITY(FEET/SEC) =  12.43 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.60   Tc(MIN.) =    8.69
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     10.30 =    1021.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.10 TO NODE     11.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   643.30
  ELEVATION DATA: UPSTREAM(FEET) =   6606.25  DOWNSTREAM(FEET) =   6540.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.194
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.707
  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
  ".4 DWELLING/ACRE"         B        2.55      0.42     0.900    76   10.19
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =     12.24
  TOTAL AREA(ACRES) =      2.55   PEAK FLOW RATE(CFS) =     12.24

****************************************************************************
  FLOW PROCESS FROM NODE     11.20 TO NODE     11.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.19
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.707
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  RESIDENTIAL
  ".4 DWELLING/ACRE"         B       25.99      0.42     0.900    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   25.99      SUBAREA RUNOFF(CFS) =  124.59
  EFFECTIVE AREA(ACRES) =     28.54   AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       28.5       PEAK FLOW RATE(CFS) =     136.83

****************************************************************************
  FLOW PROCESS FROM NODE     11.20 TO NODE     11.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6540.00  DOWNSTREAM(FEET) =   6371.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1414.30   CHANNEL SLOPE =  0.1195
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1146 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     136.83
  FLOW VELOCITY(FEET/SEC) =   9.75 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.42   Tc(MIN.) =   12.61
  LONGEST FLOWPATH FROM NODE     11.10 TO NODE     11.30 =    2057.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.30 TO NODE     11.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.61
  RAINFALL INTENSITY(INCH/HR) =   5.17
  AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.42
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =      28.54
  TOTAL STREAM AREA(ACRES) =      28.54
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     136.83

****************************************************************************
  FLOW PROCESS FROM NODE     12.10 TO NODE     12.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   965.90
  ELEVATION DATA: UPSTREAM(FEET) =   6836.40  DOWNSTREAM(FEET) =   6643.42

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.505
```

```
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.638
  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
  ".4 DWELLING/ACRE"         D        6.55      0.21     0.900    91   10.50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =     32.12
  TOTAL AREA(ACRES) =      6.55   PEAK FLOW RATE(CFS) =     32.12

****************************************************************************
  FLOW PROCESS FROM NODE     12.20 TO NODE     12.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.638
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D       39.80      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   39.80      SUBAREA RUNOFF(CFS) =  195.18
  EFFECTIVE AREA(ACRES) =     46.35   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       46.3       PEAK FLOW RATE(CFS) =     227.30

****************************************************************************
  FLOW PROCESS FROM NODE     12.20 TO NODE     11.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6643.42  DOWNSTREAM(FEET) =   6371.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2716.70   CHANNEL SLOPE =  0.1003
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1002 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     227.30
  FLOW VELOCITY(FEET/SEC) =  10.80 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.19   Tc(MIN.) =   14.70
  LONGEST FLOWPATH FROM NODE     12.10 TO NODE     11.30 =    3682.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.30 TO NODE     11.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
```

```
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.70
  RAINFALL INTENSITY(INCH/HR) =   4.71
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =      46.35
  TOTAL STREAM AREA(ACRES) =      46.35
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     227.30

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      136.83   12.61    5.170  0.42( 0.38) 0.90      28.5      11.10
      2      227.30   14.70    4.707  0.21( 0.19) 0.90      46.3      12.10

  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      351.85   12.61    5.170  0.30( 0.27) 0.90      68.3      11.10
      2      350.90   14.70    4.707  0.29( 0.26) 0.90      74.9      12.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     351.85    Tc(MIN.) =    12.61
  EFFECTIVE AREA(ACRES) =      68.31   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       74.9
  LONGEST FLOWPATH FROM NODE     12.10 TO NODE     11.30 =    3682.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.30 TO NODE     11.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.61
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.170
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"          D        0.19      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    0.85
  EFFECTIVE AREA(ACRES) =     68.50   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       75.1       PEAK FLOW RATE(CFS) =     351.85
```

```
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     11.30 TO NODE     13.20 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6371.00  DOWNSTREAM(FEET) =   6369.35
  CHANNEL LENGTH THRU SUBAREA(FEET) =    54.80   CHANNEL SLOPE =  0.0301
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0301 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     351.85
  FLOW VELOCITY(FEET/SEC) =   6.85 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.13   Tc(MIN.) =   12.74
  LONGEST FLOWPATH FROM NODE     12.10 TO NODE     13.20 =    3737.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.20 TO NODE     13.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.74
  RAINFALL INTENSITY(INCH/HR) =   5.14
  AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.30
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =      68.50
  TOTAL STREAM AREA(ACRES) =      75.08
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     351.85

****************************************************************************
  FLOW PROCESS FROM NODE     13.10 TO NODE     13.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   852.50
  ELEVATION DATA: UPSTREAM(FEET) =   6506.32  DOWNSTREAM(FEET) =   6369.35

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.438
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.653
  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
  ".4 DWELLING/ACRE"         D        4.92      0.21     0.900    91   10.44
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =     24.19
  TOTAL AREA(ACRES) =      4.92   PEAK FLOW RATE(CFS) =     24.19

****************************************************************************
  FLOW PROCESS FROM NODE     13.20 TO NODE     13.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.44
  RAINFALL INTENSITY(INCH/HR) =   5.65
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =       4.92
  TOTAL STREAM AREA(ACRES) =       4.92
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      24.19

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      351.85   12.74    5.141  0.30( 0.27) 0.90      68.5      11.10
      1      350.90   14.83    4.678  0.29( 0.26) 0.90      75.1      12.10
      2       24.19   10.44    5.653  0.21( 0.19) 0.90       4.9      13.10

  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      342.66   10.44    5.653  0.29( 0.26) 0.90      61.0      13.10
      2      373.78   12.74    5.141  0.29( 0.26) 0.90      73.4      11.10
      3      370.77   14.83    4.678  0.29( 0.26) 0.90      80.0      12.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     373.78    Tc(MIN.) =    12.74
  EFFECTIVE AREA(ACRES) =      73.42   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       80.0
  LONGEST FLOWPATH FROM NODE     12.10 TO NODE     13.20 =    3737.40 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.20 TO NODE     13.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.74
```

```
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.141
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 ".4 DWELLING/ACRE"         D        0.86      0.21     0.900    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
 SUBAREA AREA(ACRES) =    0.86      SUBAREA RUNOFF(CFS) =    3.83
 EFFECTIVE AREA(ACRES) =     74.28   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.90
 TOTAL AREA(ACRES) =       80.9       PEAK FLOW RATE(CFS) =     373.78
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE     13.20 TO NODE     13.30 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   6369.35  DOWNSTREAM(FEET) =   6363.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   107.90   CHANNEL SLOPE =  0.0570
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0570 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =     373.78
 FLOW VELOCITY(FEET/SEC) =   9.61 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.19   Tc(MIN.) =   12.93
 LONGEST FLOWPATH FROM NODE     12.10 TO NODE     13.30 =    3845.30 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.10 TO NODE     14.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   671.10
 ELEVATION DATA: UPSTREAM(FEET) =   6509.56  DOWNSTREAM(FEET) =   6270.66

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.090
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.621
 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
 ".4 DWELLING/ACRE"         D        4.08      0.21     0.900    91    8.09
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
 SUBAREA RUNOFF(CFS) =     23.62
 TOTAL AREA(ACRES) =      4.08   PEAK FLOW RATE(CFS) =     23.62
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     15.10 TO NODE     15.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   665.60
  ELEVATION DATA: UPSTREAM(FEET) =   6528.66  DOWNSTREAM(FEET) =   6446.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.971
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.763
  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
  ".4 DWELLING/ACRE"         D        5.64      0.21     0.900    91    9.97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =     28.29
  TOTAL AREA(ACRES) =      5.64   PEAK FLOW RATE(CFS) =     28.29

****************************************************************************
  FLOW PROCESS FROM NODE     15.20 TO NODE     15.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.97
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.763
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D        8.93      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =    8.93      SUBAREA RUNOFF(CFS) =   44.80
  EFFECTIVE AREA(ACRES) =     14.57   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       14.6       PEAK FLOW RATE(CFS) =      73.10

****************************************************************************
  FLOW PROCESS FROM NODE     15.20 TO NODE     15.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6446.70  DOWNSTREAM(FEET) =   6275.97
  CHANNEL LENGTH THRU SUBAREA(FEET) =   627.00   CHANNEL SLOPE =  0.2723
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1874 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

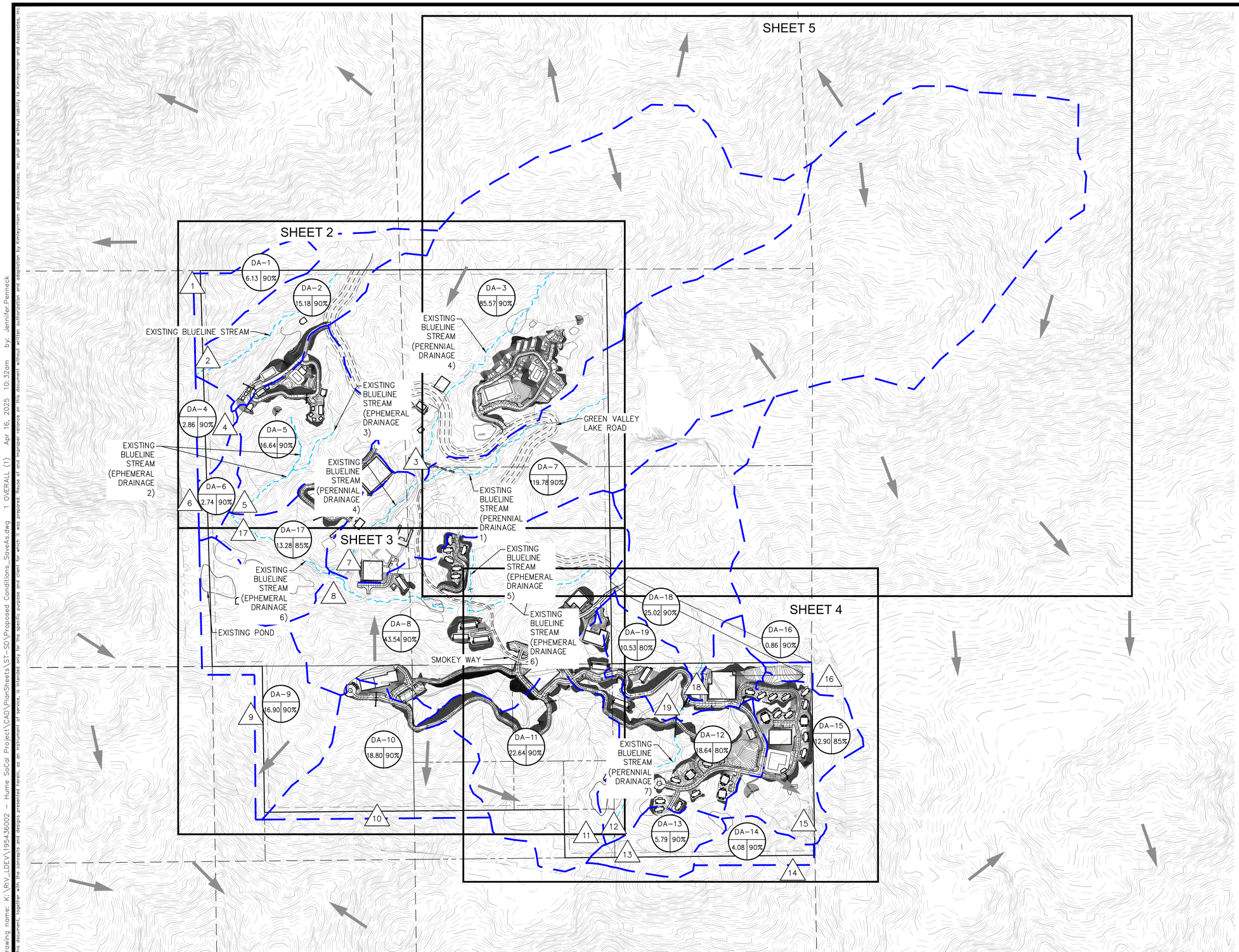
```
  CHANNEL FLOW THRU SUBAREA(CFS) =      73.10
  FLOW VELOCITY(FEET/SEC) =  10.12 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.03   Tc(MIN.) =   11.00
  LONGEST FLOWPATH FROM NODE     15.10 TO NODE     15.30 =    1292.60 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     16.10 TO NODE     16.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   322.00
  ELEVATION DATA: UPSTREAM(FEET) =   6532.31  DOWNSTREAM(FEET) =   6490.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.361
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.953
  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
  ".4 DWELLING/ACRE"         D        0.96      0.21     0.900    91    7.36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      5.84
  TOTAL AREA(ACRES) =      0.96   PEAK FLOW RATE(CFS) =      5.84
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.0  TC(MIN.) =      7.36
  EFFECTIVE AREA(ACRES) =      0.96  AREA-AVERAGED Fm(INCH/HR)=  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap = 0.900
  PEAK FLOW RATE(CFS)   =       5.84
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Appendix E

Proposed Drainage Map and Calculations



LEGEND

- PROPERTY BOUNDARY
- (XXXX) EXISTING MAJOR CONTOURS
- (XXXX) EXISTING MINOR CONTOURS
- EXISTING BLUELINE STREAM
- EXISTING DRAINAGEWAY
- EXISTING BLUELINE STREAM SETBACK
- EXISTING ROAD
- EXISTING DRAINAGE EASEMENT
- PROPOSED DMA BOUNDARY
- DA-3 / B / C — A = SUBAREA ID; B = SUBAREA ACREAGE; C = PERCENT PERVIOUS (%)
- 1 — DMA DESIGN POINT
- EXISTING FLOW ARROW
- PROPOSED FLOW ARROW

NOTES:

1. REFER TO HUME SOCAL CAMPGROUND DELINEATION OF STATE AND FEDERAL JURISDICTIONAL WATERS REPORT FOR ADDITIONAL INFORMATION ON ALL DRAINAGEWAYS.
2. FOR BASINS THAT HAVE A PERVIOUS PERCENTAGE GREATER THAN OR EQUAL TO 90%, A 90% PERVIOUS VALUE WAS UTILIZED.
3. A 80% AND 85% PERVIOUS VALUE WAS UTILIZED FOR BASINS WITH A PERVIOUS PERCENTAGE BETWEEN 80-84% AND 85%-89%, RESPECTIVELY.

NORTH

GRAPHIC SCALE IN FEET
0 150 300 600

Drawing name: K:\RIV_LDEV\195436002 - Hume SoCal Project\CAD\PlanSheets\ST-SD\Proposed Conditions_SaveAs.dwg 1 OVERALL (1) Apr 16, 2025 10:32am by: Jennifer.Penneck

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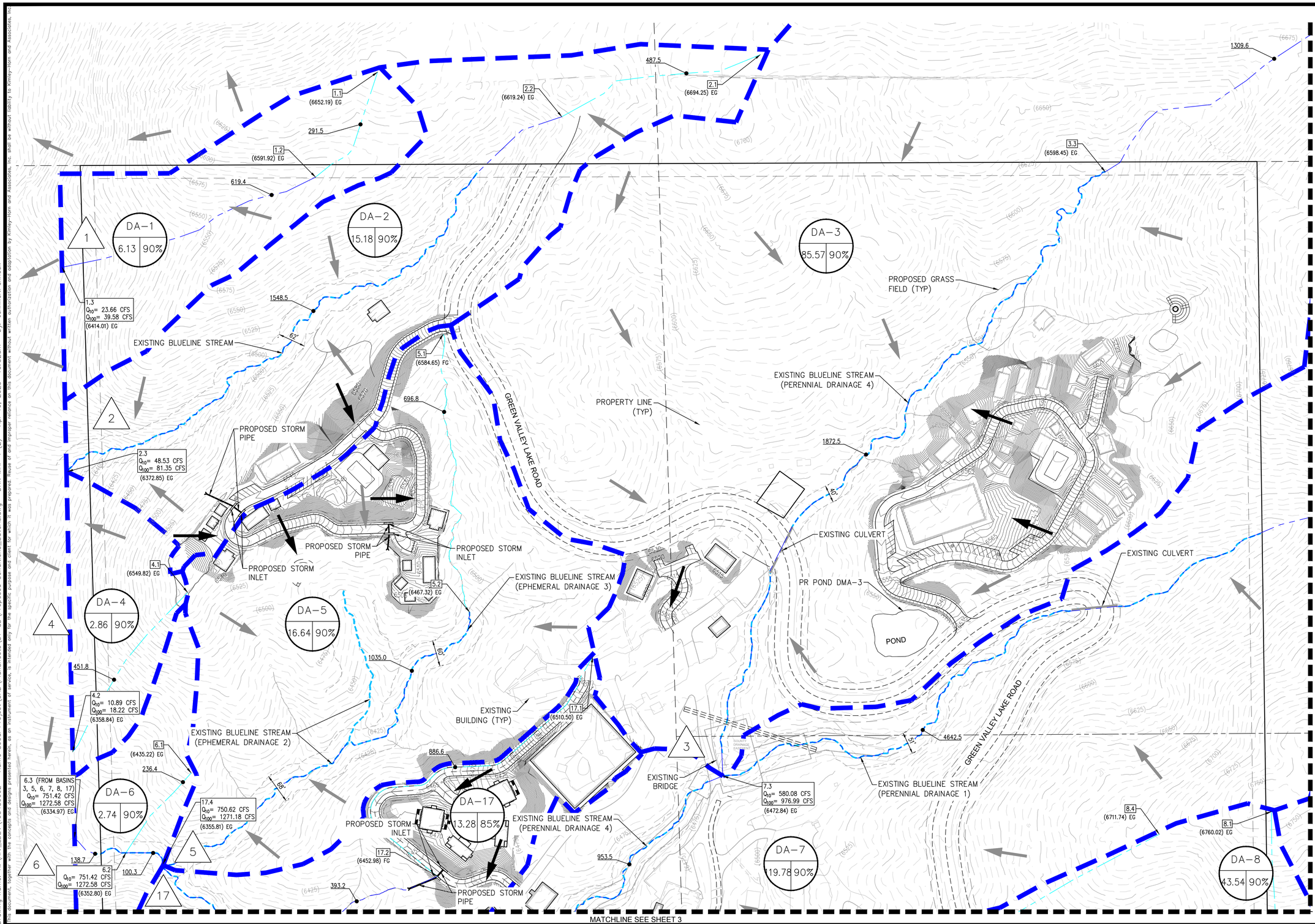
HUME SOCAL - GREEN VALLEY LAKE, CA
PREPARED FOR
HUME LAKE
PROPOSED DRAINAGE MAP OVERVIEW

SHEET 1 OF 5 SHEETS
CITY PROJECT NO.



LEGEND

- PROPERTY BOUNDARY
- EXISTING MAJOR CONTOURS
- EXISTING MINOR CONTOURS
- EXISTING BLUELINE STREAM
- EXISTING DRAINAGEWAY
- EXISTING BLUELINE STREAM SETBACK
- EXISTING ROAD
- EXISTING DRAINAGE EASEMENT
- PROPOSED DMA BOUNDARY
- OVERLAND FLOW PATH
- CHANNELIZED FLOW PATH
- A = SUBAREA ID
- B = SUBAREA ACREAGE
- C = PERCENT PERVIOUS (%)
- DMA DESIGN POINT
- EXISTING FLOW ARROW
- PROPOSED FLOW ARROW
- 15.2 (XXXX)FG/EG — NODE ID AND ELEVATION

NOTES:

1. REFER TO HUME SOCAL CAMPGROUND DELINEATION OF STATE AND FEDERAL JURISDICTIONAL WATERS REPORT FOR ADDITIONAL INFORMATION ON ALL DRAINAGEWAYS.
2. FOR BASINS THAT HAVE A PERVIOUS PERCENTAGE GREATER THAN OR EQUAL TO 90%, A 90% PERVIOUS VALUE WAS UTILIZED.
3. A 80% AND 85% PERVIOUS VALUE WAS UTILIZED FOR BASINS WITH A PERVIOUS PERCENTAGE BETWEEN 80-84% AND 85%-89%, RESPECTIVELY.

NORTH

GRAPHIC SCALE IN FEET
0 50 100 200

Drawing name: K:\RIV_LDEV\195436002 - Hume SoCal Project\CAD\PlanSheets\ST-SD\Proposed Conditions_SaveAs.dwg DRN MAP 1 (2) Apr 16, 2025 10:32am by: Jennifer.Penneck
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3801 UNIVERSITY AVE # 300, RIVERSIDE, CA 92501
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HUME SOCAL - GREEN VALLEY LAKE, CA
PREPARED FOR
HUME LAKE
PROPOSED DRAINAGE MAP

SHEET 2 OF SHEETS 5
CITY PROJECT NO.

MATCHLINE SEE SHEET 2

MATCHLINE SEE SHEET 4

DA-17
13.28 | 85%

DA-7
19.78 | 90%

DA-8
43.54 | 90%

DA-9
16.90 | 90%

DA-10
18.80 | 90%

DA-11
22.64 | 90%

DA-12
18.64 | 80%

EXISTING POND

PROPOSED GRASS FIELD (TYP)

EXISTING BLUELINE STREAM (EPHEMERAL DRAINAGE 6)

EXISTING BLUELINE STREAM (PERENNIAL DRAINAGE 4)

EXISTING BUILDING (TYP)

PR POND DMA-8

POND

EXISTING CURB CUT

EXISTING CULVERT

SMOKEY WAY

GREEN VALLEY LAKE ROAD

EXISTING BLUELINE STREAM (EPHEMERAL DRAINAGE 5)

PROPOSED STORM INLET

PROPOSED STORM PIPE

17.3
Q_{10}= 707.14 CFS
Q_{100}= 1197.13 CFS
(6378.96) EG

7.4
Q_{10}= 696.25 CFS
Q_{100}= 1178.30 CFS
(6404.98) EG

8.3
Q_{10}= 74.93 CFS
Q_{100}= 125.65 CFS
(6472.97) EG

9.3
Q_{10}= 60.93 CFS
Q_{100}= 103.94 CFS
(6353.41) EG

10.3
Q_{10}= 60.90 CFS
Q_{100}= 104.27 CFS
(6335.41) EG

386.2 | 486.3 | 953.5 | 426.2 | 757.1 | 584.7 | 897.4 | 1112.0 | 618.1 | 999.1 | 991.6 | 1325.2 | 251.2 | 392.7 | 553.8 | 504.4 | 445.3 | 651.1

8.5 (6532.00) EG | 8.2 (6589.39) EG | 19.1 (6606.25) EG | 12.1 (6594.43) FG | 9.1 (6647.05) EG | 10.1 (6650.00) FG | 11.3 (6546.53) FG | 11.1 (6651.16) FG | 11.2 (6565.95) FG | 9.2 (6532.00) EG | 10.2 (6529.00) EG

LEGEND

- PROPERTY BOUNDARY
- EXISTING MAJOR CONTOURS
- EXISTING MINOR CONTOURS
- EXISTING BLUELINE STREAM
- EXISTING DRAINAGEWAY
- EXISTING BLUELINE STREAM SETBACK
- EXISTING ROAD
- EXISTING DRAINAGE EASEMENT
- PROPOSED DMA BOUNDARY
- OVERLAND FLOW PATH
- CHANNELIZED FLOW PATH
- A = SUBAREA ID
- B = SUBAREA ACREAGE
- C = PERCENT PERVIOUS (%)
- DMA DESIGN POINT
- EXISTING FLOW ARROW
- PROPOSED FLOW ARROW
- 15.2 (XXXX)FG/EG — NODE ID AND ELEVATION

NOTES:

1. REFER TO HUME SOCAL CAMPGROUND DELINEATION OF STATE AND FEDERAL JURISDICTIONAL WATERS REPORT FOR ADDITIONAL INFORMATION ON ALL DRAINAGEWAYS.
2. FOR BASINS THAT HAVE A PERVIOUS PERCENTAGE GREATER THAN OR EQUAL TO 90%, A 90% PERVIOUS VALUE WAS UTILIZED.
3. A 80% AND 85% PERVIOUS VALUE WAS UTILIZED FOR BASINS WITH A PERVIOUS PERCENTAGE BETWEEN 80-84% AND 85%-89%, RESPECTIVELY.

NORTH

GRAPHIC SCALE IN FEET
0 50 100 200

Drawing name: K:\RIV_LDEV\195436002 - Hume SoCal Project\CAD\PlanSheets\ST-SD\Proposed Conditions_SoveAs.dwg DRN MAP 1 (3) Apr 16, 2025 10:32am by: Jennifer.Penneck
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ISSUE	DATE	DESCRIPTION

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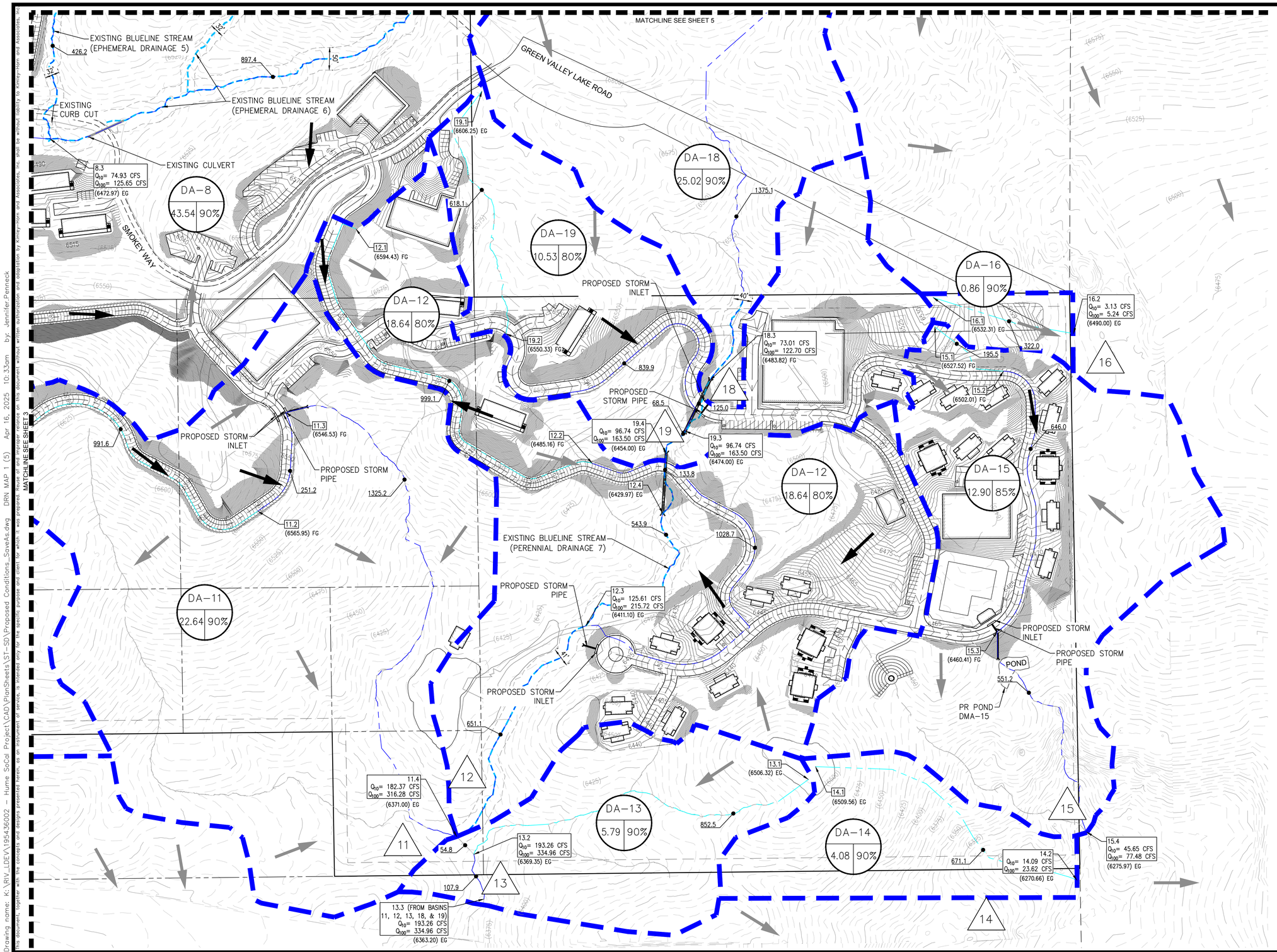
HUME SOCAL - GREEN VALLEY LAKE, CA
PREPARED FOR
HUME LAKE
PROPOSED DRAINAGE MAP

SHEET 3
OF SHEETS 5
CITY PROJECT NO.



LEGEND

- PROPERTY BOUNDARY
- EXISTING MAJOR CONTOURS
- EXISTING MINOR CONTOURS
- EXISTING BLUELINE STREAM
- EXISTING DRAINAGEWAY
- EXISTING BLUELINE STREAM SETBACK
- EXISTING ROAD
- EXISTING DRAINAGE EASEMENT
- PROPOSED DMA BOUNDARY
- OVERLAND FLOW PATH
- CHANNELIZED FLOW PATH
- A = SUBAREA ID
- B = SUBAREA ACREAGE
- C = PERCENT PERVIOUS (%)
- DMA DESIGN POINT
- EXISTING FLOW ARROW
- PROPOSED FLOW ARROW
- NODE ID AND ELEVATION

NOTES:

1. REFER TO HUME SOCAL CAMPGROUND DELINEATION OF STATE AND FEDERAL JURISDICTIONAL WATERS REPORT FOR ADDITIONAL INFORMATION ON ALL DRAINAGEWAYS.
2. FOR BASINS THAT HAVE A PERVIOUS PERCENTAGE GREATER THAN OR EQUAL TO 90%, A 90% PERVIOUS VALUE WAS UTILIZED.
3. A 80% AND 85% PERVIOUS VALUE WAS UTILIZED FOR BASINS WITH A PERVIOUS PERCENTAGE BETWEEN 80-84% AND 85%-89%, RESPECTIVELY.

NORTH

GRAPHIC SCALE IN FEET 0 50 100 200

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HUME SOCAL - GREEN VALLEY LAKE, CA
PREPARED FOR
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PROPOSED DRAINAGE MAP

SHEET 4 OF 5 SHEETS
CITY PROJECT NO.

Drawing name: K:\RIV_LDEV\195436002 - Hume SoCal Project\CAD\PlanSheets\ST-SD\Proposed Conditions_SaveAs.dwg DRN MAP 1 (5) Apr 16, 2025 10:33am by: Jennifer.Penneck
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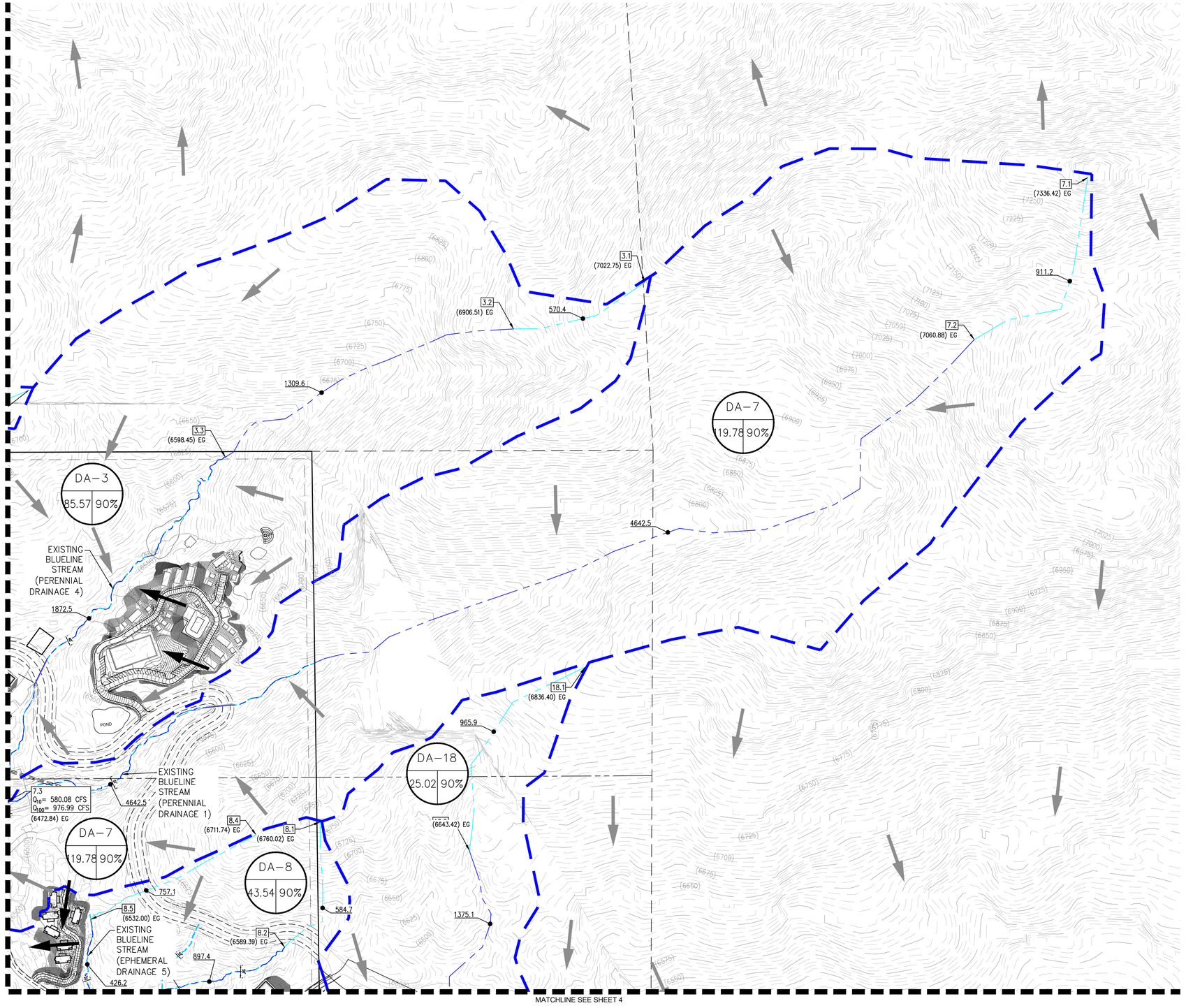

LEGEND

- PROPERTY BOUNDARY
- (XXXX) EXISTING MAJOR CONTOURS
- (XXXX) EXISTING MINOR CONTOURS
- EXISTING BLUELINE STREAM
- EXISTING DRAINAGEWAY
- EXISTING BLUELINE STREAM SETBACK
- EXISTING ROAD
- EXISTING DRAINAGE EASEMENT
- PROPOSED DMA BOUNDARY
- OVERLAND FLOW PATH
- CHANNELIZED FLOW PATH
- A = SUBAREA ID
- B = SUBAREA ACREAGE
- C = PERCENT PERVIOUS (%)
- 1 DMA DESIGN POINT
- EXISTING FLOW ARROW
- PROPOSED FLOW ARROW
- 15.2 (XXXX)FG/EG NODE ID AND ELEVATION

NOTES:

1. REFER TO HUME SOCAL CAMPGROUND DELINEATION OF STATE AND FEDERAL JURISDICTIONAL WATERS REPORT FOR ADDITIONAL INFORMATION ON ALL DRAINAGEWAYS.
2. FOR BASINS THAT HAVE A PERVIOUS PERCENTAGE GREATER THAN OR EQUAL TO 90%, A 90% PERVIOUS VALUE WAS UTILIZED.
3. A 80% AND 85% PERVIOUS VALUE WAS UTILIZED FOR BASINS WITH A PERVIOUS PERCENTAGE BETWEEN 80-84% AND 85%-89%, RESPECTIVELY.

NORTH

GRAPHIC SCALE IN FEET
0 100 200 400

Drawing name: K:\RIV_LDEV\195436002 – Hume SoCal Project\CAD\PlanSheets\ST–SD\Proposed Conditions_SaveAs.dwg DRN MAP 1 (4) Apr 16, 2025 10:33am by: Jennifer.Penneck
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HUME SOCAL - GREEN VALLEY LAKE, CA
PREPARED FOR
HUME LAKE
PROPOSED DRAINAGE MAP

SHEET 5
OF
SHEETS 5
CITY PROJECT NO.

Proposed 10-year

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
         (c) Copyright 1983-2011 Advanced Engineering Software (aes)
             Ver. 18.0  Release Date: 07/01/2011  License ID 1499

                          Analysis prepared by:
```

Kimley-Horn

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 ************************* DESCRIPTION OF STUDY *************************
* Hume SoCal                                                            *
* Proposed 10 year - 24 hours Conditions                                *
* San Bernardino County, CA                                             *
 ************************************************************************

  FILE NAME: HUMEPR.DAT
  TIME/DATE OF STUDY: 07:25 01/31/2024
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED TABLED RAINFALL USED*
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)    5.00;  4.880
   2)   10.00;  3.500
   3)   15.00;  2.820
   4)   30.00;  1.980
   5)   60.00;  1.400
   6)  120.00;  1.050
   7)  180.00;  0.907
   8)  360.00;  0.711
   9)  720.00;  0.532
  *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   15.0     10.0    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      1.10 TO NODE      1.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   291.50
  ELEVATION DATA: UPSTREAM(FEET) =   6652.19  DOWNSTREAM(FEET) =   6591.92

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.461
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.477
  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
  ".4 DWELLING/ACRE"         D        1.39      0.21     0.900    91    6.46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      5.36
  TOTAL AREA(ACRES) =      1.39   PEAK FLOW RATE(CFS) =      5.36

****************************************************************************
  FLOW PROCESS FROM NODE      1.20 TO NODE      1.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.46
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.477
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D        4.74      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =    4.74      SUBAREA RUNOFF(CFS) =   18.29
  EFFECTIVE AREA(ACRES) =      6.13   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =        6.1       PEAK FLOW RATE(CFS) =      23.66

****************************************************************************
  FLOW PROCESS FROM NODE      1.20 TO NODE      1.30 IS CODE =  53
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6591.92  DOWNSTREAM(FEET) =   6414.01
  CHANNEL LENGTH THRU SUBAREA(FEET) =   619.40   CHANNEL SLOPE =  0.2872
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1918 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      23.66
  FLOW VELOCITY(FEET/SEC) =   7.03 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.47   Tc(MIN.) =    7.93
  LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.30 =     910.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      2.10 TO NODE      2.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   487.50
  ELEVATION DATA: UPSTREAM(FEET) =   6694.25  DOWNSTREAM(FEET) =   6619.24

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.420
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.936
  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
  ".4 DWELLING/ACRE"         D        1.63      0.21     0.900    91    8.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      5.50
  TOTAL AREA(ACRES) =      1.63   PEAK FLOW RATE(CFS) =      5.50

****************************************************************************
  FLOW PROCESS FROM NODE      2.20 TO NODE      2.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =    8.42
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.936
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D       12.76      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   12.76      SUBAREA RUNOFF(CFS) =   43.03
  EFFECTIVE AREA(ACRES) =     14.39   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
```

```
  TOTAL AREA(ACRES) =       14.4       PEAK FLOW RATE(CFS) =      48.53

****************************************************************************
  FLOW PROCESS FROM NODE      2.20 TO NODE      2.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6619.24  DOWNSTREAM(FEET) =   6372.85
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1548.50   CHANNEL SLOPE =  0.1591
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1396 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      48.53
  FLOW VELOCITY(FEET/SEC) =   7.62 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.39   Tc(MIN.) =   11.81
  LONGEST FLOWPATH FROM NODE      2.10 TO NODE      2.30 =    2036.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.10 TO NODE      4.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   451.80
  ELEVATION DATA: UPSTREAM(FEET) =   6549.82  DOWNSTREAM(FEET) =   6358.84

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.673
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.418
  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
  ".4 DWELLING/ACRE"          D        2.86      0.21     0.900    91    6.67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =     10.89
  TOTAL AREA(ACRES) =      2.86   PEAK FLOW RATE(CFS) =     10.89

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   911.20
  ELEVATION DATA: UPSTREAM(FEET) =   7336.42  DOWNSTREAM(FEET) =   7060.88

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.446
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.653
```

```
  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
  ".4 DWELLING/ACRE"         D        6.53      0.21     0.900    91    9.45
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =     20.36
  TOTAL AREA(ACRES) =      6.53   PEAK FLOW RATE(CFS) =     20.36

****************************************************************************
  FLOW PROCESS FROM NODE      7.20 TO NODE      7.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.45
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.653
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D      102.45      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =  102.45      SUBAREA RUNOFF(CFS) =  319.38
  EFFECTIVE AREA(ACRES) =    108.98   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      109.0       PEAK FLOW RATE(CFS) =     339.74

****************************************************************************
  FLOW PROCESS FROM NODE      7.20 TO NODE      7.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   7060.88  DOWNSTREAM(FEET) =   6472.84
  CHANNEL LENGTH THRU SUBAREA(FEET) =  4642.50   CHANNEL SLOPE =  0.1267
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1194 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     339.74
  FLOW VELOCITY(FEET/SEC) =  13.48 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.74   Tc(MIN.) =   15.19
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      7.30 =    5553.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.30 TO NODE      7.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
```

```
  TIME OF CONCENTRATION(MIN.) =   15.19
  RAINFALL INTENSITY(INCH/HR) =   2.81
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =     108.98
  TOTAL STREAM AREA(ACRES) =     108.98
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     339.74

****************************************************************************
  FLOW PROCESS FROM NODE      3.10 TO NODE      3.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   570.40
  ELEVATION DATA: UPSTREAM(FEET) =   7022.75  DOWNSTREAM(FEET) =   6906.51

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.476
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.921
  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
  ".4 DWELLING/ACRE"         D        1.09      0.21     0.900    91    8.48
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      3.66
  TOTAL AREA(ACRES) =      1.09   PEAK FLOW RATE(CFS) =      3.66

****************************************************************************
  FLOW PROCESS FROM NODE      3.20 TO NODE      3.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.48
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.921
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D       32.62      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   32.62      SUBAREA RUNOFF(CFS) =  109.56
  EFFECTIVE AREA(ACRES) =     33.71   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       33.7       PEAK FLOW RATE(CFS) =     113.22

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

```
 FLOW PROCESS FROM NODE      3.20 TO NODE      3.30 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   6906.51  DOWNSTREAM(FEET) =   6598.45
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1309.60   CHANNEL SLOPE =  0.2352
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .1751 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =     113.22
 FLOW VELOCITY(FEET/SEC) =  11.32 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.93   Tc(MIN.) =   10.40
 LONGEST FLOWPATH FROM NODE      3.10 TO NODE      3.30 =    1880.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      3.30 TO NODE      3.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.40
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.445
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 ".4 DWELLING/ACRE"         D       51.85      0.21     0.900    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
 SUBAREA AREA(ACRES) =   51.85      SUBAREA RUNOFF(CFS) =  151.94
 EFFECTIVE AREA(ACRES) =     85.56   AREA-AVERAGED Fm(INCH/HR) =  0.19
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
 TOTAL AREA(ACRES) =       85.6       PEAK FLOW RATE(CFS) =     250.73

****************************************************************************
 FLOW PROCESS FROM NODE      3.30 TO NODE      7.30 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   6598.45  DOWNSTREAM(FEET) =   6472.84
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1872.50   CHANNEL SLOPE =  0.0671
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0671 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =     250.73
 FLOW VELOCITY(FEET/SEC) =   9.13 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   3.42   Tc(MIN.) =   13.82
 LONGEST FLOWPATH FROM NODE      3.10 TO NODE      7.30 =    3752.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.30 TO NODE      7.30 IS CODE =   1
----------------------------------------------------------------------------
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.82
  RAINFALL INTENSITY(INCH/HR) =   2.98
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =      85.56
  TOTAL STREAM AREA(ACRES) =      85.56
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     250.73

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      339.74   15.19    2.810  0.21( 0.19) 0.90     109.0       7.10
      2      250.73   13.82    2.980  0.21( 0.19) 0.90      85.6       3.10

  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      580.08   13.82    2.980  0.21( 0.19) 0.90     184.8       3.10
      2      575.14   15.19    2.810  0.21( 0.19) 0.90     194.5       7.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     580.08    Tc(MIN.) =    13.82
  EFFECTIVE AREA(ACRES) =     184.75   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      194.5
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      7.30 =    5553.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.30 TO NODE      7.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.82
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.980
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"          D       10.33      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   10.33      SUBAREA RUNOFF(CFS) =   25.95
```

```
  EFFECTIVE AREA(ACRES) =    195.08   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      204.9       PEAK FLOW RATE(CFS) =     580.08
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      7.30 TO NODE      7.40 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6472.84  DOWNSTREAM(FEET) =   6404.98
  CHANNEL LENGTH THRU SUBAREA(FEET) =   953.53   CHANNEL SLOPE =  0.0712
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0712 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     580.08
  FLOW VELOCITY(FEET/SEC) =  12.43 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.28   Tc(MIN.) =   15.10
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      7.40 =    6507.23 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.40 TO NODE      7.40 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE      8.10 TO NODE      8.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   584.70
  ELEVATION DATA: UPSTREAM(FEET) =   6760.02  DOWNSTREAM(FEET) =   6589.39

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.967
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.061
  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
  ".4 DWELLING/ACRE"          D        2.35      0.21     0.900    91    7.97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      8.19
  TOTAL AREA(ACRES) =      2.35   PEAK FLOW RATE(CFS) =      8.19

****************************************************************************
  FLOW PROCESS FROM NODE      8.20 TO NODE      8.20 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =    7.97
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.061
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D       16.79      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   16.79      SUBAREA RUNOFF(CFS) =   58.51
  EFFECTIVE AREA(ACRES) =     19.14   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       19.1       PEAK FLOW RATE(CFS) =      66.70

********************************************************************************
  FLOW PROCESS FROM NODE      8.20 TO NODE      8.30 IS CODE =  53
--------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6589.10  DOWNSTREAM(FEET) =   6472.97
  CHANNEL LENGTH THRU SUBAREA(FEET) =   897.40   CHANNEL SLOPE =  0.1294
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1213 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      66.70
  FLOW VELOCITY(FEET/SEC) =   7.90 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.89   Tc(MIN.) =    9.86
  LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.30 =    1482.10 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE      8.30 TO NODE      8.30 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.86
  RAINFALL INTENSITY(INCH/HR) =   3.54
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =      19.14
  TOTAL STREAM AREA(ACRES) =      19.14
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      66.70

********************************************************************************
  FLOW PROCESS FROM NODE      8.40 TO NODE      8.50 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   757.10
  ELEVATION DATA: UPSTREAM(FEET) =   6711.74  DOWNSTREAM(FEET) =   6532.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.206
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.719
  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
  ".4 DWELLING/ACRE"         D        1.30      0.21     0.900    91    9.21
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      4.13
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      4.13

****************************************************************************
  FLOW PROCESS FROM NODE      8.50 TO NODE      8.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.21
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.719
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D        1.43      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =    1.43      SUBAREA RUNOFF(CFS) =    4.54
  EFFECTIVE AREA(ACRES) =      2.73   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =        2.7       PEAK FLOW RATE(CFS) =       8.67

****************************************************************************
  FLOW PROCESS FROM NODE      8.50 TO NODE      8.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6532.00  DOWNSTREAM(FEET) =   6472.97
  CHANNEL LENGTH THRU SUBAREA(FEET) =   426.20   CHANNEL SLOPE =  0.1385
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1273 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       8.67
  FLOW VELOCITY(FEET/SEC) =   4.10 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.73   Tc(MIN.) =   10.94
  LONGEST FLOWPATH FROM NODE      8.40 TO NODE      8.30 =    1183.30 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      8.30 TO NODE      8.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.94
  RAINFALL INTENSITY(INCH/HR) =   3.37
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =       2.73
  TOTAL STREAM AREA(ACRES) =       2.73
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.67

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       66.70    9.86    3.539  0.21( 0.19) 0.90      19.1       8.10
      2        8.67   10.94    3.372  0.21( 0.19) 0.90       2.7       8.40

  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       74.93    9.86    3.539  0.21( 0.19) 0.90      21.6       8.10
      2       72.07   10.94    3.372  0.21( 0.19) 0.90      21.9       8.40

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      74.93    Tc(MIN.) =     9.86
  EFFECTIVE AREA(ACRES) =      21.60   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       21.9
  LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.30 =    1482.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.30 TO NODE      8.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.86
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.539
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
```

```
  ".4 DWELLING/ACRE"         D       21.66      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   21.66      SUBAREA RUNOFF(CFS) =   65.30
  EFFECTIVE AREA(ACRES) =     43.26   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       43.5       PEAK FLOW RATE(CFS) =     130.41

****************************************************************************
  FLOW PROCESS FROM NODE      8.30 TO NODE      7.40 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6472.97  DOWNSTREAM(FEET) =   6404.98
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1112.00   CHANNEL SLOPE =  0.0611
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0611 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     130.41
  FLOW VELOCITY(FEET/SEC) =   7.01 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.64   Tc(MIN.) =   12.50
  LONGEST FLOWPATH FROM NODE      8.10 TO NODE      7.40 =    2594.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.40 TO NODE      7.40 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      130.41   12.50    3.159  0.21( 0.19) 0.90      43.3       8.10
      2      124.72   13.62    3.008  0.21( 0.19) 0.90      43.5       8.40
  LONGEST FLOWPATH FROM NODE      8.10 TO NODE      7.40 =    2594.10 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      580.08   15.10    2.814  0.21( 0.19) 0.90     195.1       3.10
      2      575.14   16.47    2.738  0.21( 0.19) 0.90     204.9       7.10
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      7.40 =    6507.23 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      673.88   12.50    3.159  0.21( 0.19) 0.90     204.8       8.10
      2      686.45   13.62    3.008  0.21( 0.19) 0.90     219.5       8.40
      3      696.25   15.10    2.814  0.21( 0.19) 0.90     238.6       3.10
      4      687.92   16.47    2.738  0.21( 0.19) 0.90     248.4       7.10
    TOTAL AREA(ACRES) =       248.4
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      696.25  Tc(MIN.) =   15.101
  EFFECTIVE AREA(ACRES) =    238.61  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      248.4
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      7.40 =    6507.23 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.40 TO NODE      7.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.10
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.814
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D        6.63      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =    6.63      SUBAREA RUNOFF(CFS) =   15.67
  EFFECTIVE AREA(ACRES) =    245.24   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      255.0       PEAK FLOW RATE(CFS) =     696.25
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      7.40 TO NODE     17.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6404.98  DOWNSTREAM(FEET) =   6378.96
  CHANNEL LENGTH THRU SUBAREA(FEET) =   486.30   CHANNEL SLOPE =  0.0535
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0535 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     696.25
  FLOW VELOCITY(FEET/SEC) =  11.46 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.71   Tc(MIN.) =   15.81
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE     17.30 =    6993.53 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.30 TO NODE     17.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   15.81
```

```
  RAINFALL INTENSITY(INCH/HR) =   2.77
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =     245.24
  TOTAL STREAM AREA(ACRES) =     255.03
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     696.25

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     17.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   886.60
  ELEVATION DATA: UPSTREAM(FEET) =   6510.50  DOWNSTREAM(FEET) =   6452.98

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.607
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.145
  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                D        3.21      0.21     0.850    91   12.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      8.57
  TOTAL AREA(ACRES) =      3.21   PEAK FLOW RATE(CFS) =      8.57

****************************************************************************
  FLOW PROCESS FROM NODE     17.20 TO NODE     17.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.61
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.145
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                D        1.17      0.21     0.850    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    1.17      SUBAREA RUNOFF(CFS) =    3.12
  EFFECTIVE AREA(ACRES) =      4.38   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        4.4       PEAK FLOW RATE(CFS) =      11.70

****************************************************************************
  FLOW PROCESS FROM NODE     17.20 TO NODE     17.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
```

```
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6452.98  DOWNSTREAM(FEET) =   6378.96
  CHANNEL LENGTH THRU SUBAREA(FEET) =   393.20   CHANNEL SLOPE =  0.1883
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1541 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      11.70
  FLOW VELOCITY(FEET/SEC) =   4.99 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.31   Tc(MIN.) =   13.92
  LONGEST FLOWPATH FROM NODE     17.10 TO NODE     17.30 =    1279.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.30 TO NODE     17.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.92
  RAINFALL INTENSITY(INCH/HR) =   2.97
  AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.85
  EFFECTIVE STREAM AREA(ACRES) =       4.38
  TOTAL STREAM AREA(ACRES) =       4.38
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      11.70

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      673.88   13.22    3.062  0.21( 0.19) 0.90     211.4       8.10
      1      686.45   14.33    2.911  0.21( 0.19) 0.90     226.1       8.40
      1      696.25   15.81    2.775  0.21( 0.19) 0.90     245.2       3.10
      1      687.92   17.18    2.698  0.21( 0.19) 0.90     255.0       7.10
      2       11.70   13.92    2.967  0.21( 0.18) 0.85       4.4      17.10

  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      685.36   13.22    3.062  0.21( 0.19) 0.90     215.6       8.10
      2      693.51   13.92    2.967  0.21( 0.19) 0.90     225.1      17.10
      3      697.91   14.33    2.911  0.21( 0.19) 0.90     230.5       8.40
      4      707.14   15.81    2.775  0.21( 0.19) 0.90     249.6       3.10
      5      698.49   17.18    2.698  0.21( 0.19) 0.90     259.4       7.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     707.14    Tc(MIN.) =    15.81
```

```
  EFFECTIVE AREA(ACRES) =     249.62   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      259.4
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE     17.30 =    6993.53 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.30 TO NODE     17.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.81
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.775
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                 D        2.27      0.21     0.850    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    2.27      SUBAREA RUNOFF(CFS) =    5.30
  EFFECTIVE AREA(ACRES) =    251.89   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      261.7       PEAK FLOW RATE(CFS) =     707.14
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     17.30 TO NODE     17.40 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6378.96  DOWNSTREAM(FEET) =   6355.81
  CHANNEL LENGTH THRU SUBAREA(FEET) =   386.20   CHANNEL SLOPE =  0.0599
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0599 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     707.14
  FLOW VELOCITY(FEET/SEC) =  12.19 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.53   Tc(MIN.) =   16.34
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE     17.40 =    7379.73 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.40 TO NODE     17.40 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.34
  RAINFALL INTENSITY(INCH/HR) =   2.75
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
```

```
  EFFECTIVE STREAM AREA(ACRES) =     251.89
  TOTAL STREAM AREA(ACRES) =     261.68
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     707.14

****************************************************************************
  FLOW PROCESS FROM NODE      5.10 TO NODE      5.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   696.80
  ELEVATION DATA: UPSTREAM(FEET) =   6584.65  DOWNSTREAM(FEET) =   6467.32

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.539
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.627
  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
  ".4 DWELLING/ACRE"         D        3.31      0.21     0.900    91    9.54
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =     10.24
  TOTAL AREA(ACRES) =      3.31   PEAK FLOW RATE(CFS) =     10.24

****************************************************************************
  FLOW PROCESS FROM NODE      5.20 TO NODE      5.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.54
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.627
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D       13.33      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   13.33      SUBAREA RUNOFF(CFS) =   41.25
  EFFECTIVE AREA(ACRES) =     16.64   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       16.6       PEAK FLOW RATE(CFS) =      51.49

****************************************************************************
  FLOW PROCESS FROM NODE      5.20 TO NODE     17.40 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   6467.32  DOWNSTREAM(FEET) =   6355.81
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1035.00   CHANNEL SLOPE =  0.1077
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1058 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      51.49
  FLOW VELOCITY(FEET/SEC) =   6.77 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.55   Tc(MIN.) =   12.09
  LONGEST FLOWPATH FROM NODE      5.10 TO NODE     17.40 =    1731.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.40 TO NODE     17.40 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.) =   12.09
  RAINFALL INTENSITY(INCH/HR) =   3.22
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =      16.64
  TOTAL STREAM AREA(ACRES) =      16.64
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      51.49

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      685.36   13.75    2.990  0.21( 0.19) 0.90     217.9       8.10
      1      693.51   14.45    2.894  0.21( 0.19) 0.90     227.4      17.10
      1      697.91   14.86    2.839  0.21( 0.19) 0.90     232.8       8.40
      1      707.14   16.34    2.745  0.21( 0.19) 0.90     251.9       3.10
      1      698.49   17.71    2.668  0.21( 0.19) 0.90     261.7       7.10
      2       51.49   12.09    3.216  0.21( 0.19) 0.90      16.6       5.10

  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      702.58   12.09    3.216  0.21( 0.19) 0.90     208.1       5.10
      2      733.00   13.75    2.990  0.21( 0.19) 0.90     234.5       8.10
      3      739.53   14.45    2.894  0.21( 0.19) 0.90     244.0      17.10
      4      742.99   14.86    2.839  0.21( 0.19) 0.90     249.4       8.40
      5      750.62   16.34    2.745  0.21( 0.19) 0.90     268.5       3.10
      6      740.67   17.71    2.668  0.21( 0.19) 0.90     278.3       7.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     750.62    Tc(MIN.) =    16.34
```

```
  EFFECTIVE AREA(ACRES) =     268.53   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      278.3
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE     17.40 =    7379.73 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.40 TO NODE     17.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.34
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.745
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                 D        0.34      0.21     0.850    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.34      SUBAREA RUNOFF(CFS) =    0.79
  EFFECTIVE AREA(ACRES) =    268.87   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      278.7       PEAK FLOW RATE(CFS) =     750.62
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     17.40 TO NODE      6.20 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6355.81  DOWNSTREAM(FEET) =   6352.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   100.30   CHANNEL SLOPE =  0.0300
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0300 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     750.62
  FLOW VELOCITY(FEET/SEC) =   8.80 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.19   Tc(MIN.) =   16.53
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      6.20 =    7480.03 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.20 TO NODE      6.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.53
  RAINFALL INTENSITY(INCH/HR) =   2.73
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
```

```
  EFFECTIVE STREAM AREA(ACRES) =     268.87
  TOTAL STREAM AREA(ACRES) =     278.66
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     750.62

****************************************************************************
  FLOW PROCESS FROM NODE      6.10 TO NODE      6.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   236.40
  ELEVATION DATA: UPSTREAM(FEET) =   6435.22  DOWNSTREAM(FEET) =   6352.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.352
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.783
  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
  ".4 DWELLING/ACRE"         D        0.35      0.21     0.900    91    5.35
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      1.45
  TOTAL AREA(ACRES) =      0.35   PEAK FLOW RATE(CFS) =      1.45

****************************************************************************
  FLOW PROCESS FROM NODE      6.20 TO NODE      6.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.35
  RAINFALL INTENSITY(INCH/HR) =   4.78
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =       0.35
  TOTAL STREAM AREA(ACRES) =       0.35
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.45

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      702.58   12.28    3.190  0.21( 0.19) 0.90     208.5       5.10
      1      733.00   13.94    2.964  0.21( 0.19) 0.90     234.8       8.10
      1      739.53   14.64    2.868  0.21( 0.19) 0.90     244.3      17.10
      1      742.99   15.05    2.817  0.21( 0.19) 0.90     249.8       8.40
      1      750.62   16.53    2.735  0.21( 0.19) 0.90     268.9       3.10
```

```
     1      740.67   17.90    2.658  0.21( 0.19) 0.90     278.7       7.10
     2        1.45    5.35    4.783  0.21( 0.19) 0.90       0.3       6.10

  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      470.13    5.35    4.783  0.21( 0.19) 0.90      91.2       6.10
      2      703.53   12.28    3.190  0.21( 0.19) 0.90     208.8       5.10
      3      733.87   13.94    2.964  0.21( 0.19) 0.90     235.2       8.10
      4      740.37   14.64    2.868  0.21( 0.19) 0.90     244.7      17.10
      5      743.81   15.05    2.817  0.21( 0.19) 0.90     250.1       8.40
      6      751.42   16.53    2.735  0.21( 0.19) 0.90     269.2       3.10
      7      741.44   17.90    2.658  0.21( 0.19) 0.90     279.0       7.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     751.42    Tc(MIN.) =    16.53
  EFFECTIVE AREA(ACRES) =     269.22   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      279.0
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      6.20 =    7480.03 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.20 TO NODE      6.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.53
  *  10 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
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D        2.05      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =    2.05      SUBAREA RUNOFF(CFS) =    4.70
  EFFECTIVE AREA(ACRES) =    271.27   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      281.1       PEAK FLOW RATE(CFS) =     751.42
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      6.20 TO NODE      6.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6352.80  DOWNSTREAM(FEET) =   6334.97
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   138.70   CHANNEL SLOPE =  0.1285
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1207 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     751.42
  FLOW VELOCITY(FEET/SEC) =  17.65 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.13   Tc(MIN.) =   16.66
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      6.30 =    7618.73 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      9.10 TO NODE      9.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   392.70
  ELEVATION DATA: UPSTREAM(FEET) =   6647.05  DOWNSTREAM(FEET) =   6532.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.789
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.386
  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
  ".4 DWELLING/ACRE"          B        1.12      0.42     0.900    76    6.79
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      4.04
  TOTAL AREA(ACRES) =      1.12   PEAK FLOW RATE(CFS) =      4.04

****************************************************************************
  FLOW PROCESS FROM NODE      9.20 TO NODE      9.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.79
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.386
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"          B       15.78      0.42     0.900    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   15.78      SUBAREA RUNOFF(CFS) =   56.89
  EFFECTIVE AREA(ACRES) =     16.90   AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       16.9       PEAK FLOW RATE(CFS) =      60.93

****************************************************************************
  FLOW PROCESS FROM NODE      9.20 TO NODE      9.30 IS CODE =  53
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6532.00  DOWNSTREAM(FEET) =   6353.41
  CHANNEL LENGTH THRU SUBAREA(FEET) =   504.40   CHANNEL SLOPE =  0.3541
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2060 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      60.93
  FLOW VELOCITY(FEET/SEC) =   9.99 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.84   Tc(MIN.) =    7.63
  LONGEST FLOWPATH FROM NODE      9.10 TO NODE      9.30 =     897.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.10 TO NODE     10.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   553.80
  ELEVATION DATA: UPSTREAM(FEET) =   6650.00  DOWNSTREAM(FEET) =   6529.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.260
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.980
  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.)
  RESIDENTIAL
  ".4 DWELLING/ACRE"          B        3.88      0.42     0.900    76    8.26
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =     12.57
  TOTAL AREA(ACRES) =      3.88   PEAK FLOW RATE(CFS) =     12.57

****************************************************************************
  FLOW PROCESS FROM NODE     10.20 TO NODE     10.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.26
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.980
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"          B       14.92      0.42     0.900    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   14.92      SUBAREA RUNOFF(CFS) =   48.33
  EFFECTIVE AREA(ACRES) =     18.80   AREA-AVERAGED Fm(INCH/HR) =  0.38
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       18.8       PEAK FLOW RATE(CFS) =      60.90

****************************************************************************
  FLOW PROCESS FROM NODE     10.20 TO NODE     10.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6529.00  DOWNSTREAM(FEET) =   6335.41
  CHANNEL LENGTH THRU SUBAREA(FEET) =   445.30   CHANNEL SLOPE =  0.4347
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2182 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      60.90
  FLOW VELOCITY(FEET/SEC) =  10.28 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.72   Tc(MIN.) =    8.98
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     10.30 =     999.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     18.10 TO NODE     18.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   965.90
  ELEVATION DATA: UPSTREAM(FEET) =   6836.40  DOWNSTREAM(FEET) =   6643.42

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.505
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.431
  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
  ".4 DWELLING/ACRE"          D        6.56      0.21     0.900    91   10.50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =     19.14
  TOTAL AREA(ACRES) =      6.56   PEAK FLOW RATE(CFS) =     19.14

****************************************************************************
  FLOW PROCESS FROM NODE     18.20 TO NODE     18.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.431
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
```

```
  ".4 DWELLING/ACRE"         D       18.46      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   18.46      SUBAREA RUNOFF(CFS) =   53.87
  EFFECTIVE AREA(ACRES) =     25.02   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       25.0       PEAK FLOW RATE(CFS) =      73.01

****************************************************************************
  FLOW PROCESS FROM NODE     18.20 TO NODE     18.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6643.42  DOWNSTREAM(FEET) =   6483.82
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1375.10   CHANNEL SLOPE =  0.1161
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1120 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      73.01
  FLOW VELOCITY(FEET/SEC) =   7.82 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.93   Tc(MIN.) =   13.43
  LONGEST FLOWPATH FROM NODE     18.10 TO NODE     18.30 =    2341.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     18.30 TO NODE     19.30 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  6483.82  DOWNSTREAM(FEET) =  6474.00
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.94
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      73.01
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   13.52
  LONGEST FLOWPATH FROM NODE     18.10 TO NODE     19.30 =    2466.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     19.30 TO NODE     19.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.52
  RAINFALL INTENSITY(INCH/HR) =   3.02
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =      25.02
```

```
  TOTAL STREAM AREA(ACRES) =      25.02
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      73.01

****************************************************************************
  FLOW PROCESS FROM NODE     19.10 TO NODE     19.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   618.10
  ELEVATION DATA: UPSTREAM(FEET) =   6606.25  DOWNSTREAM(FEET) =   6550.33

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.915
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.523
  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.)
  RESIDENTIAL
  "1 DWELLING/ACRE"          D        1.90      0.21     0.800    91    9.92
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA RUNOFF(CFS) =      5.74
  TOTAL AREA(ACRES) =      1.90   PEAK FLOW RATE(CFS) =      5.74

****************************************************************************
  FLOW PROCESS FROM NODE     19.20 TO NODE     19.30 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 6550.33  DOWNSTREAM ELEVATION(FEET) = 6474.00
  STREET LENGTH(FEET) =   839.90   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 15.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      16.00
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.42
    HALFSTREET FLOOD WIDTH(FEET) =   14.26
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.96
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.32
  STREET FLOW TRAVEL TIME(MIN.) =   1.76   Tc(MIN.) =   11.67
```

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 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.273
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "1 DWELLING/ACRE"          D        7.34      0.21     0.800    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
 SUBAREA AREA(ACRES) =    7.34      SUBAREA RUNOFF(CFS) =   20.51
 EFFECTIVE AREA(ACRES) =      9.24    AREA-AVERAGED Fm(INCH/HR) =  0.17
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.80
 TOTAL AREA(ACRES) =        9.2        PEAK FLOW RATE(CFS) =      25.82

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  15.00
 FLOW VELOCITY(FEET/SEC.) =  8.14   DEPTH*VELOCITY(FT*FT/SEC.) =   3.51
 LONGEST FLOWPATH FROM NODE     19.10 TO NODE     19.30 =    1458.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     19.30 TO NODE     19.30 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   11.67
 RAINFALL INTENSITY(INCH/HR) =   3.27
 AREA-AVERAGED Fm(INCH/HR) =  0.17
 AREA-AVERAGED Fp(INCH/HR) =  0.21
 AREA-AVERAGED Ap =  0.80
 EFFECTIVE STREAM AREA(ACRES) =       9.24
 TOTAL STREAM AREA(ACRES) =       9.24
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      25.82

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       73.01   13.52    3.021  0.21( 0.19) 0.90      25.0      18.10
     2       25.82   11.67    3.273  0.21( 0.17) 0.80       9.2      19.10

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       94.44   11.67    3.273  0.21( 0.18) 0.87      30.8      19.10
     2       96.74   13.52    3.021  0.21( 0.18) 0.87      34.3      18.10

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
```

```
  PEAK FLOW RATE(CFS) =      96.74    Tc(MIN.) =    13.52
  EFFECTIVE AREA(ACRES) =      34.26   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.87
  TOTAL AREA(ACRES) =       34.3
  LONGEST FLOWPATH FROM NODE     18.10 TO NODE     19.30 =    2466.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     19.30 TO NODE     19.30 IS CODE =  82
----------------------------------------------------------------------------
  >>>>>ADD SUBAREA RUNOFF TO MAINLINE, AT MAINLINE Tc,<<<<<
  >>>>>(AND COMPUTE INITIAL SUBAREA RUNOFF)<<<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    68.50
  ELEVATION DATA: UPSTREAM(FEET) =   6474.00  DOWNSTREAM(FEET) =   6454.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.880
  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
  "1 DWELLING/ACRE"          D        1.29      0.21     0.800    91    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA AREA(ACRES) =    1.29   INITIAL SUBAREA RUNOFF(CFS) =    5.47

  ** ADD SUBAREA RUNOFF TO MAINLINE AT MAINLINE Tc:
  MAINLINE Tc(MIN.) =   13.52
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.021
  SUBAREA AREA(ACRES) =    1.29      SUBAREA RUNOFF(CFS) =    3.31
  EFFECTIVE AREA(ACRES) =     35.55   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.87
  TOTAL AREA(ACRES) =       35.5       PEAK FLOW RATE(CFS) =      96.74
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     19.30 TO NODE     19.40 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6474.00  DOWNSTREAM(FEET) =   6454.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    68.50   CHANNEL SLOPE =  0.2920
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1930 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      96.74
  FLOW VELOCITY(FEET/SEC) =  11.28 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.10   Tc(MIN.) =   13.62
  LONGEST FLOWPATH FROM NODE     18.10 TO NODE     19.40 =    2534.50 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     19.40 TO NODE     12.40 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  6454.00  DOWNSTREAM(FEET) =  6429.97
  FLOW LENGTH(FEET) =   133.80   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  35.36
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      96.74
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   13.69
  LONGEST FLOWPATH FROM NODE     18.10 TO NODE     12.40 =    2668.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.40 TO NODE     12.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.69
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.999
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "1 DWELLING/ACRE"          D        2.79      0.21     0.800    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA AREA(ACRES) =    2.79      SUBAREA RUNOFF(CFS) =    7.11
  EFFECTIVE AREA(ACRES) =     38.34   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.87
  TOTAL AREA(ACRES) =       38.3       PEAK FLOW RATE(CFS) =      97.21

****************************************************************************
  FLOW PROCESS FROM NODE     12.40 TO NODE     12.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6429.97  DOWNSTREAM(FEET) =   6411.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   543.90   CHANNEL SLOPE =  0.0347
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0347 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      97.21
  FLOW VELOCITY(FEET/SEC) =   4.79 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.89   Tc(MIN.) =   15.58
  LONGEST FLOWPATH FROM NODE     18.10 TO NODE     12.30 =    3212.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.30 TO NODE     12.30 IS CODE =   1
```

```
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   15.58
  RAINFALL INTENSITY(INCH/HR) =   2.79
  AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.87
  EFFECTIVE STREAM AREA(ACRES) =      38.34
  TOTAL STREAM AREA(ACRES) =      38.34
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      97.21

****************************************************************************
  FLOW PROCESS FROM NODE     12.10 TO NODE     12.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   999.10
  ELEVATION DATA: UPSTREAM(FEET) =   6594.43  DOWNSTREAM(FEET) =   6485.16

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.567
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.287
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "1 DWELLING/ACRE"          D        4.19      0.21     0.800    91   11.57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA RUNOFF(CFS) =     11.76
  TOTAL AREA(ACRES) =      4.19   PEAK FLOW RATE(CFS) =     11.76

****************************************************************************
  FLOW PROCESS FROM NODE     12.20 TO NODE     12.30 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 6485.16  DOWNSTREAM ELEVATION(FEET) = 6411.10
  STREET LENGTH(FEET) =  1028.70   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 15.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
```

```
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      21.03
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.43   FLOOD WIDTH(FEET) =   15.00
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    7.25
    SPLIT DEPTH(FEET) =    0.32   SPLIT FLOOD WIDTH(FEET) =    8.87
    SPLIT FLOW(CFS) =    5.06   SPLIT VELOCITY(FEET/SEC.) =    5.64
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.43
    HALFSTREET FLOOD WIDTH(FEET) =   15.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.25
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.12
  STREET FLOW TRAVEL TIME(MIN.) =   2.37   Tc(MIN.) =   13.93
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.965
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "1 DWELLING/ACRE"          D        7.36      0.21     0.800    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA AREA(ACRES) =    7.36      SUBAREA RUNOFF(CFS) =   18.53
  EFFECTIVE AREA(ACRES) =     11.55    AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.80
  TOTAL AREA(ACRES) =       11.6        PEAK FLOW RATE(CFS) =      29.08

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  15.00
  FLOW VELOCITY(FEET/SEC.) =  7.25   DEPTH*VELOCITY(FT*FT/SEC.) =   3.12
  LONGEST FLOWPATH FROM NODE     12.10 TO NODE     12.30 =    2027.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.30 TO NODE     12.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.93
  RAINFALL INTENSITY(INCH/HR) =   2.97
  AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.80
  EFFECTIVE STREAM AREA(ACRES) =      11.55
  TOTAL STREAM AREA(ACRES) =      11.55
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      29.08
```

```
 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       96.45   13.74    2.992  0.21( 0.18) 0.86      34.9      19.10
     1       97.21   15.58    2.788  0.21( 0.18) 0.87      38.3      18.10
     2       29.08   13.93    2.965  0.21( 0.17) 0.80      11.6      12.10

 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      125.39   13.74    2.992  0.21( 0.18) 0.85      46.3      19.10
     2      125.61   13.93    2.965  0.21( 0.18) 0.85      46.8      12.10
     3      124.44   15.58    2.788  0.21( 0.18) 0.85      49.9      18.10

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     125.61    Tc(MIN.) =    13.93
 EFFECTIVE AREA(ACRES) =      46.83   AREA-AVERAGED Fm(INCH/HR) =  0.18
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =       49.9
 LONGEST FLOWPATH FROM NODE     18.10 TO NODE     12.30 =    3212.20 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.30 TO NODE     12.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.93
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.965
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "1 DWELLING/ACRE"          D        4.30      0.21     0.800    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
 SUBAREA AREA(ACRES) =    4.30      SUBAREA RUNOFF(CFS) =   10.82
 EFFECTIVE AREA(ACRES) =     51.13   AREA-AVERAGED Fm(INCH/HR) =  0.18
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.84
 TOTAL AREA(ACRES) =       54.2       PEAK FLOW RATE(CFS) =     128.31

****************************************************************************
 FLOW PROCESS FROM NODE     12.30 TO NODE     11.40 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   6411.10  DOWNSTREAM(FEET) =   6371.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   651.10   CHANNEL SLOPE =  0.0616
```

```
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0616 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     128.31
  FLOW VELOCITY(FEET/SEC) =   7.00 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.55   Tc(MIN.) =   15.48
  LONGEST FLOWPATH FROM NODE     18.10 TO NODE     11.40 =    3863.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.40 TO NODE     11.40 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.) =   15.48
  RAINFALL INTENSITY(INCH/HR) =   2.79
  AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.84
  EFFECTIVE STREAM AREA(ACRES) =      51.13
  TOTAL STREAM AREA(ACRES) =      54.19
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     128.31

****************************************************************************
  FLOW PROCESS FROM NODE     11.10 TO NODE     11.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   991.60
  ELEVATION DATA: UPSTREAM(FEET) =   6651.16  DOWNSTREAM(FEET) =   6565.95

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.567
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.151
  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
  ".4 DWELLING/ACRE"          B        1.36      0.42     0.900    76   12.57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      3.39
  TOTAL AREA(ACRES) =      1.36   PEAK FLOW RATE(CFS) =      3.39

****************************************************************************
  FLOW PROCESS FROM NODE     11.20 TO NODE     11.30 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
```

```
 UPSTREAM ELEVATION(FEET) = 6565.95  DOWNSTREAM ELEVATION(FEET) = 6546.53
 STREET LENGTH(FEET) =   251.20   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 15.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.88
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.33
   HALFSTREET FLOOD WIDTH(FEET) =    9.41
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.97
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.97
 STREET FLOW TRAVEL TIME(MIN.) =   0.70   Tc(MIN.) =   13.27
 *  10 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
 ".4 DWELLING/ACRE"         B        2.07      0.42     0.900    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
 SUBAREA AREA(ACRES) =    2.07      SUBAREA RUNOFF(CFS) =    4.98
 EFFECTIVE AREA(ACRES) =      3.43    AREA-AVERAGED Fm(INCH/HR) =  0.38
 AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.90
 TOTAL AREA(ACRES) =        3.4        PEAK FLOW RATE(CFS) =       8.26

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  11.05
 FLOW VELOCITY(FEET/SEC.) =  6.43   DEPTH*VELOCITY(FT*FT/SEC.) =   2.31
 LONGEST FLOWPATH FROM NODE     11.10 TO NODE     11.30 =    1242.80 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     11.30 TO NODE     11.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.27
 *  10 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
 ".4 DWELLING/ACRE"         B       19.22      0.42     0.900    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   19.22      SUBAREA RUNOFF(CFS) =   46.27
  EFFECTIVE AREA(ACRES) =     22.65   AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       22.6       PEAK FLOW RATE(CFS) =      54.53

****************************************************************************
  FLOW PROCESS FROM NODE     11.30 TO NODE     11.40 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6546.53  DOWNSTREAM(FEET) =   6371.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1325.20   CHANNEL SLOPE =  0.1325
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1233 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      54.53
  FLOW VELOCITY(FEET/SEC) =   7.45 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.97   Tc(MIN.) =   16.23
  LONGEST FLOWPATH FROM NODE     11.10 TO NODE     11.40 =    2568.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.40 TO NODE     11.40 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.) =   16.23
  RAINFALL INTENSITY(INCH/HR) =   2.75
  AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.42
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =      22.65
  TOTAL STREAM AREA(ACRES) =      22.65
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      54.53

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      128.21   15.29    2.804  0.21( 0.18) 0.84      50.6      19.10
      1      128.31   15.48    2.793  0.21( 0.18) 0.84      51.1      12.10
      1      127.29   17.13    2.701  0.21( 0.18) 0.85      54.2      18.10
      2       54.53   16.23    2.751  0.42( 0.38) 0.90      22.6      11.10

  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      180.70   15.29    2.804  0.28( 0.24) 0.86      71.9      19.10
      2      181.24   15.48    2.793  0.28( 0.24) 0.86      72.7      12.10
      3      182.37   16.23    2.751  0.28( 0.24) 0.86      75.2      11.10
      4      180.66   17.13    2.701  0.28( 0.24) 0.86      76.8      18.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     182.37    Tc(MIN.) =    16.23
  EFFECTIVE AREA(ACRES) =      75.18   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =       76.8
  LONGEST FLOWPATH FROM NODE     18.10 TO NODE     11.40 =    3863.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.40 TO NODE     11.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.23
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D        0.19      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    0.44
  EFFECTIVE AREA(ACRES) =     75.37   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =       77.0       PEAK FLOW RATE(CFS) =     182.37
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     11.40 TO NODE     13.20 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6371.00  DOWNSTREAM(FEET) =   6369.35
  CHANNEL LENGTH THRU SUBAREA(FEET) =    54.80   CHANNEL SLOPE =  0.0301
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0301 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     182.37
  FLOW VELOCITY(FEET/SEC) =   5.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.17   Tc(MIN.) =   16.40
  LONGEST FLOWPATH FROM NODE     18.10 TO NODE     13.20 =    3918.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.20 TO NODE     13.20 IS CODE =   1
----------------------------------------------------------------------------
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.40
  RAINFALL INTENSITY(INCH/HR) =   2.74
  AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.28
  AREA-AVERAGED Ap =  0.86
  EFFECTIVE STREAM AREA(ACRES) =      75.37
  TOTAL STREAM AREA(ACRES) =      77.03
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     182.37

****************************************************************************
  FLOW PROCESS FROM NODE     13.10 TO NODE     13.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   852.50
  ELEVATION DATA: UPSTREAM(FEET) =   6506.32  DOWNSTREAM(FEET) =   6369.35

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.438
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.440
  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
  ".4 DWELLING/ACRE"          D        4.74      0.21     0.900    91   10.44
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =     13.87
  TOTAL AREA(ACRES) =      4.74   PEAK FLOW RATE(CFS) =     13.87

****************************************************************************
  FLOW PROCESS FROM NODE     13.20 TO NODE     13.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.44
  RAINFALL INTENSITY(INCH/HR) =   3.44
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =       4.74
  TOTAL STREAM AREA(ACRES) =       4.74
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      13.87
```

```
  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      180.70   15.45    2.795  0.28( 0.24) 0.86      72.1      19.10
      1      181.24   15.65    2.784  0.28( 0.24) 0.86      72.9      12.10
      1      182.37   16.40    2.742  0.28( 0.24) 0.86      75.4      11.10
      1      180.66   17.30    2.691  0.28( 0.24) 0.86      77.0      18.10
      2       13.87   10.44    3.440  0.21( 0.19) 0.90       4.7      13.10

  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      166.75   10.44    3.440  0.27( 0.23) 0.86      53.5      13.10
      2      191.82   15.45    2.795  0.27( 0.23) 0.86      76.9      19.10
      3      192.31   15.65    2.784  0.27( 0.23) 0.86      77.7      12.10
      4      193.26   16.40    2.742  0.27( 0.24) 0.86      80.1      11.10
      5      191.33   17.30    2.691  0.27( 0.23) 0.86      81.8      18.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     193.26    Tc(MIN.) =    16.40
  EFFECTIVE AREA(ACRES) =      80.11   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =       81.8
  LONGEST FLOWPATH FROM NODE     18.10 TO NODE     13.20 =    3918.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.20 TO NODE     13.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.40
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.742
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D        0.86      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =    0.86      SUBAREA RUNOFF(CFS) =    1.98
  EFFECTIVE AREA(ACRES) =     80.97   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =       82.6       PEAK FLOW RATE(CFS) =     193.26
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     13.20 TO NODE     13.30 IS CODE =  53
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6369.35  DOWNSTREAM(FEET) =   6363.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   107.90   CHANNEL SLOPE =  0.0570
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0570 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     193.26
  FLOW VELOCITY(FEET/SEC) =   7.72 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.23   Tc(MIN.) =   16.63
  LONGEST FLOWPATH FROM NODE     18.10 TO NODE     13.30 =    4026.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.10 TO NODE     14.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   671.10
  ELEVATION DATA: UPSTREAM(FEET) =   6509.56  DOWNSTREAM(FEET) =   6270.66

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.090
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.027
  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
  ".4 DWELLING/ACRE"          D        4.08      0.21     0.900    91    8.09
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =     14.09
  TOTAL AREA(ACRES) =      4.08   PEAK FLOW RATE(CFS) =     14.09

****************************************************************************
  FLOW PROCESS FROM NODE     15.10 TO NODE     15.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   195.50
  ELEVATION DATA: UPSTREAM(FEET) =   6527.52  DOWNSTREAM(FEET) =   6502.01

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.988
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.607
  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                 D        0.35      0.21     0.850    91    5.99
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      1.40
  TOTAL AREA(ACRES) =      0.35   PEAK FLOW RATE(CFS) =      1.40

****************************************************************************
  FLOW PROCESS FROM NODE     15.20 TO NODE     15.30 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 6502.01  DOWNSTREAM ELEVATION(FEET) = 6460.41
  STREET LENGTH(FEET) =   646.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 15.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.26
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   11.52
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.99
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.20
  STREET FLOW TRAVEL TIME(MIN.) =   1.80   Tc(MIN.) =    7.79
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.111
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                D        3.87      0.21     0.850    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    3.87      SUBAREA RUNOFF(CFS) =   13.70
  EFFECTIVE AREA(ACRES) =      4.22    AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        4.2        PEAK FLOW RATE(CFS) =      14.94

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  14.96
  FLOW VELOCITY(FEET/SEC.) =  6.81   DEPTH*VELOCITY(FT*FT/SEC.) =   2.93
  LONGEST FLOWPATH FROM NODE     15.10 TO NODE     15.30 =     841.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.30 TO NODE     15.30 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.79
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.111
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                D        8.68      0.21     0.850    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    8.68      SUBAREA RUNOFF(CFS) =   30.72
  EFFECTIVE AREA(ACRES) =     12.90   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =       12.9       PEAK FLOW RATE(CFS) =      45.65

****************************************************************************
  FLOW PROCESS FROM NODE     15.30 TO NODE     15.40 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6460.41  DOWNSTREAM(FEET) =   6275.97
  CHANNEL LENGTH THRU SUBAREA(FEET) =   551.20   CHANNEL SLOPE =  0.3346
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2026 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      45.65
  FLOW VELOCITY(FEET/SEC) =   9.00 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.02   Tc(MIN.) =    8.81
  LONGEST FLOWPATH FROM NODE     15.10 TO NODE     15.40 =    1392.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     16.10 TO NODE     16.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   322.00
  ELEVATION DATA: UPSTREAM(FEET) =   6532.31  DOWNSTREAM(FEET) =   6490.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.361
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  4.228
  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
  ".4 DWELLING/ACRE"         D        0.86      0.21     0.900    91    7.36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      3.13
  TOTAL AREA(ACRES) =      0.86   PEAK FLOW RATE(CFS) =      3.13
```

```
===============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.9  TC(MIN.) =      7.36
  EFFECTIVE AREA(ACRES) =      0.86  AREA-AVERAGED Fm(INCH/HR)=  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap = 0.900
  PEAK FLOW RATE(CFS)   =       3.13
===============================================================================
===============================================================================
  END OF RATIONAL METHOD ANALYSIS
```



Proposed 100-year

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        (c) Copyright 1983-2011 Advanced Engineering Software (aes)
            Ver. 18.0  Release Date: 07/01/2011  License ID 1499

                          Analysis prepared by:
```

Kimley-Horn

```
 ************************* DESCRIPTION OF STUDY *************************
* Hume SoCal                                                            *
* Proposed 100 year - 24 hours Conditions                               *
* San Bernardino County, CA                                             *
 ************************************************************************

  FILE NAME: HUMEPR.DAT
  TIME/DATE OF STUDY: 07:19 01/31/2024
==========================================================================
  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 TABLED RAINFALL USED*
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)    5.00;  8.030
   2)   10.00;  5.750
   3)   15.00;  4.640
   4)   30.00;  3.260
   5)   60.00;  2.300
   6)  120.00;  1.740
   7)  180.00;  1.510
   8)  360.00;  1.190
   9)  720.00;  0.881
  *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   15.0     10.0    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      1.10 TO NODE      1.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   291.50
  ELEVATION DATA: UPSTREAM(FEET) =   6652.19  DOWNSTREAM(FEET) =   6591.92

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.461
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  7.364
  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
  ".4 DWELLING/ACRE"         D        1.39      0.21     0.900    91    6.46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      8.98
  TOTAL AREA(ACRES) =      1.39   PEAK FLOW RATE(CFS) =      8.98

****************************************************************************
  FLOW PROCESS FROM NODE      1.20 TO NODE      1.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.46
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  7.364
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D        4.74      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =    4.74      SUBAREA RUNOFF(CFS) =   30.61
  EFFECTIVE AREA(ACRES) =      6.13   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =        6.1       PEAK FLOW RATE(CFS) =      39.58

****************************************************************************
  FLOW PROCESS FROM NODE      1.20 TO NODE      1.30 IS CODE =  53
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6591.92  DOWNSTREAM(FEET) =   6414.01
  CHANNEL LENGTH THRU SUBAREA(FEET) =   619.40   CHANNEL SLOPE =  0.2872
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1918 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      39.58
  FLOW VELOCITY(FEET/SEC) =   8.35 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.24   Tc(MIN.) =    7.70
  LONGEST FLOWPATH FROM NODE      1.10 TO NODE      1.30 =     910.90 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      2.10 TO NODE      2.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   487.50
  ELEVATION DATA: UPSTREAM(FEET) =   6694.25  DOWNSTREAM(FEET) =   6619.24

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.420
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.471
  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
  ".4 DWELLING/ACRE"         D        1.63      0.21     0.900    91    8.42
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      9.22
  TOTAL AREA(ACRES) =      1.63   PEAK FLOW RATE(CFS) =      9.22

****************************************************************************
  FLOW PROCESS FROM NODE      2.20 TO NODE      2.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =    8.42
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.471
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D       12.76      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   12.76      SUBAREA RUNOFF(CFS) =   72.14
  EFFECTIVE AREA(ACRES) =     14.39   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
```

```
  TOTAL AREA(ACRES) =       14.4       PEAK FLOW RATE(CFS) =      81.35

****************************************************************************
  FLOW PROCESS FROM NODE      2.20 TO NODE      2.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6619.24  DOWNSTREAM(FEET) =   6372.85
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1548.50   CHANNEL SLOPE =  0.1591
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1396 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      81.35
  FLOW VELOCITY(FEET/SEC) =   9.05 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.85   Tc(MIN.) =   11.27
  LONGEST FLOWPATH FROM NODE      2.10 TO NODE      2.30 =    2036.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.10 TO NODE      4.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   451.80
  ELEVATION DATA: UPSTREAM(FEET) =   6549.82  DOWNSTREAM(FEET) =   6358.84

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.673
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  7.267
  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
  ".4 DWELLING/ACRE"         D        2.86      0.21     0.900    91    6.67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =     18.22
  TOTAL AREA(ACRES) =      2.86   PEAK FLOW RATE(CFS) =     18.22

****************************************************************************
  FLOW PROCESS FROM NODE      7.10 TO NODE      7.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   911.20
  ELEVATION DATA: UPSTREAM(FEET) =   7336.42  DOWNSTREAM(FEET) =   7060.88

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.446
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.003
```

```
  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.)
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D        6.53      0.21      0.900    91    9.45
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =     34.17
  TOTAL AREA(ACRES) =      6.53   PEAK FLOW RATE(CFS) =     34.17

****************************************************************************
  FLOW PROCESS FROM NODE      7.20 TO NODE      7.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.45
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.003
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D      102.45      0.21      0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =  102.45      SUBAREA RUNOFF(CFS) =  536.03
  EFFECTIVE AREA(ACRES) =    108.98   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      109.0       PEAK FLOW RATE(CFS) =     570.20

****************************************************************************
  FLOW PROCESS FROM NODE      7.20 TO NODE      7.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   7060.88  DOWNSTREAM(FEET) =   6472.84
  CHANNEL LENGTH THRU SUBAREA(FEET) =  4642.50   CHANNEL SLOPE =  0.1267
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1194 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     570.20
  FLOW VELOCITY(FEET/SEC) =  16.01 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.83   Tc(MIN.) =   14.28
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      7.30 =    5553.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.30 TO NODE      7.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
```

```
  TIME OF CONCENTRATION(MIN.) =   14.28
  RAINFALL INTENSITY(INCH/HR) =   4.80
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =     108.98
  TOTAL STREAM AREA(ACRES) =     108.98
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     570.20

****************************************************************************
  FLOW PROCESS FROM NODE      3.10 TO NODE      3.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   570.40
  ELEVATION DATA: UPSTREAM(FEET) =   7022.75  DOWNSTREAM(FEET) =   6906.51

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.476
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.445
  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
  ".4 DWELLING/ACRE"         D        1.09      0.21     0.900    91    8.48
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      6.14
  TOTAL AREA(ACRES) =      1.09   PEAK FLOW RATE(CFS) =      6.14

****************************************************************************
  FLOW PROCESS FROM NODE      3.20 TO NODE      3.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.48
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.445
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D       32.62      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   32.62      SUBAREA RUNOFF(CFS) =  183.67
  EFFECTIVE AREA(ACRES) =     33.71   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       33.7       PEAK FLOW RATE(CFS) =     189.81

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

```
 FLOW PROCESS FROM NODE      3.20 TO NODE      3.30 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   6906.51  DOWNSTREAM(FEET) =   6598.45
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1309.60   CHANNEL SLOPE =  0.2352
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .1751 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =     189.81
 FLOW VELOCITY(FEET/SEC) =  13.44 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.62   Tc(MIN.) =   10.10
 LONGEST FLOWPATH FROM NODE      3.10 TO NODE      3.30 =    1880.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      3.30 TO NODE      3.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.10
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.728
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 ".4 DWELLING/ACRE"         D       51.85      0.21     0.900    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
 SUBAREA AREA(ACRES) =   51.85      SUBAREA RUNOFF(CFS) =  258.48
 EFFECTIVE AREA(ACRES) =     85.56   AREA-AVERAGED Fm(INCH/HR) =  0.19
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
 TOTAL AREA(ACRES) =       85.6       PEAK FLOW RATE(CFS) =     426.52

****************************************************************************
 FLOW PROCESS FROM NODE      3.30 TO NODE      7.30 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   6598.45  DOWNSTREAM(FEET) =   6472.84
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1872.50   CHANNEL SLOPE =  0.0671
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0671 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =     426.52
 FLOW VELOCITY(FEET/SEC) =  10.90 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.86   Tc(MIN.) =   12.96
 LONGEST FLOWPATH FROM NODE      3.10 TO NODE      7.30 =    3752.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.30 TO NODE      7.30 IS CODE =   1
----------------------------------------------------------------------------
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.96
  RAINFALL INTENSITY(INCH/HR) =   5.09
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =      85.56
  TOTAL STREAM AREA(ACRES) =      85.56
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     426.52

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      570.20   14.28    4.800  0.21( 0.19) 0.90     109.0       7.10
      2      426.52   12.96    5.092  0.21( 0.19) 0.90      85.6       3.10

  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      976.99   12.96    5.092  0.21( 0.19) 0.90     184.5       3.10
      2      971.34   14.28    4.800  0.21( 0.19) 0.90     194.5       7.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     976.99    Tc(MIN.) =    12.96
  EFFECTIVE AREA(ACRES) =     184.51   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      194.5
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      7.30 =    5553.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.30 TO NODE      7.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.96
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.092
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"          D       10.33      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   10.33      SUBAREA RUNOFF(CFS) =   45.58
```

```
  EFFECTIVE AREA(ACRES) =    194.84   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      204.9       PEAK FLOW RATE(CFS) =     976.99
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      7.30 TO NODE      7.40 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6472.84  DOWNSTREAM(FEET) =   6404.98
  CHANNEL LENGTH THRU SUBAREA(FEET) =   953.53   CHANNEL SLOPE =  0.0712
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0712 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     976.99
  FLOW VELOCITY(FEET/SEC) =  14.79 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.07   Tc(MIN.) =   14.04
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      7.40 =    6507.23 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.40 TO NODE      7.40 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE      8.10 TO NODE      8.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   584.70
  ELEVATION DATA: UPSTREAM(FEET) =   6760.02  DOWNSTREAM(FEET) =   6589.39

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.967
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.677
  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
  ".4 DWELLING/ACRE"          D        2.35      0.21     0.900    91    7.97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =     13.72
  TOTAL AREA(ACRES) =      2.35   PEAK FLOW RATE(CFS) =     13.72

****************************************************************************
  FLOW PROCESS FROM NODE      8.20 TO NODE      8.20 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =    7.97
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.677
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D       16.79      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   16.79      SUBAREA RUNOFF(CFS) =   98.04
  EFFECTIVE AREA(ACRES) =     19.14   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       19.1       PEAK FLOW RATE(CFS) =     111.77

********************************************************************************
  FLOW PROCESS FROM NODE      8.20 TO NODE      8.30 IS CODE =  53
--------------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6589.10  DOWNSTREAM(FEET) =   6472.97
  CHANNEL LENGTH THRU SUBAREA(FEET) =   897.40   CHANNEL SLOPE =  0.1294
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1213 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     111.77
  FLOW VELOCITY(FEET/SEC) =   9.38 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.59   Tc(MIN.) =    9.56
  LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.30 =    1482.10 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE      8.30 TO NODE      8.30 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.56
  RAINFALL INTENSITY(INCH/HR) =   5.95
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =      19.14
  TOTAL STREAM AREA(ACRES) =      19.14
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     111.77

********************************************************************************
  FLOW PROCESS FROM NODE      8.40 TO NODE      8.50 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   757.10
  ELEVATION DATA: UPSTREAM(FEET) =   6711.74  DOWNSTREAM(FEET) =   6532.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.206
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.112
  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
  ".4 DWELLING/ACRE"         D        1.30      0.21     0.900    91    9.21
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      6.93
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      6.93

****************************************************************************
  FLOW PROCESS FROM NODE      8.50 TO NODE      8.50 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.21
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.112
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D        1.43      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =    1.43      SUBAREA RUNOFF(CFS) =    7.62
  EFFECTIVE AREA(ACRES) =      2.73   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =        2.7       PEAK FLOW RATE(CFS) =      14.55

****************************************************************************
  FLOW PROCESS FROM NODE      8.50 TO NODE      8.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6532.00  DOWNSTREAM(FEET) =   6472.97
  CHANNEL LENGTH THRU SUBAREA(FEET) =   426.20   CHANNEL SLOPE =  0.1385
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1273 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      14.55
  FLOW VELOCITY(FEET/SEC) =   4.87 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.46   Tc(MIN.) =   10.66
  LONGEST FLOWPATH FROM NODE      8.40 TO NODE      8.30 =    1183.30 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      8.30 TO NODE      8.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.66
  RAINFALL INTENSITY(INCH/HR) =   5.60
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =       2.73
  TOTAL STREAM AREA(ACRES) =       2.73
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      14.55

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      111.77    9.56    5.950  0.21( 0.19) 0.90      19.1       8.10
      2       14.55   10.66    5.603  0.21( 0.19) 0.90       2.7       8.40

  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      125.65    9.56    5.950  0.21( 0.19) 0.90      21.6       8.10
      2      119.58   10.66    5.603  0.21( 0.19) 0.90      21.9       8.40

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     125.65    Tc(MIN.) =     9.56
  EFFECTIVE AREA(ACRES) =      21.59   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       21.9
  LONGEST FLOWPATH FROM NODE      8.10 TO NODE      8.30 =    1482.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.30 TO NODE      8.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.56
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.950
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
```

```
  ".4 DWELLING/ACRE"         D       21.66      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   21.66      SUBAREA RUNOFF(CFS) =  112.31
  EFFECTIVE AREA(ACRES) =     43.25   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       43.5       PEAK FLOW RATE(CFS) =     224.24

****************************************************************************
  FLOW PROCESS FROM NODE      8.30 TO NODE      7.40 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6472.97  DOWNSTREAM(FEET) =   6404.98
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1112.00   CHANNEL SLOPE =  0.0611
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0611 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     224.24
  FLOW VELOCITY(FEET/SEC) =   8.40 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.21   Tc(MIN.) =   11.77
  LONGEST FLOWPATH FROM NODE      8.10 TO NODE      7.40 =    2594.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.40 TO NODE      7.40 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      224.24   11.77    5.357  0.21( 0.19) 0.90      43.2       8.10
      2      212.09   12.91    5.104  0.21( 0.19) 0.90      43.5       8.40
  LONGEST FLOWPATH FROM NODE      8.10 TO NODE      7.40 =    2594.10 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      976.99   14.04    4.854  0.21( 0.19) 0.90     194.8       3.10
      2      971.34   15.35    4.607  0.21( 0.19) 0.90     204.9       7.10
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      7.40 =    6507.23 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1131.74   11.77    5.357  0.21( 0.19) 0.90     206.6       8.10
      2     1158.88   12.91    5.104  0.21( 0.19) 0.90     222.7       8.40
      3     1178.30   14.04    4.854  0.21( 0.19) 0.90     238.4       3.10
      4     1162.02   15.35    4.607  0.21( 0.19) 0.90     248.4       7.10
    TOTAL AREA(ACRES) =       248.4
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     1178.30  Tc(MIN.) =   14.038
  EFFECTIVE AREA(ACRES) =    238.37  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      248.4
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      7.40 =    6507.23 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.40 TO NODE      7.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.04
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.854
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D        6.63      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =    6.63      SUBAREA RUNOFF(CFS) =   27.83
  EFFECTIVE AREA(ACRES) =    245.00   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      255.0       PEAK FLOW RATE(CFS) =    1178.30
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      7.40 TO NODE     17.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6404.98  DOWNSTREAM(FEET) =   6378.96
  CHANNEL LENGTH THRU SUBAREA(FEET) =   486.30   CHANNEL SLOPE =  0.0535
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0535 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    1178.30
  FLOW VELOCITY(FEET/SEC) =  13.65 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.59   Tc(MIN.) =   14.63
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE     17.30 =    6993.53 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.30 TO NODE     17.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.63
```

```
  RAINFALL INTENSITY(INCH/HR) =   4.72
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =     245.00
  TOTAL STREAM AREA(ACRES) =     255.03
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    1178.30

****************************************************************************
  FLOW PROCESS FROM NODE     17.10 TO NODE     17.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   886.60
  ELEVATION DATA: UPSTREAM(FEET) =   6510.50  DOWNSTREAM(FEET) =   6452.98

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.607
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.171
  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                D        3.21      0.21     0.850    91   12.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =     14.42
  TOTAL AREA(ACRES) =      3.21   PEAK FLOW RATE(CFS) =     14.42

****************************************************************************
  FLOW PROCESS FROM NODE     17.20 TO NODE     17.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.61
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.171
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                D        1.17      0.21     0.850    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    1.17      SUBAREA RUNOFF(CFS) =    5.26
  EFFECTIVE AREA(ACRES) =      4.38   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        4.4       PEAK FLOW RATE(CFS) =      19.68

****************************************************************************
  FLOW PROCESS FROM NODE     17.20 TO NODE     17.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
```

```
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6452.98  DOWNSTREAM(FEET) =   6378.96
  CHANNEL LENGTH THRU SUBAREA(FEET) =   393.20   CHANNEL SLOPE =  0.1883
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1541 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      19.68
  FLOW VELOCITY(FEET/SEC) =   5.93 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.11   Tc(MIN.) =   13.71
  LONGEST FLOWPATH FROM NODE     17.10 TO NODE     17.30 =    1279.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.30 TO NODE     17.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.71
  RAINFALL INTENSITY(INCH/HR) =   4.93
  AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.85
  EFFECTIVE STREAM AREA(ACRES) =       4.38
  TOTAL STREAM AREA(ACRES) =       4.38
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      19.68

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1131.74   12.37    5.224  0.21( 0.19) 0.90     213.2       8.10
      1     1158.88   13.51    4.971  0.21( 0.19) 0.90     229.4       8.40
      1     1178.30   14.63    4.722  0.21( 0.19) 0.90     245.0       3.10
      1     1162.02   15.95    4.553  0.21( 0.19) 0.90     255.0       7.10
      2       19.68   13.71    4.926  0.21( 0.18) 0.85       4.4      17.10

  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     1150.61   12.37    5.224  0.21( 0.19) 0.90     217.2       8.10
      2     1178.45   13.51    4.971  0.21( 0.19) 0.90     233.7       8.40
      3     1182.07   13.71    4.926  0.21( 0.19) 0.90     236.6      17.10
      4     1197.13   14.63    4.722  0.21( 0.19) 0.90     249.4       3.10
      5     1180.16   15.95    4.553  0.21( 0.19) 0.90     259.4       7.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    1197.13    Tc(MIN.) =    14.63
```

```
  EFFECTIVE AREA(ACRES) =     249.38   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      259.4
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE     17.30 =    6993.53 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.30 TO NODE     17.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.63
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.722
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                D        2.27      0.21     0.850    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    2.27      SUBAREA RUNOFF(CFS) =    9.28
  EFFECTIVE AREA(ACRES) =    251.65   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      261.7       PEAK FLOW RATE(CFS) =    1197.13
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     17.30 TO NODE     17.40 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6378.96  DOWNSTREAM(FEET) =   6355.81
  CHANNEL LENGTH THRU SUBAREA(FEET) =   386.20   CHANNEL SLOPE =  0.0599
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0599 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    1197.13
  FLOW VELOCITY(FEET/SEC) =  14.52 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.44   Tc(MIN.) =   15.07
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE     17.40 =    7379.73 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.40 TO NODE     17.40 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) =   4.63
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
```

```
  EFFECTIVE STREAM AREA(ACRES) =     251.65
  TOTAL STREAM AREA(ACRES) =     261.68
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    1197.13

****************************************************************************
  FLOW PROCESS FROM NODE      5.10 TO NODE      5.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   696.80
  ELEVATION DATA: UPSTREAM(FEET) =   6584.65  DOWNSTREAM(FEET) =   6467.32

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.539
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.960
  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
  ".4 DWELLING/ACRE"         D        3.31      0.21     0.900    91    9.54
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =     17.19
  TOTAL AREA(ACRES) =      3.31   PEAK FLOW RATE(CFS) =     17.19

****************************************************************************
  FLOW PROCESS FROM NODE      5.20 TO NODE      5.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.54
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.960
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D       13.33      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   13.33      SUBAREA RUNOFF(CFS) =   69.24
  EFFECTIVE AREA(ACRES) =     16.64   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       16.6       PEAK FLOW RATE(CFS) =      86.43

****************************************************************************
  FLOW PROCESS FROM NODE      5.20 TO NODE     17.40 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   6467.32  DOWNSTREAM(FEET) =   6355.81
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1035.00   CHANNEL SLOPE =  0.1077
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1058 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      86.43
  FLOW VELOCITY(FEET/SEC) =   8.04 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.15   Tc(MIN.) =   11.68
  LONGEST FLOWPATH FROM NODE      5.10 TO NODE     17.40 =    1731.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.40 TO NODE     17.40 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.) =   11.68
  RAINFALL INTENSITY(INCH/HR) =   5.38
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =      16.64
  TOTAL STREAM AREA(ACRES) =      16.64
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      86.43

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1150.61   12.82    5.124  0.21( 0.19) 0.90     219.4       8.10
      1     1178.45   13.95    4.872  0.21( 0.19) 0.90     236.0       8.40
      1     1182.07   14.16    4.827  0.21( 0.19) 0.90     238.9      17.10
      1     1197.13   15.07    4.633  0.21( 0.19) 0.90     251.6       3.10
      1     1180.16   16.40    4.512  0.21( 0.19) 0.90     261.7       7.10
      2       86.43   11.68    5.376  0.21( 0.19) 0.90      16.6       5.10

  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     1188.71   11.68    5.376  0.21( 0.19) 0.90     216.6       5.10
      2     1232.84   12.82    5.124  0.21( 0.19) 0.90     236.1       8.10
      3     1256.48   13.95    4.872  0.21( 0.19) 0.90     252.6       8.40
      4     1259.35   14.16    4.827  0.21( 0.19) 0.90     255.5      17.10
      5     1271.18   15.07    4.633  0.21( 0.19) 0.90     268.3       3.10
      6     1252.18   16.40    4.512  0.21( 0.19) 0.90     278.3       7.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    1271.18    Tc(MIN.) =    15.07
```

```
  EFFECTIVE AREA(ACRES) =     268.29   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      278.3
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE     17.40 =    7379.73 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     17.40 TO NODE     17.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.07
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.633
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                 D        0.34      0.21     0.850    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    0.34      SUBAREA RUNOFF(CFS) =    1.36
  EFFECTIVE AREA(ACRES) =    268.63   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      278.7       PEAK FLOW RATE(CFS) =    1271.18
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     17.40 TO NODE      6.20 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6355.81  DOWNSTREAM(FEET) =   6352.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   100.30   CHANNEL SLOPE =  0.0300
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0300 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    1271.18
  FLOW VELOCITY(FEET/SEC) =  10.48 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.16   Tc(MIN.) =   15.23
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      6.20 =    7480.03 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.20 TO NODE      6.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   15.23
  RAINFALL INTENSITY(INCH/HR) =   4.62
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
```

```
  EFFECTIVE STREAM AREA(ACRES) =     268.63
  TOTAL STREAM AREA(ACRES) =     278.66
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    1271.18

****************************************************************************
  FLOW PROCESS FROM NODE      6.10 TO NODE      6.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   236.40
  ELEVATION DATA: UPSTREAM(FEET) =   6435.22  DOWNSTREAM(FEET) =   6352.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.352
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  7.870
  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
  ".4 DWELLING/ACRE"         D        0.35      0.21     0.900    91    5.35
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      2.42
  TOTAL AREA(ACRES) =      0.35   PEAK FLOW RATE(CFS) =      2.42

****************************************************************************
  FLOW PROCESS FROM NODE      6.20 TO NODE      6.20 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.35
  RAINFALL INTENSITY(INCH/HR) =   7.87
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =       0.35
  TOTAL STREAM AREA(ACRES) =       0.35
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.42

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1     1188.71   11.85    5.340  0.21( 0.19) 0.90     217.0       5.10
      1     1232.84   12.98    5.088  0.21( 0.19) 0.90     236.4       8.10
      1     1256.48   14.11    4.837  0.21( 0.19) 0.90     252.9       8.40
      1     1259.35   14.32    4.792  0.21( 0.19) 0.90     255.8      17.10
      1     1271.18   15.23    4.618  0.21( 0.19) 0.90     268.6       3.10
```

```
     1     1252.18   16.56    4.497  0.21( 0.19) 0.90     278.7       7.10
     2        2.42    5.35    7.870  0.21( 0.19) 0.90       0.3       6.10

  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      803.11    5.35    7.870  0.21( 0.19) 0.90      98.4       6.10
      2     1190.33   11.85    5.340  0.21( 0.19) 0.90     217.3       5.10
      3     1234.39   12.98    5.088  0.21( 0.19) 0.90     236.8       8.10
      4     1257.95   14.11    4.837  0.21( 0.19) 0.90     253.3       8.40
      5     1260.80   14.32    4.792  0.21( 0.19) 0.90     256.2      17.10
      6     1272.58   15.23    4.618  0.21( 0.19) 0.90     269.0       3.10
      7     1253.54   16.56    4.497  0.21( 0.19) 0.90     279.0       7.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    1272.58    Tc(MIN.) =    15.23
  EFFECTIVE AREA(ACRES) =     268.98   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      279.0
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      6.20 =    7480.03 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.20 TO NODE      6.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.23
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.618
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D        2.05      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =    2.05      SUBAREA RUNOFF(CFS) =    8.17
  EFFECTIVE AREA(ACRES) =    271.03   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =      281.1       PEAK FLOW RATE(CFS) =    1272.58
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      6.20 TO NODE      6.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6352.80  DOWNSTREAM(FEET) =   6334.97
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   138.70   CHANNEL SLOPE =  0.1285
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1207 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =    1272.58
  FLOW VELOCITY(FEET/SEC) =  21.03 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.11   Tc(MIN.) =   15.34
  LONGEST FLOWPATH FROM NODE      7.10 TO NODE      6.30 =    7618.73 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      9.10 TO NODE      9.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   392.70
  ELEVATION DATA: UPSTREAM(FEET) =   6647.05  DOWNSTREAM(FEET) =   6532.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.789
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  7.214
  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
  ".4 DWELLING/ACRE"          B        1.12      0.42     0.900    76    6.79
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      6.89
  TOTAL AREA(ACRES) =      1.12   PEAK FLOW RATE(CFS) =      6.89

****************************************************************************
  FLOW PROCESS FROM NODE      9.20 TO NODE      9.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.79
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  7.214
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"          B       15.78      0.42     0.900    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   15.78      SUBAREA RUNOFF(CFS) =   97.05
  EFFECTIVE AREA(ACRES) =     16.90   AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       16.9       PEAK FLOW RATE(CFS) =     103.94

****************************************************************************
  FLOW PROCESS FROM NODE      9.20 TO NODE      9.30 IS CODE =  53
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6532.00  DOWNSTREAM(FEET) =   6353.41
  CHANNEL LENGTH THRU SUBAREA(FEET) =   504.40   CHANNEL SLOPE =  0.3541
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2060 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     103.94
  FLOW VELOCITY(FEET/SEC) =  11.93 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.70   Tc(MIN.) =    7.49
  LONGEST FLOWPATH FROM NODE      9.10 TO NODE      9.30 =     897.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     10.10 TO NODE     10.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   553.80
  ELEVATION DATA: UPSTREAM(FEET) =   6650.00  DOWNSTREAM(FEET) =   6529.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.260
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.543
  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.)
  RESIDENTIAL
  ".4 DWELLING/ACRE"          B        3.88      0.42     0.900    76    8.26
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =     21.52
  TOTAL AREA(ACRES) =      3.88   PEAK FLOW RATE(CFS) =     21.52

****************************************************************************
  FLOW PROCESS FROM NODE     10.20 TO NODE     10.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.26
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.543
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"          B       14.92      0.42     0.900    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   14.92      SUBAREA RUNOFF(CFS) =   82.75
  EFFECTIVE AREA(ACRES) =     18.80   AREA-AVERAGED Fm(INCH/HR) =  0.38
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       18.8       PEAK FLOW RATE(CFS) =     104.27

****************************************************************************
  FLOW PROCESS FROM NODE     10.20 TO NODE     10.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6529.00  DOWNSTREAM(FEET) =   6335.41
  CHANNEL LENGTH THRU SUBAREA(FEET) =   445.30   CHANNEL SLOPE =  0.4347
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2182 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     104.27
  FLOW VELOCITY(FEET/SEC) =  12.29 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.60   Tc(MIN.) =    8.86
  LONGEST FLOWPATH FROM NODE     10.10 TO NODE     10.30 =     999.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     18.10 TO NODE     18.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   965.90
  ELEVATION DATA: UPSTREAM(FEET) =   6836.40  DOWNSTREAM(FEET) =   6643.42

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.505
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.638
  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
  ".4 DWELLING/ACRE"          D        6.56      0.21     0.900    91   10.50
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =     32.17
  TOTAL AREA(ACRES) =      6.56   PEAK FLOW RATE(CFS) =     32.17

****************************************************************************
  FLOW PROCESS FROM NODE     18.20 TO NODE     18.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.638
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
```

```
  ".4 DWELLING/ACRE"         D       18.46      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   18.46      SUBAREA RUNOFF(CFS) =   90.53
  EFFECTIVE AREA(ACRES) =     25.02   AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       25.0       PEAK FLOW RATE(CFS) =     122.70

****************************************************************************
  FLOW PROCESS FROM NODE     18.20 TO NODE     18.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6643.42  DOWNSTREAM(FEET) =   6483.82
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1375.10   CHANNEL SLOPE =  0.1161
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1120 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     122.70
  FLOW VELOCITY(FEET/SEC) =   9.30 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.46   Tc(MIN.) =   12.97
  LONGEST FLOWPATH FROM NODE     18.10 TO NODE     18.30 =    2341.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     18.30 TO NODE     19.30 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  6483.82  DOWNSTREAM(FEET) =  6474.00
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  27.30
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     122.70
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   13.05
  LONGEST FLOWPATH FROM NODE     18.10 TO NODE     19.30 =    2466.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     19.30 TO NODE     19.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.05
  RAINFALL INTENSITY(INCH/HR) =   5.07
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =      25.02
```

```
  TOTAL STREAM AREA(ACRES) =      25.02
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     122.70

****************************************************************************
  FLOW PROCESS FROM NODE     19.10 TO NODE     19.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   618.10
  ELEVATION DATA: UPSTREAM(FEET) =   6606.25  DOWNSTREAM(FEET) =   6550.33

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.915
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.789
  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
  "1 DWELLING/ACRE"          D        1.90      0.21     0.800    91    9.92
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA RUNOFF(CFS) =      9.61
  TOTAL AREA(ACRES) =      1.90   PEAK FLOW RATE(CFS) =      9.61

****************************************************************************
  FLOW PROCESS FROM NODE     19.20 TO NODE     19.30 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 6550.33  DOWNSTREAM ELEVATION(FEET) = 6474.00
  STREET LENGTH(FEET) =   839.90   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 15.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      26.85
    ***STREET FLOW SPLITS OVER STREET-CROWN***
    FULL DEPTH(FEET) =    0.43   FLOOD WIDTH(FEET) =   15.00
    FULL HALF-STREET VELOCITY(FEET/SEC.) =    8.14
    SPLIT DEPTH(FEET) =    0.36   SPLIT FLOOD WIDTH(FEET) =   11.05
    SPLIT FLOW(CFS) =    8.91   SPLIT VELOCITY(FEET/SEC.) =    6.93
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
```

```
    STREET FLOW DEPTH(FEET) =  0.43
    HALFSTREET FLOOD WIDTH(FEET) =   15.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    8.14
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.51
  STREET FLOW TRAVEL TIME(MIN.) =   1.72   Tc(MIN.) =   11.63
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.387
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "1 DWELLING/ACRE"          D        7.34      0.21     0.800    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA AREA(ACRES) =    7.34      SUBAREA RUNOFF(CFS) =   34.48
  EFFECTIVE AREA(ACRES) =      9.24    AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.80
  TOTAL AREA(ACRES) =        9.2        PEAK FLOW RATE(CFS) =      43.40

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  15.00
  FLOW VELOCITY(FEET/SEC.) =  8.79   DEPTH*VELOCITY(FT*FT/SEC.) =   3.94
  LONGEST FLOWPATH FROM NODE     19.10 TO NODE     19.30 =    1458.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     19.30 TO NODE     19.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.63
  RAINFALL INTENSITY(INCH/HR) =   5.39
  AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.80
  EFFECTIVE STREAM AREA(ACRES) =       9.24
  TOTAL STREAM AREA(ACRES) =       9.24
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      43.40

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      122.70   13.05    5.074  0.21( 0.19) 0.90      25.0      18.10
      2       43.40   11.63    5.387  0.21( 0.17) 0.80       9.2      19.10

  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      159.85   11.63    5.387  0.21( 0.18) 0.87      31.6      19.10
    2      163.50   13.05    5.074  0.21( 0.18) 0.87      34.3      18.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     163.50    Tc(MIN.) =    13.05
  EFFECTIVE AREA(ACRES) =      34.26   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.87
  TOTAL AREA(ACRES) =       34.3
  LONGEST FLOWPATH FROM NODE     18.10 TO NODE     19.30 =    2466.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     19.30 TO NODE     19.30 IS CODE =  82
----------------------------------------------------------------------------
  >>>>>ADD SUBAREA RUNOFF TO MAINLINE, AT MAINLINE Tc,<<<<<
  >>>>>(AND COMPUTE INITIAL SUBAREA RUNOFF)<<<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    68.50
  ELEVATION DATA: UPSTREAM(FEET) =   6474.00  DOWNSTREAM(FEET) =   6454.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  8.030
  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
  "1 DWELLING/ACRE"          D        1.29      0.21     0.800    91    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA AREA(ACRES) =    1.29   INITIAL SUBAREA RUNOFF(CFS) =    9.13

  ** ADD SUBAREA RUNOFF TO MAINLINE AT MAINLINE Tc:
  MAINLINE Tc(MIN.) =   13.05
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.074
  SUBAREA AREA(ACRES) =    1.29      SUBAREA RUNOFF(CFS) =    5.70
  EFFECTIVE AREA(ACRES) =     35.55   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.87
  TOTAL AREA(ACRES) =       35.5       PEAK FLOW RATE(CFS) =     163.50
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     19.30 TO NODE     19.40 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6474.00  DOWNSTREAM(FEET) =   6454.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    68.50   CHANNEL SLOPE =  0.2920
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1930 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
  CHANNEL FLOW THRU SUBAREA(CFS) =     163.50
  FLOW VELOCITY(FEET/SEC) =  13.43 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.09   Tc(MIN.) =   13.13
  LONGEST FLOWPATH FROM NODE     18.10 TO NODE     19.40 =    2534.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     19.40 TO NODE     12.40 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  6454.00  DOWNSTREAM(FEET) =  6429.97
  FLOW LENGTH(FEET) =   133.80   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  39.31
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     163.50
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   13.19
  LONGEST FLOWPATH FROM NODE     18.10 TO NODE     12.40 =    2668.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.40 TO NODE     12.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.19
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.042
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "1 DWELLING/ACRE"          D        2.79      0.21     0.800    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA AREA(ACRES) =    2.79      SUBAREA RUNOFF(CFS) =   12.24
  EFFECTIVE AREA(ACRES) =     38.34   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.87
  TOTAL AREA(ACRES) =       38.3       PEAK FLOW RATE(CFS) =     167.72

****************************************************************************
  FLOW PROCESS FROM NODE     12.40 TO NODE     12.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6429.97  DOWNSTREAM(FEET) =   6411.10
  CHANNEL LENGTH THRU SUBAREA(FEET) =   543.90   CHANNEL SLOPE =  0.0347
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0347 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     167.72
  FLOW VELOCITY(FEET/SEC) =   5.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
  TRAVEL TIME(MIN.) =   1.58   Tc(MIN.) =   14.77
  LONGEST FLOWPATH FROM NODE     18.10 TO NODE     12.30 =    3212.20 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.30 TO NODE     12.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.77
  RAINFALL INTENSITY(INCH/HR) =   4.69
  AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.87
  EFFECTIVE STREAM AREA(ACRES) =      38.34
  TOTAL STREAM AREA(ACRES) =      38.34
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     167.72

****************************************************************************
  FLOW PROCESS FROM NODE     12.10 TO NODE     12.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   999.10
  ELEVATION DATA: UPSTREAM(FEET) =   6594.43  DOWNSTREAM(FEET) =   6485.16

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.567
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.402
  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
  "1 DWELLING/ACRE"          D        4.19      0.21     0.800    91   11.57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA RUNOFF(CFS) =     19.74
  TOTAL AREA(ACRES) =      4.19   PEAK FLOW RATE(CFS) =     19.74

****************************************************************************
  FLOW PROCESS FROM NODE     12.20 TO NODE     12.30 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 6485.16  DOWNSTREAM ELEVATION(FEET) = 6411.10
  STREET LENGTH(FEET) =  1028.70   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 15.00
```

```
  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      35.43
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.44
    HALFSTREET FLOOD WIDTH(FEET) =   15.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.57
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.33
  STREET FLOW TRAVEL TIME(MIN.) =   2.26   Tc(MIN.) =   13.83
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.899
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "1 DWELLING/ACRE"          D        7.36      0.21     0.800    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
  SUBAREA AREA(ACRES) =    7.36      SUBAREA RUNOFF(CFS) =   31.34
  EFFECTIVE AREA(ACRES) =     11.55    AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.80
  TOTAL AREA(ACRES) =       11.6        PEAK FLOW RATE(CFS) =      49.18

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.47   HALFSTREET FLOOD WIDTH(FEET) =  15.00
  FLOW VELOCITY(FEET/SEC.) =  8.62   DEPTH*VELOCITY(FT*FT/SEC.) =   4.08
  LONGEST FLOWPATH FROM NODE     12.10 TO NODE     12.30 =    2027.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.30 TO NODE     12.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.83
  RAINFALL INTENSITY(INCH/HR) =   4.90
  AREA-AVERAGED Fm(INCH/HR) =  0.17
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.80
  EFFECTIVE STREAM AREA(ACRES) =      11.55
  TOTAL STREAM AREA(ACRES) =      11.55
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      49.18
```

```
 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      165.94   13.36    5.004  0.21( 0.18) 0.86      35.6      19.10
     1      167.72   14.77    4.692  0.21( 0.18) 0.87      38.3      18.10
     2       49.18   13.83    4.899  0.21( 0.17) 0.80      11.6      12.10

 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      214.50   13.36    5.004  0.21( 0.18) 0.85      46.8      19.10
     2      215.72   13.83    4.899  0.21( 0.18) 0.85      48.1      12.10
     3      214.75   14.77    4.692  0.21( 0.18) 0.85      49.9      18.10

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     215.72    Tc(MIN.) =    13.83
 EFFECTIVE AREA(ACRES) =      48.09   AREA-AVERAGED Fm(INCH/HR) =  0.18
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.85
 TOTAL AREA(ACRES) =       49.9
 LONGEST FLOWPATH FROM NODE     18.10 TO NODE     12.30 =    3212.20 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.30 TO NODE     12.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   13.83
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.899
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "1 DWELLING/ACRE"          D        4.30      0.21     0.800    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.800
 SUBAREA AREA(ACRES) =    4.30      SUBAREA RUNOFF(CFS) =   18.31
 EFFECTIVE AREA(ACRES) =     52.39   AREA-AVERAGED Fm(INCH/HR) =  0.18
 AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.84
 TOTAL AREA(ACRES) =       54.2       PEAK FLOW RATE(CFS) =     222.65

****************************************************************************
 FLOW PROCESS FROM NODE     12.30 TO NODE     11.40 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   6411.10  DOWNSTREAM(FEET) =   6371.00
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   651.10   CHANNEL SLOPE =  0.0616
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0616 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     222.65
  FLOW VELOCITY(FEET/SEC) =   8.41 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.29   Tc(MIN.) =   15.12
  LONGEST FLOWPATH FROM NODE     18.10 TO NODE     11.40 =    3863.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.40 TO NODE     11.40 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.) =   15.12
  RAINFALL INTENSITY(INCH/HR) =   4.63
  AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.84
  EFFECTIVE STREAM AREA(ACRES) =      52.39
  TOTAL STREAM AREA(ACRES) =      54.19
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     222.65

****************************************************************************
  FLOW PROCESS FROM NODE     11.10 TO NODE     11.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   991.60
  ELEVATION DATA: UPSTREAM(FEET) =   6651.16  DOWNSTREAM(FEET) =   6565.95

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.567
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.180
  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
  ".4 DWELLING/ACRE"          B        1.36      0.42     0.900    76   12.57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      5.87
  TOTAL AREA(ACRES) =      1.36   PEAK FLOW RATE(CFS) =      5.87

****************************************************************************
  FLOW PROCESS FROM NODE     11.20 TO NODE     11.30 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
```

```
==========================================================================
  UPSTREAM ELEVATION(FEET) = 6565.95  DOWNSTREAM ELEVATION(FEET) = 6546.53
  STREET LENGTH(FEET) =   251.20   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 15.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.22
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   12.15
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.76
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.56
  STREET FLOW TRAVEL TIME(MIN.) =   0.62   Tc(MIN.) =   13.19
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.043
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         B        2.07      0.42     0.900    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =    2.07      SUBAREA RUNOFF(CFS) =    8.69
  EFFECTIVE AREA(ACRES) =      3.43    AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =        3.4        PEAK FLOW RATE(CFS) =      14.39

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  14.10
  FLOW VELOCITY(FEET/SEC.) =  7.31   DEPTH*VELOCITY(FT*FT/SEC.) =   3.03
  LONGEST FLOWPATH FROM NODE     11.10 TO NODE     11.30 =    1242.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.30 TO NODE     11.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.19
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.043
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         B       19.22      0.42     0.900    76
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =   19.22      SUBAREA RUNOFF(CFS) =   80.64
  EFFECTIVE AREA(ACRES) =     22.65   AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.90
  TOTAL AREA(ACRES) =       22.6       PEAK FLOW RATE(CFS) =      95.03

****************************************************************************
  FLOW PROCESS FROM NODE     11.30 TO NODE     11.40 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6546.53  DOWNSTREAM(FEET) =   6371.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1325.20   CHANNEL SLOPE =  0.1325
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1233 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      95.03
  FLOW VELOCITY(FEET/SEC) =   8.96 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.47   Tc(MIN.) =   15.65
  LONGEST FLOWPATH FROM NODE     11.10 TO NODE     11.40 =    2568.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.40 TO NODE     11.40 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   15.65
  RAINFALL INTENSITY(INCH/HR) =   4.58
  AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.42
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =      22.65
  TOTAL STREAM AREA(ACRES) =      22.65
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      95.03

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      221.94   14.65    4.717  0.21( 0.18) 0.84      51.1      19.10
      1      222.65   15.12    4.629  0.21( 0.18) 0.84      52.4      12.10
      1      220.17   16.06    4.542  0.21( 0.18) 0.85      54.2      18.10
      2       95.03   15.65    4.580  0.42( 0.38) 0.90      22.6      11.10

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

  ** PEAK FLOW RATE TABLE **
```

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	313.81	14.65	4.717	0.28(0.24)	0.86	72.3	19.10
2	315.54	15.12	4.629	0.28(0.24)	0.86	74.3	12.10
3	316.28	15.65	4.580	0.28(0.24)	0.86	76.1	11.10
4	314.35	16.06	4.542	0.28(0.24)	0.86	76.8	18.10

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     316.28    Tc(MIN.) =    15.65
  EFFECTIVE AREA(ACRES) =      76.05   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =       76.8
  LONGEST FLOWPATH FROM NODE     18.10 TO NODE     11.40 =    3863.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.40 TO NODE     11.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.65
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.580
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D        0.19      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =    0.19      SUBAREA RUNOFF(CFS) =    0.75
  EFFECTIVE AREA(ACRES) =     76.24   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =       77.0       PEAK FLOW RATE(CFS) =     316.28
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     11.40 TO NODE     13.20 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6371.00  DOWNSTREAM(FEET) =   6369.35
  CHANNEL LENGTH THRU SUBAREA(FEET) =    54.80   CHANNEL SLOPE =  0.0301
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0301 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     316.28
  FLOW VELOCITY(FEET/SEC) =   6.61 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.14   Tc(MIN.) =   15.79
  LONGEST FLOWPATH FROM NODE     18.10 TO NODE     13.20 =    3918.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.20 TO NODE     13.20 IS CODE =   1
```

```
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   15.79
  RAINFALL INTENSITY(INCH/HR) =   4.57
  AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.28
  AREA-AVERAGED Ap =  0.86
  EFFECTIVE STREAM AREA(ACRES) =      76.24
  TOTAL STREAM AREA(ACRES) =      77.03
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     316.28

************************************************************************
  FLOW PROCESS FROM NODE     13.10 TO NODE     13.20 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   852.50
  ELEVATION DATA: UPSTREAM(FEET) =   6506.32  DOWNSTREAM(FEET) =   6369.35

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.438
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.653
  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
  ".4 DWELLING/ACRE"         D        4.74      0.21     0.900    91   10.44
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =     23.31
  TOTAL AREA(ACRES) =      4.74   PEAK FLOW RATE(CFS) =     23.31

************************************************************************
  FLOW PROCESS FROM NODE     13.20 TO NODE     13.20 IS CODE =   1
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.44
  RAINFALL INTENSITY(INCH/HR) =   5.65
  AREA-AVERAGED Fm(INCH/HR) =  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21
  AREA-AVERAGED Ap =  0.90
  EFFECTIVE STREAM AREA(ACRES) =       4.74
  TOTAL STREAM AREA(ACRES) =       4.74
```

```
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      23.31

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      313.81   14.79    4.686  0.28( 0.24) 0.86      72.5      19.10
      1      315.54   15.26    4.616  0.28( 0.24) 0.86      74.5      12.10
      1      316.28   15.79    4.567  0.28( 0.24) 0.86      76.2      11.10
      1      314.35   16.20    4.530  0.28( 0.24) 0.86      77.0      18.10
      2       23.31   10.44    5.653  0.21( 0.19) 0.90       4.7      13.10

  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      292.86   10.44    5.653  0.27( 0.23) 0.86      55.9      13.10
      2      332.99   14.79    4.686  0.27( 0.23) 0.86      77.2      19.10
      3      334.42   15.26    4.616  0.27( 0.23) 0.86      79.2      12.10
      4      334.96   15.79    4.567  0.27( 0.24) 0.86      81.0      11.10
      5      332.86   16.20    4.530  0.27( 0.23) 0.86      81.8      18.10

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     334.96    Tc(MIN.) =    15.79
  EFFECTIVE AREA(ACRES) =      80.98   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =       81.8
  LONGEST FLOWPATH FROM NODE     18.10 TO NODE     13.20 =    3918.10 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.20 TO NODE     13.20 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.79
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.567
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  ".4 DWELLING/ACRE"         D        0.86      0.21     0.900    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA AREA(ACRES) =    0.86      SUBAREA RUNOFF(CFS) =    3.39
  EFFECTIVE AREA(ACRES) =     81.84   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =       82.6       PEAK FLOW RATE(CFS) =     334.96
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

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

```
  FLOW PROCESS FROM NODE     13.20 TO NODE     13.30 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6369.35  DOWNSTREAM(FEET) =   6363.20
  CHANNEL LENGTH THRU SUBAREA(FEET) =   107.90   CHANNEL SLOPE =  0.0570
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0570 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =     334.96
  FLOW VELOCITY(FEET/SEC) =   9.27 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.19   Tc(MIN.) =   15.98
  LONGEST FLOWPATH FROM NODE     18.10 TO NODE     13.30 =    4026.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.10 TO NODE     14.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   671.10
  ELEVATION DATA: UPSTREAM(FEET) =   6509.56  DOWNSTREAM(FEET) =   6270.66

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.090
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.621
  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
  ".4 DWELLING/ACRE"         D        4.08      0.21     0.900    91    8.09
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =     23.62
  TOTAL AREA(ACRES) =      4.08   PEAK FLOW RATE(CFS) =     23.62

****************************************************************************
  FLOW PROCESS FROM NODE     15.10 TO NODE     15.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   195.50
  ELEVATION DATA: UPSTREAM(FEET) =   6527.52  DOWNSTREAM(FEET) =   6502.01

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.988
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  7.579
  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                D        0.35      0.21     0.850    91    5.99
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      2.33
  TOTAL AREA(ACRES) =      0.35   PEAK FLOW RATE(CFS) =      2.33

****************************************************************************
  FLOW PROCESS FROM NODE     15.20 TO NODE     15.30 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 6502.01  DOWNSTREAM ELEVATION(FEET) = 6460.41
  STREET LENGTH(FEET) =   646.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 15.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.97
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.42
    HALFSTREET FLOOD WIDTH(FEET) =   14.49
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.75
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.85
  STREET FLOW TRAVEL TIME(MIN.) =   1.59   Tc(MIN.) =    7.58
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.852
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                D        3.87      0.21     0.850    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    3.87      SUBAREA RUNOFF(CFS) =   23.24
  EFFECTIVE AREA(ACRES) =      4.22    AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =        4.2        PEAK FLOW RATE(CFS) =      25.35

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  15.00
  FLOW VELOCITY(FEET/SEC.) =  6.86   DEPTH*VELOCITY(FT*FT/SEC.) =   2.95
  LONGEST FLOWPATH FROM NODE     15.10 TO NODE     15.30 =     841.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.30 TO NODE     15.30 IS CODE =  81
```

```
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.58
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.852
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  PUBLIC PARK                D        8.68      0.21     0.850    91
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA AREA(ACRES) =    8.68      SUBAREA RUNOFF(CFS) =   52.14
  EFFECTIVE AREA(ACRES) =     12.90   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =       12.9       PEAK FLOW RATE(CFS) =      77.48

****************************************************************************
  FLOW PROCESS FROM NODE     15.30 TO NODE     15.40 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   6460.41  DOWNSTREAM(FEET) =   6275.97
  CHANNEL LENGTH THRU SUBAREA(FEET) =   551.20   CHANNEL SLOPE =  0.3346
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .2026 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      77.48
  FLOW VELOCITY(FEET/SEC) =  10.73 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.86   Tc(MIN.) =    8.44
  LONGEST FLOWPATH FROM NODE     15.10 TO NODE     15.40 =    1392.70 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     16.10 TO NODE     16.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   322.00
  ELEVATION DATA: UPSTREAM(FEET) =   6532.31  DOWNSTREAM(FEET) =   6490.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.361
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.953
  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
  ".4 DWELLING/ACRE"         D        0.86      0.21     0.900    91    7.36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.21
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
  SUBAREA RUNOFF(CFS) =      5.24
```

```
  TOTAL AREA(ACRES) =      0.86   PEAK FLOW RATE(CFS) =      5.24
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        0.9  TC(MIN.) =      7.36
  EFFECTIVE AREA(ACRES) =      0.86  AREA-AVERAGED Fm(INCH/HR)=  0.19
  AREA-AVERAGED Fp(INCH/HR) =  0.21  AREA-AVERAGED Ap = 0.900
  PEAK FLOW RATE(CFS)   =       5.24
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```



Appendix F

Geotechnical Investigation Report

PRELIMINARY GEOTECHNICAL REPORT
PROPOSED HUME SOCAL CAMPGROUND REDEVELOPMENT AND EXPANSION PROJECT
251-ACRES OF FORESTED LAND
UNINCORPORATED SAN BERNARDINO COUNTY CALIFORNIA

Prepared for: **KIMLEY-HORN AND ASSOCIATES, INC.**
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Project Number CLA.0013655001

December 13, 2023

Leighton
a verdantas company

Leighton and Associates, Inc.

December 13, 2023

Project No. CLA.00136555001

Kimley-Horn and Associates, Inc.
3880 Lemon Street, Suite 420
Riverside, California 92501

Attention: Mr. John Nsofor

Subject: Preliminary Geotechnical Report
Proposed Hume SoCal Campground Redevelopment and Expansion Project
251-Acres of Forested Land
Unincorporated San Bernardino County, California

In accordance with our July 22, 2022 authorization, Leighton and Associates, Inc. (Leighton) is pleased to present this Geotechnical Exploration Report addressing redevelopment and expansion of the subject Hume SoCal Christian Campground facility, located on approximately 251-acres of partially developed forestland within unincorporated San Bernardino County, California. The purpose of our study was to evaluate subsurface soil, groundwater and geologic hazard conditions within the areas planned improvements and provide preliminary geotechnical recommendations for project design and construction.

We appreciate the opportunity to provide our services. If you have any questions or concerns, please contact us at your convenience. The undersigned can be reached at **(866) *LEIGHTON***, or directly at the phone extensions and e-mail addresses listed below.



Respectfully submitted,

LEIGHTON AND ASSOCIATES, INC.

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JLH/CD/dlm

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1.0 INTRODUCTION

1.1 Site Description

The boundaries of the site are roughly rectangular in shape and encompassing approximately 251 acres of forested mountain terrain, situated within the San Bernardino National Forest, unincorporated San Bernardino County, California. The regional site location is shown on attached Figure 1, *Site Location Map*. The property is developed sparsely as a 300-occupant campground facility, including various existing building structures, paved access roads, recreational ponds, pools, lawn areas and other appurtenant improvements. Similar undeveloped forest land borders the site on the north and northwest. Nearby local communities include Green Valley Lake, Arrowbear Lake and Running Springs to northeast, southeast, and southwest of the property, respectively. The site is accessed via Green Valley Lake Road, which transects through the property on the north, and forms its eastern boundary on the south. Based on a review of historical aerial photographs, construction of Green Valley Road and improvements on the stie commenced sometime between 1951 and 1955.

Site Coordinates:	USGS 7.5 Topographic Map
Latitude: N34.2268°	Keller Peak
Longitude: W-117.0941°	December 2021

A majority of the site terrain is manifest in a series of relatively narrow ridgelines and valleys with steeply sided slopes. Surface elevations range between approximately 6,400 and 6,600 feet above mean sea level (msl). Loal Areas of relatively flatter terrain exist as elevated paleo-stream terraces. Additional relatively localized flat terrain also occur within certain narrow valley-bottom areas resulting from more recent alluvial deposition. The main existing campground facilities are centrally located on the property, haven taken advantage of an area of naturally flatter surface relief. Existing building pads, access roads and minor slopes have been created by limited grading modification.

Our site reconnaissance, geologic mapping and auger borings reveal a large part of the site is mantled by thin deposits of residual soil, colluvium and/or alluvium. Large areas of bedrock are also exposed in surface outcrop, consisting of a Cretaceous-age granitic formation which is hard to very hard, massive, and slightly weathered. The general subsurface distribution of soil and bedrock units is depicted in a series of 20-scale cross sections prepared as transecting areas of planned improvements, attached as Plates 2A and 2B.

1.2 Proposed Development

We understand construction will be performed in five phases of work. Upon completion, the improvements will accommodate approximately 3,000 additional occupants. Based on a set of preliminary plans forwarded to our office, dated January 9, 2023, the phase numbers, phase names and general locations on the property are referred to herein as follows:

- Phase 1 – Junior High School Camp (central)
- Phase 2 – High School Camp (SE)
- Phase 3 – Adult Lodge (W)
- Phase 4 – Elementary School Camp (NE)
- Phase 5 – Wildwood Camp (NW)

The proposed location and layout of improvements for each phase are depicted on attached Plate 1, *Geotechnical Map*. Construction types will vary from phase to phase, including demolition and replacement of certain existing buildings, and conversions and/or additions to others. New structures will include multi-story dormitories, large open-ceiling chapels, dining facilities, pools, gymnasiums, snack shops, restrooms, maintenance facilities, parking lots, grass quads, outdoor amphitheaters and recreational ponds. We expect appurtenant improvements will include access roads with embankment fills and/or cut slopes, drainage control structures and underground utilities.

Given existing site geologic conditions, and preference to limit disturbance of natural terrain by grading, many lighter-load structures of limited footprint can be founded on systems of drilled rock-socketed piles and grade-beams. Floors may consist of raised and/or slab-on-grade construction. For larger buildings, especially in areas of formerly graded flat pads where existing buildings will be demolished, re-grading and use of conventional spread footings and slab-on-grade construction should be considered. Where building footprints will span sloped terrain, a combination of conventional spread footing and drilled rock-socketed pile foundations may be considered.

As of the date of this report, no grading or structural plans defining foundation design or load demands of structures have been prepared. Geotechnical recommendations for design are thus considered preliminary, and subject to revision or value engineering once plans become available.

1.3 Purpose and Scope

The purpose of our work was to evaluate site geotechnical conditions and geologic hazards pertinent to the proposed development, determine engineering properties of soil and bedrock, and provide preliminary geotechnical recommendations to aid in project planning. To accomplish these tasks we reviewed readily available published geologic reports and maps, conducted site geologic reconnaissance mapping and advanced small-diameter auger borings to determine the thickness of surface soils, depth to competent bedrock, and collection of samples for physical and chemical laboratory testing. We prepared this report to summarize the findings of our study, and aid in the preparation of project grading and foundation design plans. A list of documents consulted as part of our study are noted in attached Appendix A, *References*.

The scope of work performed is as follows:

- **Background Review:** Reviewed published geology reports/maps, and historical aerial photographs and topographic maps and Lidar imagery readily available and pertinent to the site.

- **Field Exploration:** For the purpose of site soil and bedrock exploration, assessment of groundwater conditions, and collection of samples for laboratory testing, we advanced fifty-five (55) small-diameter auger borings into select locations each of the five development phases, and collected representative samples of surficial bedrock boulders for coring and testing. A summary of subsurface boring data is attached in Appendix B1, *Auger Boring Summary*. A summary of our field exploration is attached in Appendix B2, *Field Exploration.*

- **Geotechnical Laboratory Testing:** Conducted certain laboratory tests on collected soil and bedrock samples including Modified Proctor Compaction (maximum dry density and optimum moisture content), R-Value, remolded direct shear, unconfined compressive strength, and corrosivity suite (sulfate and chloride content, resistivity and pH). The results of our laboratory testing are attached in Appendix C, *Laboratory Test Data*.

- **Analyses and Report Preparation:** Analyzed collected field data to determine soil properties for design. Prepared this report presenting our preliminary geotechnical findings, conclusions and recommendations.

2.0 GEOTECHNICAL FINDINGS

2.1 Regional Geologic Setting

From a regional perspective, the site exists within the eastern (San Bernardino Mountains) segment of the Transverse Ranges Geomorphic Province of California. The province is defined by an east-west trending series of steep mountain ranges and valleys trending obliquely to the typical northwesterly trend of coastal California. The regional extent of the province spans easterly from the San Bernardino Mountains as far as the offshore islands of San Miguel, Santa Rosa, and Santa Cruz. The San Bernardino Mountains are considered one of the most rapidly rising regions on earth. Over the past 11 million years they have been uplifted to heights over 11,000 feet above mean sea level (msl), largely in response to intense north-south tectonic compression and southward displacement along the San Andreas Fault. The bulk of bedrock underlying the San Bernardino Mountains, and the site, are composed of Mesozoic age granitoid and gneissose bedrock associated with the southern California Batholith, see attached Figure 2, *Regional Geology Map*, and Figure 3, *Regional Fault and Historical Seismicity Map*.

2.2 Local Geologic Setting

Based on the findings of our subsurface exploration and review of published geologic reports/maps, the site is underlain by units of relatively thin surficial deposits including artificial fill and colluvium/alluvium. Granitic bedrock occurs extensively in surface outcrop and at shallow depths below the surface soils. Due to the relative thin and variable thickness of the surficial units, they are not mappable at the scale of the attached geologic maps. While the soil units are excluded from Plate 1, they are shown in attached 20-scale cross sections to provide a generalized understanding of local conditions and relationship to improvement concepts.

A brief description of soil and bedrock units encountered on the site is presented below.

- *Artificial Fill (undocumented) (Map Symbol: Afu):* The deposits of fill encountered on the site typically consist of a loose to medium dense light yellowish-grey to tan coarse-grained sand, derived from weathered bedrock and containing roots and scattered cobbles. The fill thickness ranges from approximately 1 to 5 feet where encountered. The fill was identified as occurring in local slopes adjacent existing roadways, or as underlying certain leveled pads beneath existing buildings. No reports documenting placement of fill under engineered control were available. Thus, this unit is herein defined as undocumented. Where a grading solution is preferred to provide structural support of new improvements, the undocumented fill unit will require complete removal and replacement.

- *Quaternary Alluvium/Colluvium (Map Symbol: Qal/col):* Deposits of Alluvium and Colluvium are grouped together for the purposes of this report. The colluvium unit is defined as a thin mantle of soil typically covering slopes, derived from upslope erosion. The soils were found to consist of loose light grey to tan coarse-grained silts and sands with roots concentrated along their contact with underlying bedrock. The diameter of roots generally increases with depth below the surface. The thickness of the colluvium is generally less than 2 feet where encountered. Alluvium consist of loose sediments concentrated along canyon bottoms, and locally as deposits on elevated terrace areas. Given the potential compressible nature of the alluvium/colluvium unit, it will require complete removal and replacement in areas where a grading solution is preferred to provide structural support for new improvements.

  Cretaceous Granite (Map Symbol: Kk): The entire site is underlain by bedrock assigned as Cretaceous age Granite (USGS, 1998). The crystalline igneous rock occurs widely in surface outcrop or buried beneath thin deposits of alluvium/colluvium and/or fill units. It is hard to very hard, light in color, massive, and exhibits a widely spaced joint pattern. Where exposed at the surface it is altered by differential physical and chemical weathering processes resulting in rounded shapes bounded by open joints. The depth of weathering is on the order of a few feet thick, where fracturing and jointing are more pronounced. Rock hardness quickly increases with depth beneath the surface, as does the effects of open fracturing and jointing. Where surface erosion is focused along joints, localized precarious-pedestaled boulders take form which can become dislodged and prone to downslope movement as rockfalls. Fresh bedrock is considered suitable for structural support new fill, and/or rock-socketed piles.

  The depths to bedrock beneath the site surface was determined by drilling and logging a series of auger borings. The encountered thickness of surface soils and depths of bedrock are noted in attached Appendix B1, *Auger Boring Summary*. The depths to bedrock are considered representative of site conditions, however, it is possible that deeper soils may exist in areas beyond the locations of the auger borings.

2.3 Geologic Structure

Our field mapping indicates the bedrock structure is massive and absent any adverse through-going structures that would otherwise result in large-scale planes of weakness. If larger cut slopes are planned, the orientation of joint-sets should be mapped to determine any degree of potential surficial instability.

2.4 Groundwater

Local groundwater was encountered as a shallow perched condition above bedrock, confined to deposits of alluvium/colluvium adjacent to active stream channels. Sources of groundwater mainly relate to periods of precipitation in the form of rain or snow melt. Based on the encountered conditions, we expect groundwater will not pose any significant constraint to planned grading or proposed construction.

2.5 Surface Water

The most significant occurrence of surface water is limited to active stream channels on the site. Certain structures are planned to span the axes of dry and active stream channels on the site. If buildings cannot be relocated, the control of surface waters will be required to mitigate the potential impacts of current and potentially larger future flow of water and debris. Other areas of potential concentrated surface flow can be expected in side-slope swales. Through implementation of proper engineering control, the impacts of surface water are not expected to be a significant constraint to development.

2.6 Landslides and Slope Stability

No evidence of landslides or landslide deposits were observed during our site reconnaissance, nor identified during our review of historical aerial photographs. The massive nature of the granitic bedrock formation underlying the site is such that the potential for significant landslides or large-scale slope instability is considered very low. However, an assessment of slope stability should be made during and after excavations into the existing road cut are made. Slope stability analysis was not within the scope of this study. Furthermore, although no surficial signs of adverse geologic structure (adverse jointing and joint orientation) were observed in the areas of planned improvements at the time of our investigation, adverse structure could be exposed during construction. As such, a Geologist should be present at the time of any temporary or permanent cuts to observe and map exposed geologic structure, as needed.

2.7 Site Soil Properties

Based on the results of our field exploration and laboratory testing, certain engineering characteristics of on-site soils (fill and alluvium/colluvium) are discussed as follows.

2.7.1 Expansive Soil

Given the non-cohesive course-grained nature of on-site soils, no tests were performed to evaluate expansive potential.

2.8 Hydrocollapse and Compressible Soils

Based on the coarse-grained character of alluvium/colluvium soils, the relative thin presence of the soil, and recommendations for complete removal of the soil where grading is preferred, the potential for hydro-collapse is not a constraint to site development. The bedrock is hard and not prone to such hazards.

2.9 Soil Corrosivity

A screening of site soil units for corrosivity was performed to evaluate their potential effect on concrete and ferrous metals. The corrosion potential was evaluated using the results of laboratory tests on representative soil samples obtained during our subsurface evaluation. Resultant test parameters were determined for pH, minimum electrical resistivity, and chloride and soluble sulfate content. The testing results indicated an average values of 5.33 for pH, measured minimum electrical resistivity of 45,1400 ohm-cm, chloride content of 74.8 ppm, and soluble sulfate content of 157.8 ppm.

In general, several agencies list a set of conditions for soils to be considered a corrosive environment. The California Department of Transportation (Caltrans) considers a site to exhibit a corrosive environment if one or more of the following conditions exist: chloride concentration is 500 ppm or greater, sulfate concentration is 2000 ppm or greater, or pH is 5.5 or less (Caltrans, 2012).

In addition, the American Association of State Highway and Transportation Officials (AASHTO) considers a water condition detrimental potential piles where: chloride concentration is greater than 500 ppm, sulfate concentration is greater than 500 ppm, there is potential effluence of mine or industrial runoff, high organic content, a pH of less than 5.5, marine borers (biological), or piles exposed to wet/dry cycles.

The following table presents a summary of corrosion analysis, in addition to values where Caltrans and AASHTO consider an environment to be corrosive. Please note the summary is limited to ONLY the listed conditions expressed in the table. Not all conditions considered to be constituent, part or whole, to corrosion potential were considered during our exploration and as a result our assessment of onsite corrosion potential is considered preliminary. A corrosion engineer should be consulted for further analysis and recommendations.

Table 1. – Summary of Corrosion Potential

Constituent		Average Site Value (ppm)	Caltrans Values (ppm)	AASHTO Values (ppm)
Chloride Content (ppm)		74.8	500 or greater	500 or greater
Sulfate Content (ppm)		157.8	2,000 or greater	500 or greater
pH		5.33	5.5 or less	5.5 or less

Preliminary corrosion analysis indicate the site soils are generally considered not to host a corrosive environment; however, site soils in contact with buried uncoated ferrous metals is considered to pose a corrosion hazard and should be mitigated.

2.9.1 Soil Compressibility

While no in-situ samples of surficial alluvium/colluvium soils were collected for compressibility testing, their organic content and density suggest they are compressible and should not be relied upon for structural support of structures.

2.9.2 Shear Strength

Evaluation of shear strength characteristics included laboratory direct shear testing of composite remolded soils. The results of testing are attached in Appendix C, including graphs of angle of internal friction (ø) and cohesion (c) for use in geotechnical analysis.

2.9.3 Excavation Characteristics

Soil: It is anticipated on-site alluvium/colluvium and fill soils can be excavated with relative ease using conventional light- to heavy-duty construction equipment.

Bedrock: Bedrock ranges from moderately hard where weathered, and hard to very hard where unweathered. Its rippability depends on the degree of weathering, density of fractures and jointing. Given the interest to avoid grading, we do not anticipate that excavations of any significant depth, or modifications of the site surface other than to remove and replace existing soils are planned. If deeper cuts in bedrock are planned, we anticipate rippability will be difficult and require use of heavy grading equipment including but not limited to dozers with single-shank rippers. To further discern rippability characteristics where such grading is

planned, the use of geophysical refraction surveys may provide more specific information concerning the feasibility of bedrock excavations.

2.9.4 Infiltration

The location and types of stormwater or septic systems was not designated on the current site plan. Thus, Leighton did not evaluate the infiltration rates for site soils. We anticipate the employment of such systems would be limited to the thin on-site alluvium/colluvium soil unit, away from planned structures. The evaluation of infiltration rates should be performed once more detailed plans are available.

3.0 GEOLOGIC HAZARDS

Potential geologic hazards common to southern California and more directly constrained to an on-site condition commonly include surface fault rupture and landslides and rockfalls. A summary of these hazards is provided in the following sections.

3.1 Liquefaction Potential

Liquefaction is the phenomenon of the reduction in strength and stiffness of certain soil types that exist below the groundwater table when subjected to strong ground shaking such as typically associated with seismic activity. Soils most susceptible to liquefaction are saturated granular deposits that exhibit loose to medium dense relative density.
The San Bernardino County Geologic Hazard Overlay Maps (2010), indicate the site is not located within an area susceptible to liquefaction, and thus not warranting any required investigation for liquefaction.

3.2 Seismically-Induced Settlement

Seismically-induced settlement consists of dynamic settlement of unsaturated soil (above groundwater) and liquefaction-induced settlement (below groundwater). These settlements occur primarily within low density sandy soil due to reduction in volume during and shortly after an earthquake event. Given the relatively thin presence of soil deposits on the site, and intended use of pile foundation and/or grading solutions, the potential for seismically-induced settlement is expected to be negligible.

3.3 Seismically-Induced Lateral Displacements

On sites where a liquifiable soil mass exists, the lateral movement of a non-liquefied soil mass can occur, termed lateral spreading. The direction of mass movement is typically towards a nearby gap in local topography, such as a basin, channel or valley. As earth deposits on the subject site are not prone the occurrence of liquefaction which is instrumental for the occurrence of lateral spreading, the potential for lateral spreading is in turn considered remote.

3.4 Seismically-Induced Landsliding

Based on the geologic hazard overlay maps issued by the County of San Bernardino, and preponderance of underlying massive igneous bedrock, the potential occurrence of landslides at the site is considered low. Proposed slopes, if any, should be engineered and constructed at a gradient of 2:1 (horizontal:vertical) or flatter top facilitate overall stability.

3.5 Rockfalls

The subject site consists of rugged forested terrain with moderate to steep slopes and narrow valleys. In areas where bedrock is exposed at the surface and an advanced degree of spheroidic weathering has occurred, larger precariously perched boulders have formed, typically bounded by joints, which are subject to dislodging and sudden downslope movement. The movement is often triggered by ground-shaking during earthquakes, where the boulders are mobilized in a downslope direction. In natural areas upgradient of planned grading, rockfalls can pose a hazard to path of human life, improvements, and/or infrastructure. Leighton observed only localized areas on the site during our reconnaissance, where the potential for this hazard exists. During the development phase of the project, a qualified geologist should examine areas upslope of planned improvements in more detail, and designate boulders posing a potential rockfall hazard. The boulders should be eliminated as part of the construction process, by either removal or breaking the rock in-place.

3.6 Flooding

According to current flood hazard maps available on the ESRI ArcGIS on-line database, 2023, the site is not located within a 100-year flood zone. A map showing the site and location of nearby flood hazard zones is attached as Figure 4, *Flood Hazard Zone Map*. Based on the above, the potential for site flooding is considered low.

3.7 Debris Flows

Debris flows are typically defined as the down-gradient movement of a viscous saturated silt and sand laden slurry like mixture soils laden with cobbles, boulders, vegetation and other debris. These events are surface phenomenon typically confined to areas with vertical gradients, including slopes, side-hill swales and valley bottoms where volumes of sediment have accumulated. The impacts of potential debris flows often depend on the type and volume of soil present, water content, and degree of vegetation. Debris flows are common in recent wildfire burn areas where vegetation and root structure has been removed. The loss of soil support leads to the accumulation of moisture in the soil from rain events and a higher potential for structural failure. Debris flows are not exclusive to a post-fire areas, and can occur as a result of repeated heavy rain storms where soils become increasingly saturated by waters. Debris flows can travel a significant distance from its source area under the right conditions.

Our reconnaissance of the site revealed no direct evidence of recent surface scaring or accumulations of relatively thick soils at the toe of slopes relating to possible debris flows.

While our observations note the above, the potential for debris slows is considered a potential hazard at the site as areas surrounding planned improvements will remain undisturbed or subject to little modification. A consideration of this hazard should be evaluated a part of site development, especially where buildings are cited in canyon bottom areas or side-slopes. The mitigation of debris flow hazards can include installation of drainage diversion devices such as sandbags, K-Rails, Hydro Barriers, etc., placed along known flow paths to divert runoff.

3.8 Seiches and Tsunamis

Seiches are the occurrence of waves within enclosed water bodies in response to ground shaking. The waves have the potential to runup shorelines and overtop dams. The existing and future recreational ponds and pools on the site are considered subject to the occurrence of a seiche hazard in the event of large earthquakes.

Tsunamis are sea waves generated by the sudden displacement or movement of a sea floor. Tsunami waves can impact shorelines a great distance from their source. Based on the absence of any ocean body in proximity to the site, and significant altitude above mean sea level, the potential for a tsunami to impact the site is considered remote.

3.9 Dam Inundation

According to current flood hazard maps available on the ESRI ArcGIS on-line database, 2023, the site is not located within a 100-year flood zone. A map showing the site and location of nearby flood hazard zones is attached as Figure 4, *Flood Hazard Zone Map*. A map is also provided showing an absence of potential dam inundation hazards at the site, see Figure 6, *Dam Inundation Map*. Based on the above, the potential for site flooding is considered low.

4.0 SEISMIC HAZARDS

Seismic hazards common to southern California include surface fault rupture and strong ground shaking associated earthquake(s). Depending on site conditions, other secondary seismic effects may include liquefaction, seismically-induced settlement, dynamic settlement, lateral spreading, seismically-induced landslides, seismically-induced flooding, seiches and tsunamis. Attached Figure 5, *Seismic Hazard Map*, depicts potential state-designated seismic hazards in the site area. The following sections discuss seismic hazards and their potential effects on the subject site.

4.1 Surface Fault Rupture

The project site is located in a seismically active region of southern California crossed by multiple well-defined active and potentially active faults capable of inducing ground motions affecting wide areas including the subject site. Accordingly, to reduce seismic risk, project improvements should be designed using appropriate seismic design parameters promulgated by current codes and standards, including the "Minimum Statewide Safety Standard" in Chapter 2 of the California Geological Survey (CGS) Special Publication 117a (CGS, 2008).

Our review of available in-house and readily available literature indicates the presence of no known active faults within the site boundaries. And the site is not designated within a state-defined Alquist-Priolo Earthquake Fault Zone (Bryant and Hart, 2007). Therefore, the potential for surface fault rupture on the site is expected to be low and a surface fault rupture hazard evaluation is not mandated for this site.

The locations of active faults within 100 miles of the site was determined using the on-line program managed by the United States Geological Survey (USGS) Earthquake Hazards Program National Seismic Hazard Maps (USGS, 2008c). The nearest active faults with historical or latest Quaternary displacement occur within the San Andreas Fault Zone (SAFZ), San Jacinto Fault Zone (SJFZ), and Johnson Valley Fault Zone (JVFZ) located approximately 7.9, 15.5 and 36.7 miles from the site, respectively. The SAFZ is the largest active tectonic plate boundary in California. The SJFZ is considered one of the most active faults in southern California. And the JVFZ is considered an important component of the system in that it has experienced several more recent surface rupture events affecting the local area. Attached Figure 3, *Regional Faults and Historical Seismicity Map*, depicts these and other major faults in the vicinity of the subject site.

4.2 Seismicity and Ground Motion

The intensity of ground shaking at a given location depends primarily upon the earthquake magnitude, the distance from the source, and the site response characteristics. Peak horizontal ground accelerations are generally used to evaluate the intensity of ground motion. Using the SEAOC/OSHPD Seismic Design Maps Tool (https://seismicmaps.org/) to obtain seismic design parameter values from the United States Geological Survey (USGS), the peak ground acceleration for the Maximum Considered Earthquake (MCE_G) adjusted for the Site Class effects (PGA_M) is 0.71g. Based on the USGS online unified hazard tool program (USGS, 2023a), the modal seismic event is Moment Magnitude (M_W) 8.08 at a distance of 7.7 miles.

5.0 SUMMARY OF FINDINGS AND CONCLUSIONS

Presented below is a summary of findings based on the results of our site geotechnical exploration.

- The site is not located in a state-designated Alquist-Priolo Earthquake Fault Zone, nor fault hazard zone depicted on San Bernardino County Hazard Overlay Maps. The nearest known significant active faults are the San Andreas Fault Zone (SAFZ), San Jacinto Fault Zone (SJFZ), and Johnson Valley Fault Zone (JVFZ) located approximately 7.9, 15.5 and 36.7 miles from the site, respectively. An earthquake along any of these or other similar more distant faults in the southern California area, are capable of generating moderate to strong ground shaking at the site.

- The site is not located within an area shown as susceptible to liquefaction or landslides.

- The site is underlain by locally by up to approximately 4 to 5 feet of undocumented artificial fill. The fill typically underlies existing building pads and some slopes. The fill is not considered suitable for support of new buildings and will require removal and replacement in areas of planned grading.

- No areas of side-hill seepage or springs were encountered on the site. The occurrence of shallow perched groundwater conditions was encountered locally in thin scattered deposits of alluvium confined to valley bottoms associated with active stream flow.

- The shallow depth of bedrock on the site will permit use of rock-socked piers to support light-weight structures. On sloping ground it is possible that a combination of piers with raised floors and grading for slab-on-grade floors will be feasible. For larger relatively flat pad areas, especially where existing buildings are present, a grading solution is recommended for entire support of new buildings.

6.0 PRELIMINARY RECOMMENDATIONS

Preliminary geotechnical recommendations intended to assist in preparation of grading and foundation plans are presented in the following sections. The recommendations are considered sufficient at this preliminary stage to develop project plans in accordance with 2022 CBC requirements. The following recommendations may be superseded by more restrictive requirements of the architect, structural engineer, and/or local building official.

The client is also directed to attached Appendix E, *GBA Geotechnical Insert*, for more information concerning this report.

6.1 Earthwork

All site grading should be performed in accordance with the project specifications of appropriate design professionals. Attached are geotechnical specifications for use as a guideline in developing plans for earthwork grading, see Appendix D, *General Earthwork and Grading Recommendations*.

6.1.1 Site Preparation

Vegetation, debris, and other deleterious materials should be removed and disposed of offsite prior to the commencement of grading operations. Existing underground improvements, including utility lines, should be identified prior to the start of grading and abandoned or relocated as necessary. Trenches resulted from removal of existing improvements should be excavated to competent materials and properly backfilled under the observation and testing of the geotechnical engineer.

6.1.2 Overexcavation and Recompaction

Proposed foundations may be constructed on bedrock or a minimum of 2 feet of compacted fill. Existing near surface fill and alluvial/colluvial soils below the proposed foundation should be removed to expose bedrock and recompacted. The foundation for the proposed structures may then be constructed on undisturbed, competent bedrock or properly compacted structural fill, in order to reduce the potential for differential settlement. If fill soils or unsuitable native soils are exposed at the bottom of the excavation, they should be removed and replaced with engineered structural fill of uniform thickness. The compacted fill should extend a minimum 3 feet beyond outside edges of the foundation. If any of the planned structures are supported on a deep foundation system, then overexcavation is not required.

Pavement areas, driveway, concrete flatwork, and slab on grade should be underlain by a minimum 1 foot of compacted fill. Local conditions may be encountered which may require additional removals and recompaction. The exact extent of removals can best be determined during grading by the geotechnical engineer when direct observation and evaluation of materials are possible.

6.1.3 Subgrade Preparation

Prior to placing fill materials, the subgrade should be scarified to a minimum depth of 6 inches, moisture conditioned, and proof-rolled. Any soft and/or unsuitable materials encountered at the bottom of the excavations should be removed and replaced with fill material.

6.1.4 Fill Placement and Compaction

The onsite soils to be used as compacted structural fill should be free of organic material, construction debris or oversized material larger than 6 inches. Imported fill soils, if any, should be approved by the geotechnical engineer prior to placement as fill. Fill soils should be placed in loose lifts not exceeding 8 inches, moisture-conditioned as necessary to at least two percent above moisture optimum and compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM D 1557.

6.2 Preliminary Foundation Design Parameters

New structures may be supported on shallow footings or Cast-in-Drilled-Hole (CIDH) concrete piles. Driven piles are not recommended due to the hardness of bedrock. Note that these values are preliminary, and supplemental field data including drill cores should be collected during pile drilling to confirm design parameters.

6.2.1 Shallow Foundations

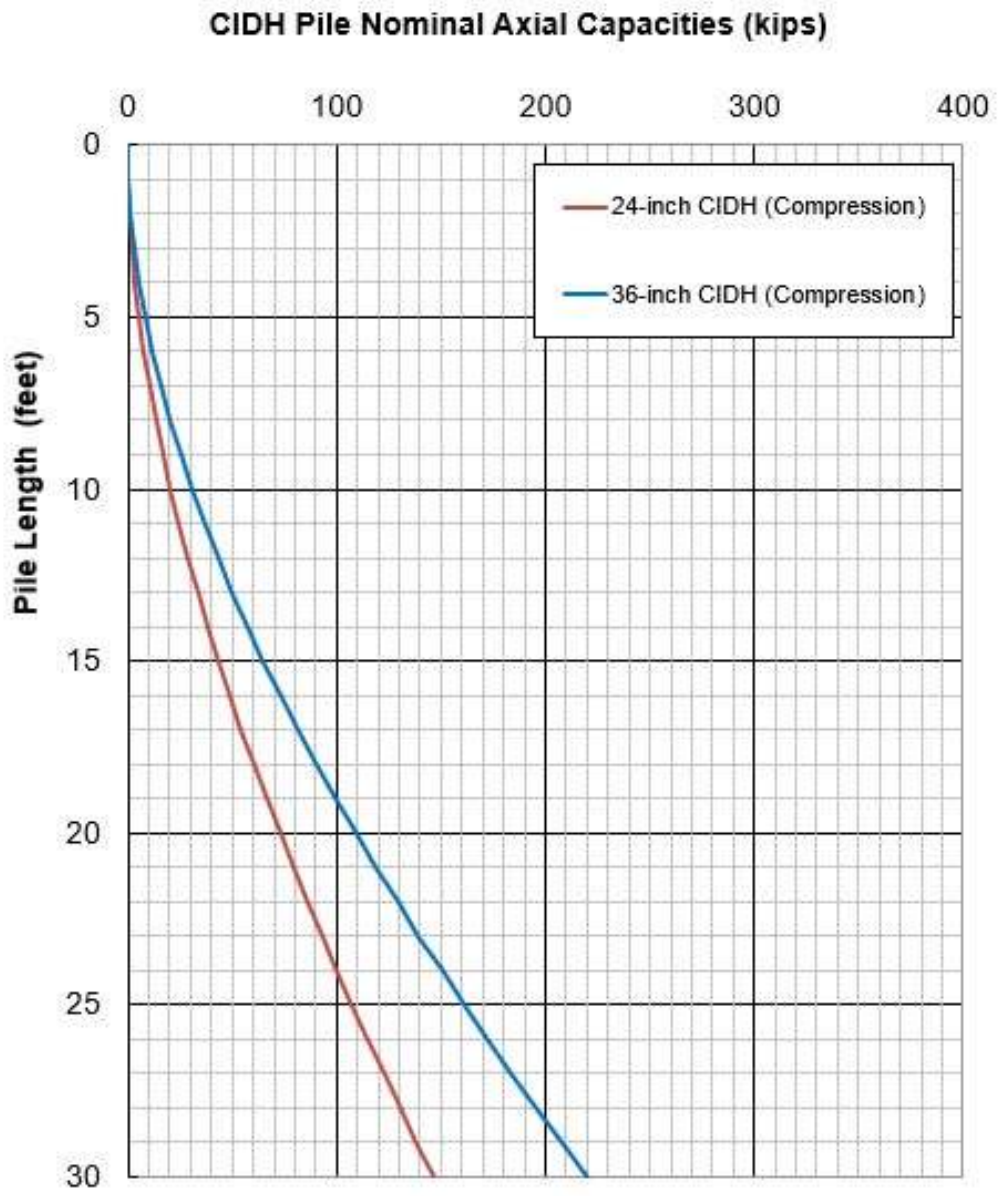
Following site grading recommended in Section 6.1, new structures may be supported on a conventional shallow foundation system. Footings may be designed using an allowable bearing capacity of 2,500 psf based on a minimum width of 12 inches and embedment depth of 12 inches below the lowest adjacent grade. This value may be increased by 250 psf for each additional foot of width or each additional foot of embedment to a maximum value of 4,000 psf. In addition, the bearing capacity may be increased by one-third for wind or seismic loading. The allowable bearing capacity incorporates a factor of safety of 3.0 and is based on a total static settlement of 1 inch and differential settlement of ½ inch over a

horizontal distance of 30 feet. Since settlement is a function of footing size and contact bearing pressure, differential settlement can be expected between adjacent columns or walls where a large differential loading condition exists. The settlement estimate should be reviewed by Leighton Consulting when final foundation plans and loads for the proposed structures become available.

Resistance to lateral loads will be provided by a combination of friction between the soils and foundation interface and passive pressure acting against the vertical portion of the foundation. A friction coefficient of 0.40 may be used at the soil-concrete interface for calculating the sliding resistance. A passive pressure based on an equivalent fluid pressure of 390 pounds per cubic foot (pcf) may be used for calculating the lateral passive resistance. The lateral passive resistance can be taken into account only if it is ensured that the soils against embedded structures will remain intact with time. The above values do not contain an appreciable factor of safety, so the structural engineer should apply the applicable factors of safety and/or load factors during design.

6.2.2 Deep Foundation

The axial capacities of 24-inch and 36-inch CIDH piles for frequently applied dead plus live load is presented in the figure below. A factor of safety of 2.0 may be used to obtain the allowable static pile capacities and a factor of safety of 1.0 may be used for transient loads such as wind or seismic forces. Uplift capacities may be taken as equal to 50 percent of the downward capacities. To avoid group effects, the pile on-center spacing should be at least three times its largest dimension.



Note:
1. A minimum factor of safety (FS) of 2.0 should be applied to estimate allowable capacities.
2. For seismic loading condition, a FS of 1.0 may be used to estimate allowable capacities.
3. The axial tension capacity may be taken as 50% of the axial compression capacity.

Pile design to provide lateral load resistance is recommended to be performed based upon the idealized subsurface profile and design parameters presented in the following table. If piles are used in a group with a pile cap, the passive pressure indicated in Section 6.5 may be used to calculate lateral resistance of the pile cap.

Table 2. – Preliminary Geotechnical Parameters for LPILE Analysis

Depth Range (feet)	Material	LPILE Model	Effective Unit Weight (lbs/ft^3)	Cohesion (lbs/ft^2)	ø (degrees)	ε50	k[(1)] (lbs/in^3)
0 - 5	Fill Soils, Alluvium/Colluvium	SAND	120	0	32	---	30
Below 5	Granitic Bedrock	SAND	130	0	38	---	225

Notes: (1) Modulus of Subgrade Reaction

P-multipliers dependent upon center-to-center (CTC) spacing. P-mult. = 1.0 for CTC = 3 oriented perpendicular to loading.

6.3 Slab-On-Grade

Concrete slabs-on-grade subjected to special loads should be designed by the structural engineer. Where conventional light floor loading conditions exist, the following minimum recommendations for conventional slabs-on-grade should be used. More stringent requirements may be required by local agencies, the structural engineer, the architect, or the CBC.

- A minimum slab thickness of 5 inches. Slab reinforcement should be designed by the structural engineer but as a minimum should consist of No. 3 rebar placed at 24 inches on center in each direction and provided with adequate concrete cover.
- A vapor barrier, 10-mil or thicker, should be placed below slabs where moisture-sensitive floor coverings or equipment is planned. The vapor barrier should be properly sealed at all joints and any penetrations.
- To reduce the potential for excessive cracking, concrete slabs-on-grade should be provided with construction or weakened plane joints at frequent intervals. Joints should be laid out to form approximately square panels.
- Subgrade for slab-on-grade should be thoroughly wetted prior to placement of rebar and concrete.

Our experience indicates that use of reinforcement in slabs can generally reduce the potential for drying and shrinkage cracking. Some cracking should be expected as the concrete cures. Minor cracking is considered normal; however, it is often aggravated by

a high water/cement ratio, high concrete temperature at the time of placement, small nominal aggregate size, and rapid moisture loss due to hot, dry, and/or windy weather conditions during placement and curing. Cracking due to temperature and moisture fluctuations can also be expected. The use of low slump concrete can reduce the potential for shrinkage cracking.

6.4 Seismic Design Parameters

Design parameters for minimum seismic load based on the 2022 California Building Code are included in Table 3 below.

Table 3. – 2022 CBC Based Seismic Design Parameters

Categorization/Coefficient	Design Value
Site Latitude	34.2268°
Site Longitude	-117.0941°
Site Class	C
Mapped Spectral Response Acceleration at Short Period (0.2 sec), S_S	1.50g
Mapped Spectral Response Acceleration at Long Period (1 sec), S_1	0.60g
Short Period (0.2 sec) Site Coefficient, F_a	1.2
Long Period (1 sec) Site Coefficient, F_v	1.4
Adjusted Spectral Response Acceleration at Short Period (0.2 sec), S_{MS}	1.80g
Adjusted Spectral Response Acceleration at Long Period (1 sec), S_{M1}	0.84g
Design Spectral Response Acceleration at Short Period (0.2 sec), S_{DS}	1.20g
Design Spectral Response Acceleration at Long Period (1 sec), S_{D1}	0.56g
Mapped Geometric Mean MCE_G Peak Ground Acceleration, PGA	0.59g
Site Coefficient, F_{PGA}	1.2
PGA adjusted for Site Class, $PGA_M = F_{PGA}$ *PGA	0.708g

6.5 Earth Retaining Structures

The following recommendations may be used for design and construction of retaining structures at the site. We recommend that any permanent earth retaining structures be backfilled with onsite or import soil with Expansion Index (EI) of not greater than 50 (per ASTM D 4829).

Table 4. – Equivalent Fluid Pressures

Condition	Level Backfill	2:1 Backfill
Active	37 pcf	89 pcf
At-Rest	57 pcf	63 pcf
Passive	390 pcf (Maximum of 3,900 psf)	
Seismic	20 pcf	48 pcf

Retaining walls retaining more than 6 feet of soil should consider a seismic earth pressure increment with an inverted triangular distribution in addition to the active earth pressure provided above. The seismic earth pressure increment is included in Table 3. The above values do not contain an appreciable factor of safety, so the structural engineer should apply the applicable factors of safety and/or load factors during design. Retaining walls should include provisions for wall drainage with a backdrain system in accordance with the recommendations provided on attached Figure 7, *Retaining Wall Backfill and Subdrain Detail (EI < 50)*, and the materials behind the wall should be free-draining (i.e., less than 5 percent passing the No. 200 sieve).

Cantilever walls that are designed for a deflection at the top of the wall of at least 0.001H, where H is equal to the wall height, may be designed using the active earth pressure condition. Rigid walls that are not free to rotate, walls that are braced at the top, and walls that provide indirect support for foundations should be designed using the at-rest condition.

Lateral load resistance will be provided by the sliding resistance at the base of the foundation and the passive pressure developed along the front of the foundation. A frictional resistance coefficient of 0.40 may be used at the concrete and soil interface.

In addition to the above lateral forces due to retained earth, the appropriate loads due to surcharges should be considered in the design of retaining structures.

6.6 Cement Type

In general, soil environments that are detrimental to concrete have high concentrations of soluble sulfates and/or pH values of less than 5.5. Section 4.3 of ACI 318 (ACI, 2018) provides specific guidelines for the concrete mix-design when the soluble sulfate content of the soil exceeds 0.1 percent by weight or 1,000 parts per million (ppm).

The results of laboratory testing indicated concentrations of soluble sulfate greater than 0.1 percent but less than 0.2 percent. The test results indicate a sulfate Exposure Class

designation of “S1” appears to be appropriate for the project site based upon criteria presented in ACI 318. If the concrete is expected to be in contact with reclaimed water, Type V cement and a water/cement ratio of 0.45 should be used. Samples should be collected from materials imported to the site as well as soils the compacted fill subgrade upon completion of grading to confirm the initial findings of this exploration.

6.7 Corrosion Protection Measures

In general, soil resistivity, which is a measure of how easily electrical current flows through soils, is the most influential factor for corrosion to ferrous metals. The following table presents an approximate relationship between soil resistivity and soil corrosiveness.

Table 5. – Soil Corrosivity as a Function of Resistivity

Soil Resistivity (ohm-cm)	Classification of Soil Corrosiveness
< 900	Very severe corrosion
900 to 2,300	Severely corrosive
2,300 to 5,000	Moderately corrosive
5,000 to 10,000	Mildly corrosive
10,000 to >100,000	Very mildly corrosive

Note: [1] ASTM STP 1013 titled *Effects of Soil Characteristics on Corrosion* (February, 1989).

In addition to resistivity, the concentration of chloride ions can also be used to evaluate corrosive potential to steel, either in the form of reinforcement protected by concrete cover or plain steel substructures, such as steel pipes. As a general guideline, the chloride threshold adopted by Caltrans is a concentration of 500 ppm or greater as determined by California Test 532. Concentrations of chloride ions above the stated concentration or other characteristics such as soil resistivity or redox potential may warrant special corrosion protection measures. The results of corrosivity testing are summarized in the following table.

Table 6. – Summary of Corrosivity Testing

Test Parameter	Test Results						General Classification of Hazard
	HA-5a	HA-15	HA-19	HA-27	HA-37	HA-17	
	0 to 1’	1’ to 2’	1’ to 1.5’	2’ to 2.5’	1.5’ to 2’	3’ to 3.5’	
Water-Soluble Sulfate in Soil (ppm)	72	283	219	98	99	176	Negligible to moderate
Water-Soluble Chloride in Soil (ppm)	144	42	53	41	44	125	Non-corrosive
pH	5.68	5.33	5.37	5.88	5.33	5.40	Moderately Acidic
Minimum Resistivity (saturated, ohm-cm)	47,000	50,500	20,600	39,600	23,000	45,000	Very mildly corrosive to buried ferrous pipes

The results of the resistivity tests indicate that the near surface soil exhibits very mildly corrosive potential to buried ferrous metals per ASTM STP 1013. The samples tested for water-soluble chloride content indicate a very low potential for corrosion of steel in concrete due to the chloride content of the soil.

Based on the available laboratory testing, the onsite soils are not considered to have low corrosion potential to ferrous metals. The corrosion information presented in this report should be provided to the underground utility subcontractors. We recommend that additional testing for general corrosion potential to ferrous materials and water-soluble sulfates in soils is performed during grading.

6.8 Pavement Design

Driveways and parking areas can be constructed using conventional asphalt concrete (AC) over aggregate base (AB). We have designed the pavement sections using a design R-value of 50 for different Traffic Indices (TI) and the minimum pavement thickness is presented in Table 6. The pavement design was performed using the method in *Caltrans Highway Design Manual*.

Table 7. – Pavement Sections

Traffic Index	Flexible Pavement (inches)	
	AC	AB
5 or less	3	4½
6	4	4½
7	4½	5
8	5	5½

Concrete pavement, if used, may consist of 6 inches of Portland Cement Concrete (PCC) over 4 inches of AB. The PCC pavement sections should be provided with crack-control joints spaced no more than 10 feet on-center each way, to control where cracks develop.

All pavement construction should be performed in accordance with the *Standard Specifications for Public Works Construction*. Field inspection and periodic testing, as needed during placement of the base course materials, should be undertaken to ensure that the requirements of the standard specifications are fulfilled. Prior to placement of aggregate base, the subgrade soil should be processed to a minimum depth of 8 inches, moisture-conditioned, as necessary, and recompacted to a minimum of 90 percent relative compaction. Localized areas of loose soils may be encountered that require deeper removal and recompaction. The actual extent of the removal depth will be best determined during construction when direct observation of the subgrade soils can be made.

Aggregate base should be moisture conditioned, as necessary, and compacted to a minimum of 95 percent relative compaction.

Aggregate base and asphalt materials should conform to Sections 200-2 and 203, respectively, of the *Standard Specifications for Public Works Construction*. PCC should conform to Section 201 of the *Standard Specifications for Public Works Construction*.

6.9 Surface Drainage

Positive drainage of surface water away from structures is very important. Water should not be allowed to pond adjacent to buildings or new site improvements. Water should not be allowed to flow directly over the slope faces. Positive drainage may be accomplished by providing drainage away at a minimum of 2 percent for earthen surfaces for a lateral distance of at least five feet and further maintained by a swale or drainage path at a gradient of at least 1 percent. Where necessary, drainage paths may be shortened by the use of area drains and collector pipes. Eave gutters are recommended and should

reduce water infiltration into the subgrade materials. Downspouts should be connected to appropriate outlet devices.

Irrigation of landscaping should be controlled to maintain, as much as possible, consistent moisture content sufficient to provide healthy plant growth without over watering. Where improvements are located within valley bottoms, use of diversion structures should be considered to control anticipated flood waters. Sub-slab drainage galleries

6.10 Additional Geotechnical Services

Geotechnical observation and testing should be provided during the following activities:

- Upon completion of site clearing, where applicable;
- During site earthwork;
- Compaction of all fill materials;
- During installation of temporary shoring, wherever needed;
- After foundation excavations and prior to placement of concrete;
- Foundation pile and retaining wall construction;
- Utility trench backfilling and compaction; and
- When any unusual conditions are encountered.

6.11 Plan Review

Final project grading and foundation plans should be reviewed by Leighton as part of the design development process to ensure that recommendations in this report are incorporated in project plans.

7.0 CONSTRUCTION CONSIDERATIONS

7.1 Rippability and Oversize Materials

Based on the results of our auger borings, existing surface soils are expected to be readily rippable using conventional equipment in good working condition. The rippability of weathered near-surface bedrock is expected to be difficult but feasible using heavy equipment, such as dozer with single-shank ripper tooth. Oversized material may be generated from bedrock removals.,

7.2 Trench Backfill

Utility trenches should be backfilled with compacted fill in accordance with Sections 306-1.2 and 306-1.3 of the Standard *Specifications for Public Works Construction,* (SSPWC, "Greenbook"), current edition. Utility trenches can be backfilled with onsite material free of rubble, debris, organic and oversized material up to 3 inches in largest dimension. Prior to backfilling trenches, pipes should be bedded in and covered with either:

(1) **Granular Bedding:** a) ½-inch open grade aggregate; or b) a uniform sand material with a Sand Equivalent (SE) greater-than-or-equal-to (≥) 30, passing the No. 4 U.S. Standard Sieve (or as specified by the pipe manufacturer).

(2) **CLSM:** Controlled Low Strength Material (CLSM) conforming to Section 201-6 of the SSPWC. CLSM bedding should be placed to 1 foot (0.3 m) over the top of the conduit, and vibrated.

Pipe bedding should extend at least 4 inches below the pipeline invert and at least 12 inches over the top of the pipeline. The bedding and shading sand is recommended to be densified in place by vibratory, lightweight compaction equipment.

Trench backfill over the pipe bedding zone may consist of native and clean fill soils. All backfill should be placed in thin lifts (appropriate for the type of compaction equipment), moisture conditioned above optimum, and mechanically compacted to at least 90 percent relative compaction, relative to the ASTM D 1557 laboratory maximum density.

7.3 Recreational Ponds

We anticipate recreation ponds will be constructed using down-gradient gravity dam structures consisting of reinforced concrete founded on bedrock. The structures should be designed by a specialty engineer experienced in dam design, and incorporate

elements to facilitate pass-through seepage conditions. The need for collection of future rock-rippability and other geotechnical studies can be precluded to aid in dam design.

7.4 Foundation Setback

We recommend a minimum horizontal setback distance from the face of slopes for all foundations, footings, and other settlement-sensitive structures as indicated on Table 8 below. The minimum recommended setback distance from the face of retaining wall is equal to 1.5 times the height of the retaining wall. This distance is measured from the outside bottom edge of the footing, horizontally to the slope or retaining wall face, and is based on the slope or wall height. However, the foundation setback distance may be revised by the geotechnical consultant on a case-by-case basis if the geotechnical conditions are different than anticipated.

Table 8. – Minimum Foundation Setback from Slope Faces

Slope Height	Setback
less than 5 feet	5 feet
5 to 15 feet	7 feet

Potential distress to improvements (retaining walls, fences, etc.) may be mitigated by use of deepened footings or grade beam systems for support.

In addition, open or backfilled utility trenches that parallel or nearly parallel structure footings should not encroach within an imaginary 2:1 (horizontal to vertical) downward sloping line starting 9 inches above the bottom edge of the footing and should also not be located closer than 18 inches from the face of the footing. Deepened footings should meet the setbacks as described above. Also, over-excavation should be accomplished such that deepening of footings to accomplish the setback will not introduce a cut/fill transition bearing condition.

Where pipes cross under footings, the footings should be specially designed. Pipe sleeves should be provided where pipes cross through footings or footing walls and sleeve clearances should provide for possible footing settlement, but not less than 1 inch around the pipe.

7.5 Temporary Excavations and Shoring Design

All temporary excavations should be performed in accordance with project plans, specifications, and all OSHA requirements. OSHA allows the sides of unbraced excavations, up to a maximum height of 20 feet, to be cut to a ¾H:1V (horizontal:vertical)

slope for Type A soils, 1H:1V for Type B soils, and 1½H:1V for Type C soils. The soil type should be verified or revised based on geotechnical observation and testing during construction, as soil classifications may vary over short horizontal distances. Excavations 5 feet or deeper should be laid back or shored in accordance with OSHA requirements before personnel are allowed to enter.

Typical cantilever shoring should be designed using an active earth pressure presented in Table 3. If excavations are braced at the top and at specific design intervals, the active pressure may then be approximated by a rectangular soil pressure distribution with the pressure per foot of width equal to 24H, where H is equal to the depth of the excavation being shored. These lateral earth pressures are for a drained condition. For an undrained condition, hydrostatic pressure should be included.

During construction, the soil conditions should be regularly evaluated to verify that conditions are as anticipated. The contractor should be responsible for providing the "competent person" required by OSHA standards to evaluate soil conditions. Close coordination between the competent person and the geotechnical engineer should be maintained to facilitate construction while providing safe excavations.

7.6 Rockfalls

Precariously perched bedrock boulders subject to potential dislodging and downslope movement as rock falls, exist locally on the site. Removal of the boulders can be accomplished using a variety of hand tools, or equipment such as excavators or dozers., is We recommended the removals of boulders be performed in conjunction with grading activities, and prior to construction of improvements located downslope of the hazard. A specialized contractor may be necessary to perform these activities.

If removal of the rock is not feasible due to access limitations or other reasons, the hazard may be mitigated by breaking up the rock in place to reduce the potential for dislodgement.

In some instances, boulders with a large flat side may be flipped onto the flat surface where they no longer pose a rolling potential and can then be left in place per the recommendations of a State Certified Engineering Geologist.

Possible ground disturbance resulting from these operations would likely consist of trampled brush and creation of rubble piles.

In areas where no mitigation is feasible, it is possible that barrier trenches, deflection walls or earthen berms may be constructed.

8.0 LIMITATIONS

Leighton's work was performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical consultants practicing in this or similar localities. No other warranty, express or implied, is made as to the conclusions and professional opinions included in this report.

As in many projects, conditions revealed in excavations may be at variance with preliminary findings. If this occurs, the changed conditions must be evaluated by the geotechnical consultant and additional recommendations be developed as needed.

The identification and testing of hazardous, toxic or contaminated materials was outside the scope of Leighton's work. Should such materials be encountered at any time, or their existence be suspected, all measures stipulated in local, County, State and Federal regulations, as applicable, should be implemented.

This report is issued with the understanding that it is the responsibility of the owner, or of his representative, to ensure that the information and recommendations contained herein are brought to the attention of the necessary design consultants for the project and incorporated into the plans; and that the necessary steps are taken to see that the contractors carry out such recommendations in the field.

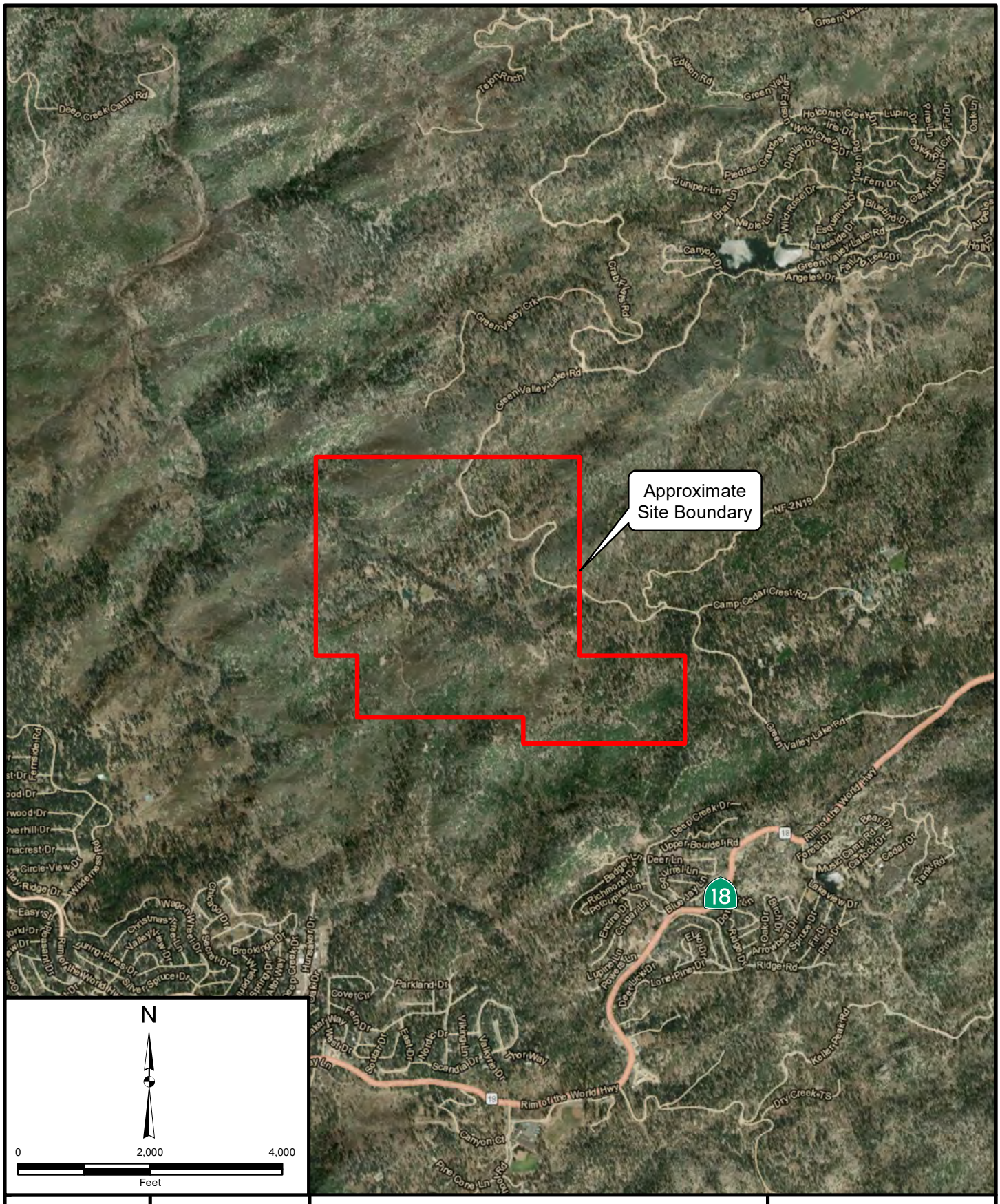
Changes in the conditions of a property can occur with the passage of time, whether due to natural processes or the work of man on the subject or adjacent properties. In addition, changes in standards of practice may occur from legislation or the broadening of knowledge. Accordingly, the findings of this report may at some future time be invalidated wholly or partially by changes outside Leighton's control.

The conclusions and recommendations in this report are based in part upon data that were obtained from a necessarily limited number of observations, site visits, excavations, samples and tests. Such information can be obtained only with respect to the specific locations explored, and therefore may not completely define all subsurface conditions throughout the site. The nature of many sites is that differing geotechnical or geological conditions can occur within small distances and under varying climatic conditions. Furthermore, changes in subsurface conditions can and do occur over time. Therefore, the findings, conclusions and recommendations presented in this report can be relied upon only if Leighton has the opportunity to observe the subsurface conditions during grading and construction of the project, in order to verify that our preliminary findings are representative of the site.

This report is intended only for the use of Kimley-Horn and Associates, Inc., and its design consultants, and only as related expressly to evaluation of the feasibility of developing the subject site with the proposed development and for preliminary planning and design.

If parties other than Leighton are engaged to provide construction geotechnical services, they must be notified that they will be required to assume complete responsibility for the geotechnical phase of the project by concurring with the findings and recommendations in this report or by providing alternative recommendations.

Any persons using this report for bidding or construction purposes should perform such independent explorations as they deem necessary to satisfy themselves as to the surface and subsurface conditions to be encountered and the procedures to be used in the performance of work on the subject site.



Project: 13655.001	Eng/Geol: JLH
Scale: 1 " = 2,000 '	Date: November 2023
Base Map: ESRI ArcGIS Online 2023 Author: (mmurphy)	

SITE LOCATION MAP

Hume SoCal

Green Valley Lake, California

FIGURE 1

Leighton

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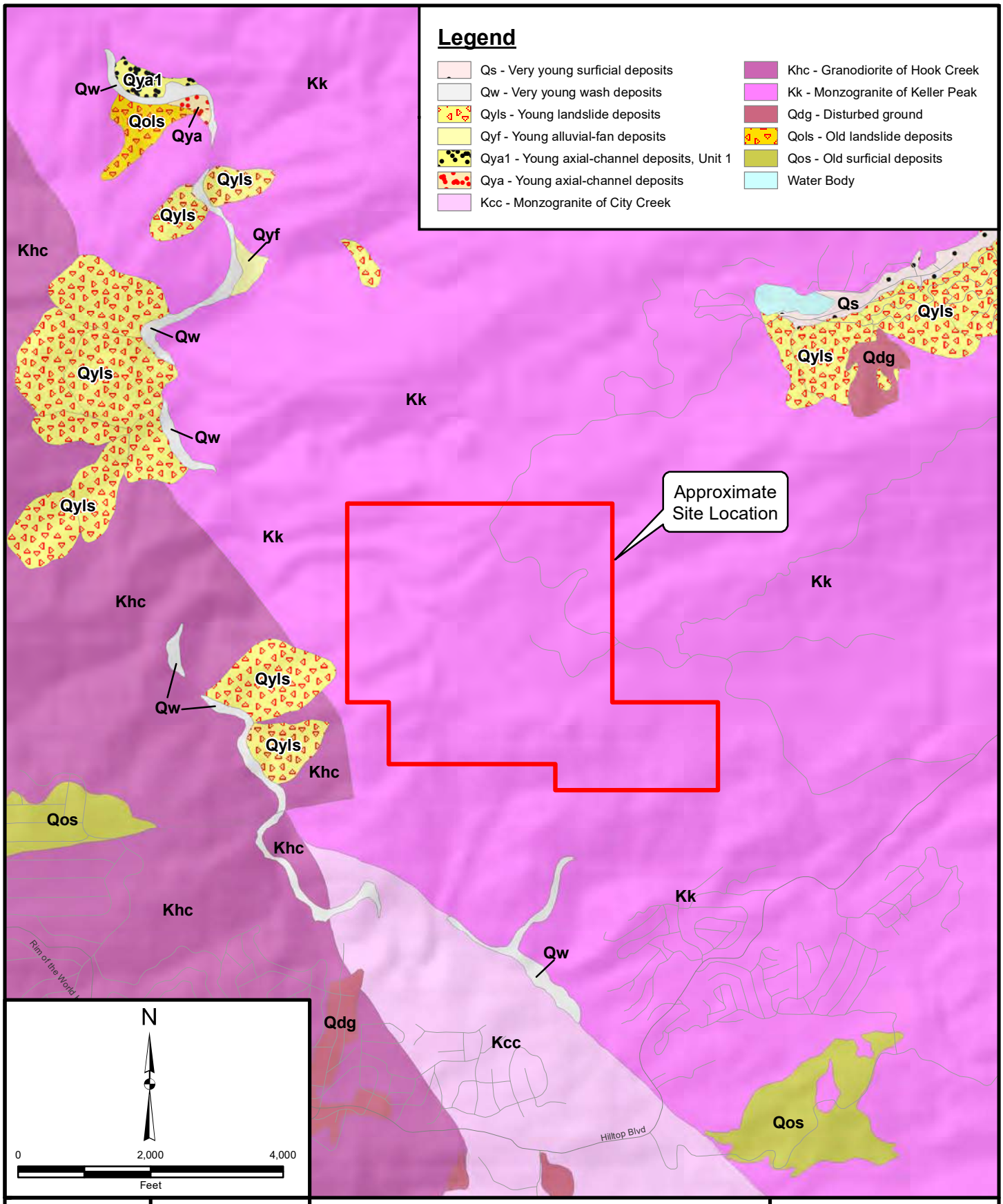

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Scale: 1 " = 2,000 '	Date: November 2023

Reference: USGS, 2006 Geologic map of the San Bernardino and Santa Ana 30'x60 quadrangle, California Version 1,0 Open File Report 2006-1217.

REGIONAL GEOLOGY MAP

Hume SoCal

Green Valley Lake, California

FIGURE 2

Leighton

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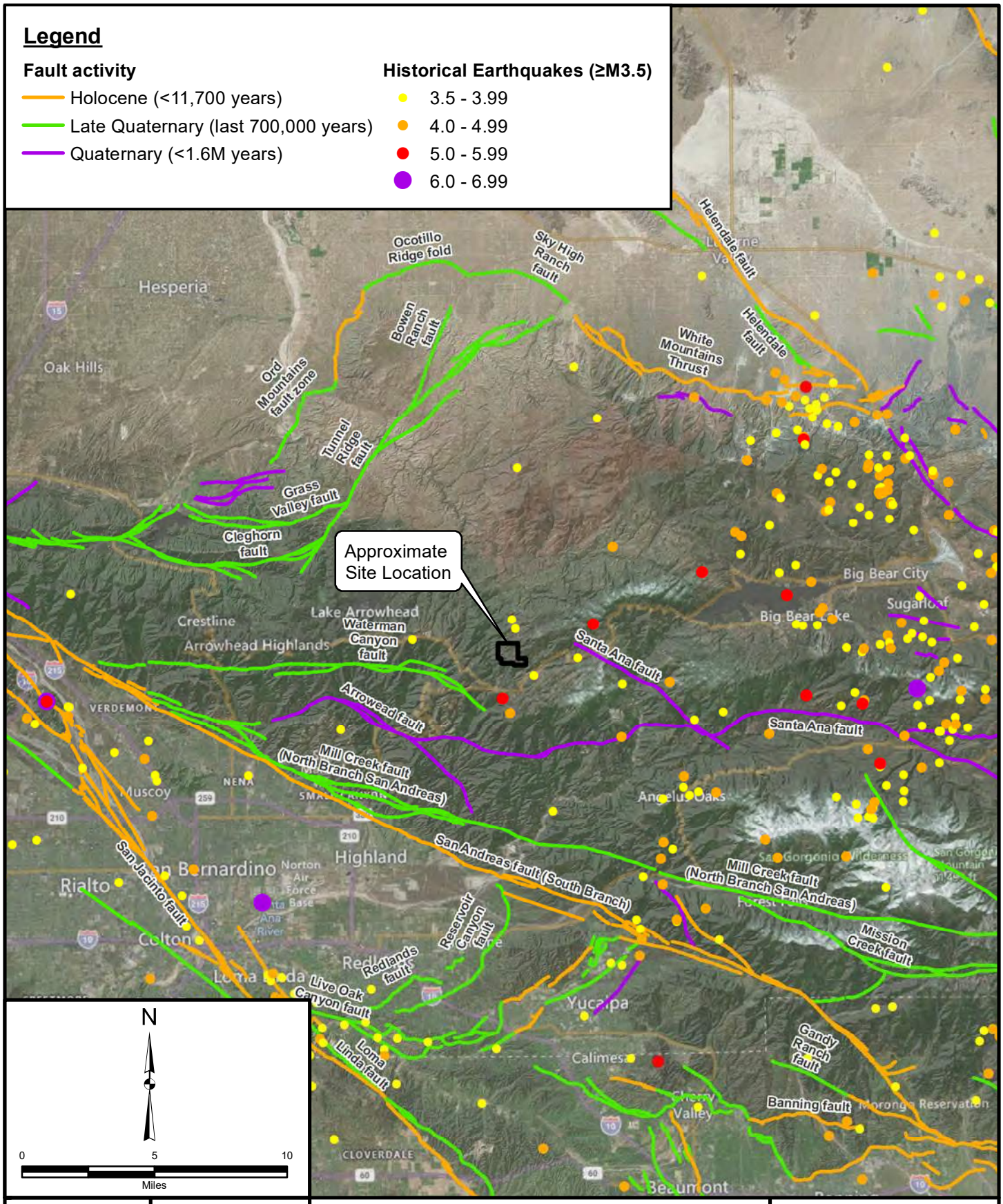

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Scale: 1 " = 5 miles	Date: November 2023

Base Map: ESRI ArcGIS Online 2023
Reference: maps.conservation.ca.gov

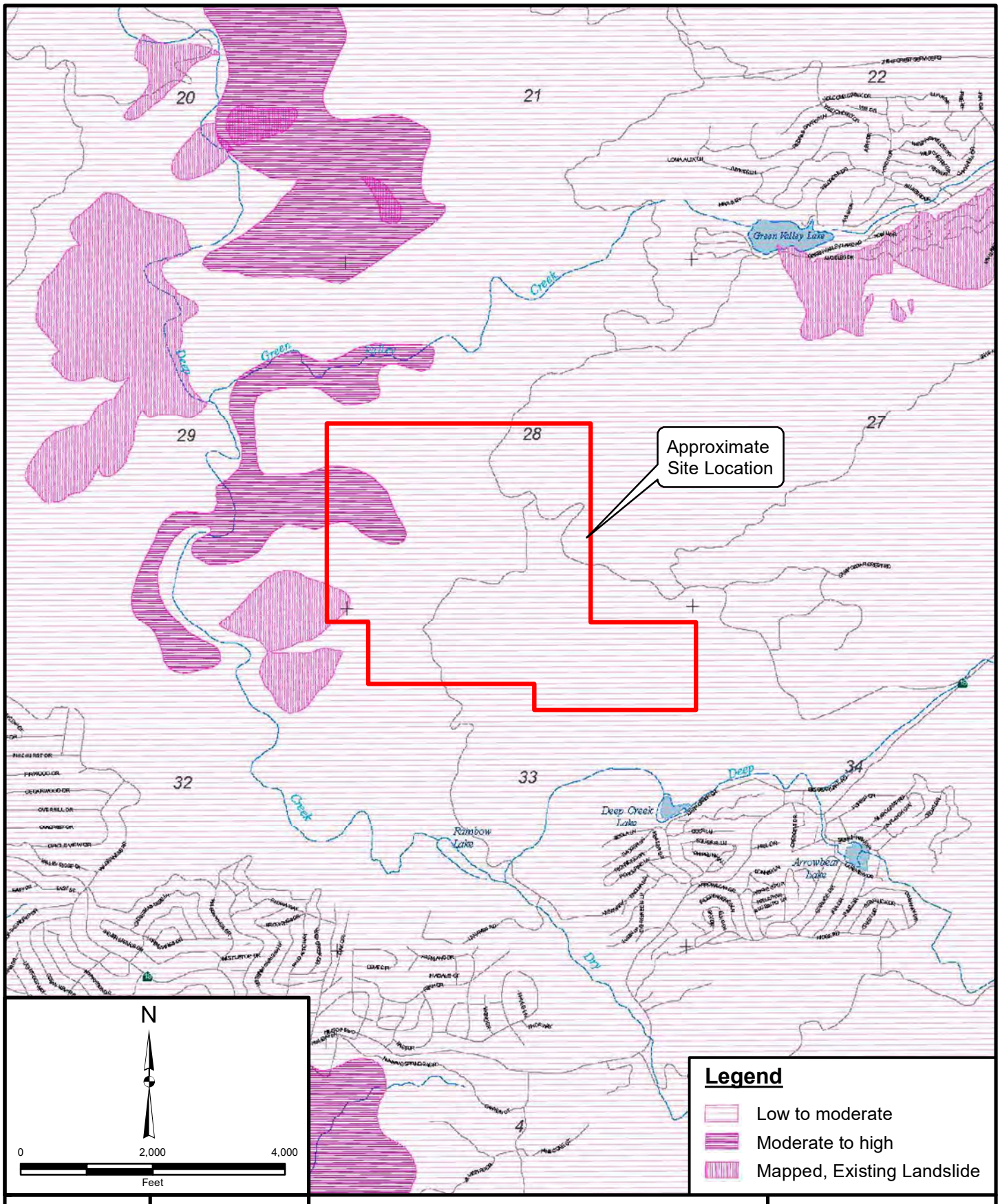
REGIONAL FAULTS AND HISTORIC SEISMICITY MAP

Hume SoCal
Green Valley Lake, California

FIGURE 3

Leighton

Map Saved as P:\Drafting\13655\001\Maps\13655_F03_RFHSM_2023-11-22.mxd on 11/27/2023 10:39:07 AM Author: KVM (mmurphy)



Project: 13655.001	Eng/Geol: JLH
Scale: 1 " = 2,000 '	Date: November 2023

Base Map: San Bernardino County Land Use Plan GENERAL PLAN Geologic Hazard Overlays Map data originally compiled on 1:48,000 scale mosaicked maps photo-reduced from 7-1/2 minute USGS quads by D.M. Morton, U.S.Geological Survey, 1974 and by S.S. Tan, State Division of Mines and Geology, 1989.

SEISMIC HAZARD MAP

Hume SoCal

Green Valley Lake, California

FIGURE 4

Leighton

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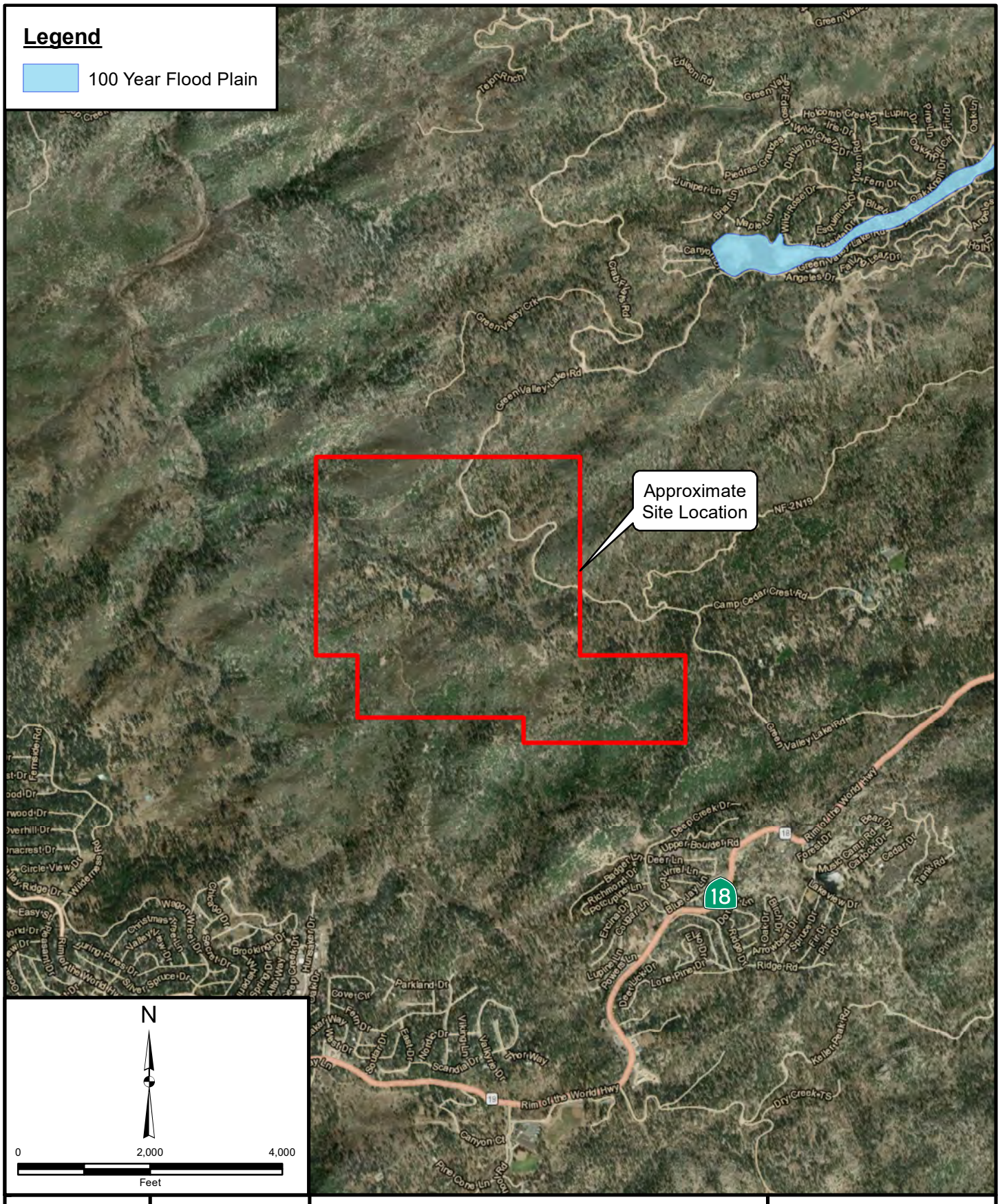

Project: 13655.001	Eng/Geol: JLH
Scale: 1 " = 2,000 '	Date: November 2023

Base Map: ESRI ArcGIS Online 2023
Reference: FEMA, DWR
Author: (mmurphy)

FLOOD HAZARD ZONE MAP

Hume SoCal
Green Valley Lake, California

FIGURE 5

Leighton

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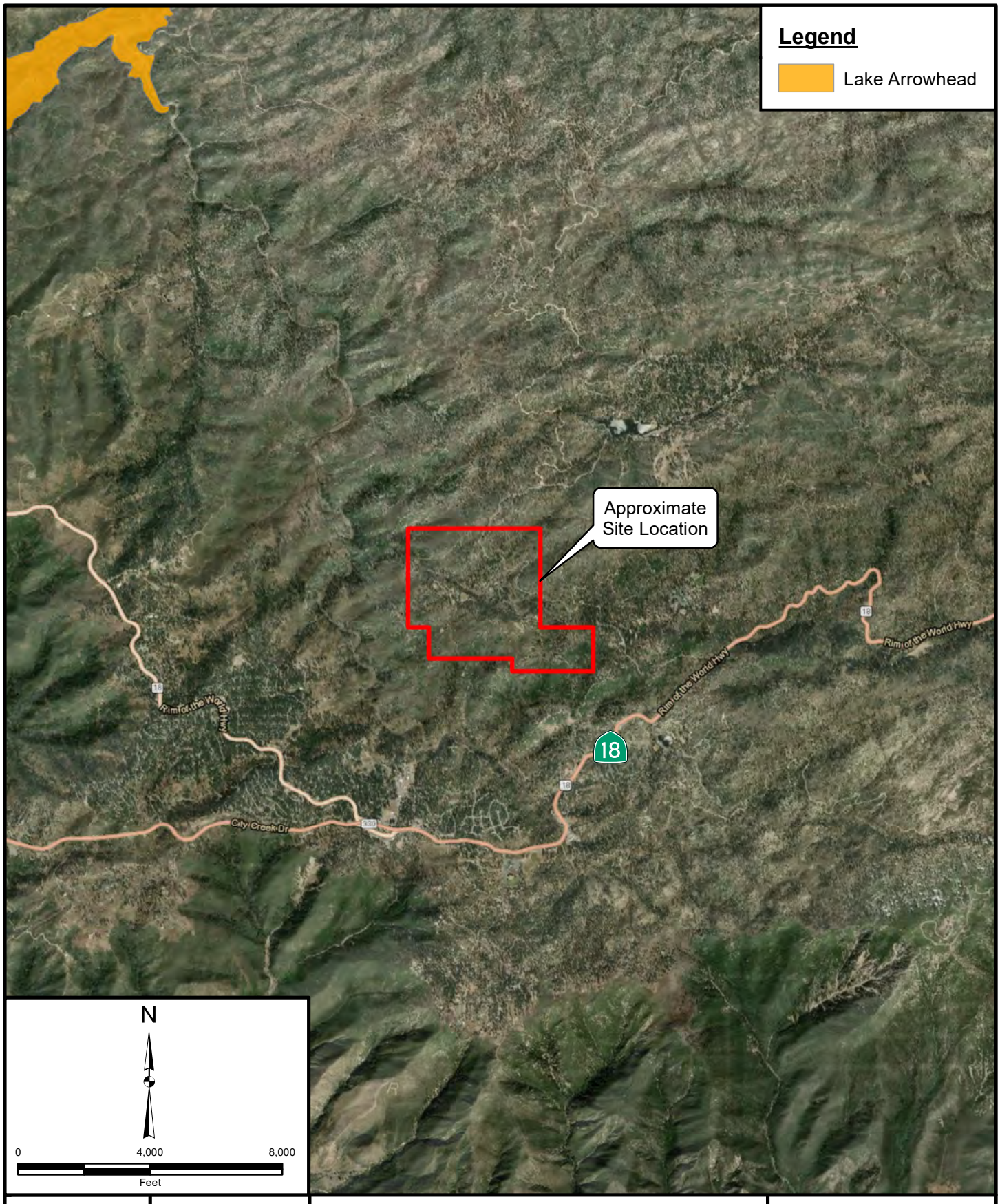

Project: 13655.001	Eng/Geol: JLH
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Base Map: ESRI ArcGIS Online 2023
Reference: Office of Emergency Services (2007),
Dept of Safety of Dams (2021)
National Inventory of Dams, Army Corps of Engrs (2021)

DAM INUNDATION MAP

Hume SoCal

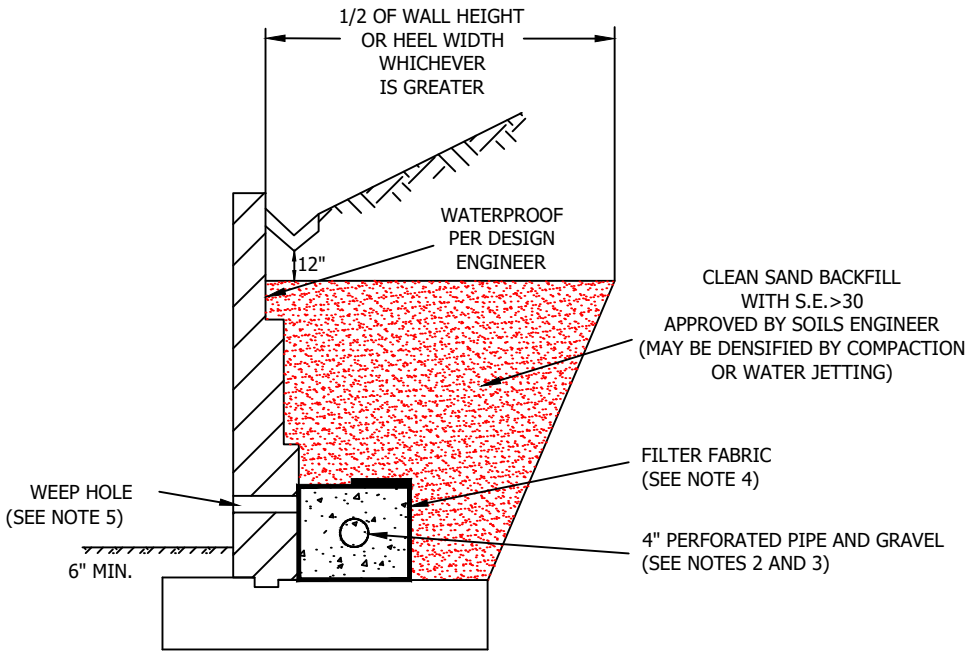
Green Valley Lake, California

FIGURE 6

Leighton

Map Saved as J:\Templates\MXD_Templates\StandardSet\Geotech\13655-001_F06_DIM_2023-11-22.mxd on 11/27/2023 12:25:22 PM Author: (mmurphy)

SUBDRAIN OPTIONS AND BACKFILL WHEN NATIVE MATERIAL HAS EXPANSION INDEX OF >50



NOTE: AS AN ALTERNATE TO CLEAN SAND BACKFILL, CLEAN GRAVEL MAY BE UTILIZED WITH APPROVED FILTER FABRIC. A SECOND ALTERNATE IS TO UTILIZE AN AGGREGATE BASE MATERIAL COMPACTED TO 90% RELATIVE COMPACTION. A SAMPLE OF THE PROPOSED BASE MUST BE APPROVED BY THE GEOTECHNICAL CONSULTANT PRIOR TO BACKFILL FOR SUITABILITY. COMPACTION SHOULD BE ACHIEVED WITHOUT DAMAGING THE WALL.

GENERAL NOTES:

* Waterproofing should be provided where moisture nuisance problem through the wall is undesirable.
* Water proofing of the walls is not under purview of the geotechnical engineer
* All drains should have a gradient of 1 percent minimum
*Outlet portion of the subdrain should have a 4-inch diameter solid pipe discharged into a suitable disposal area designed by the project engineer. The subdrain pipe should be accessible for maintenance (rodding)
*Other subdrain backfill options are subject to the review by the geotechnical engineer and modification of design parameters.

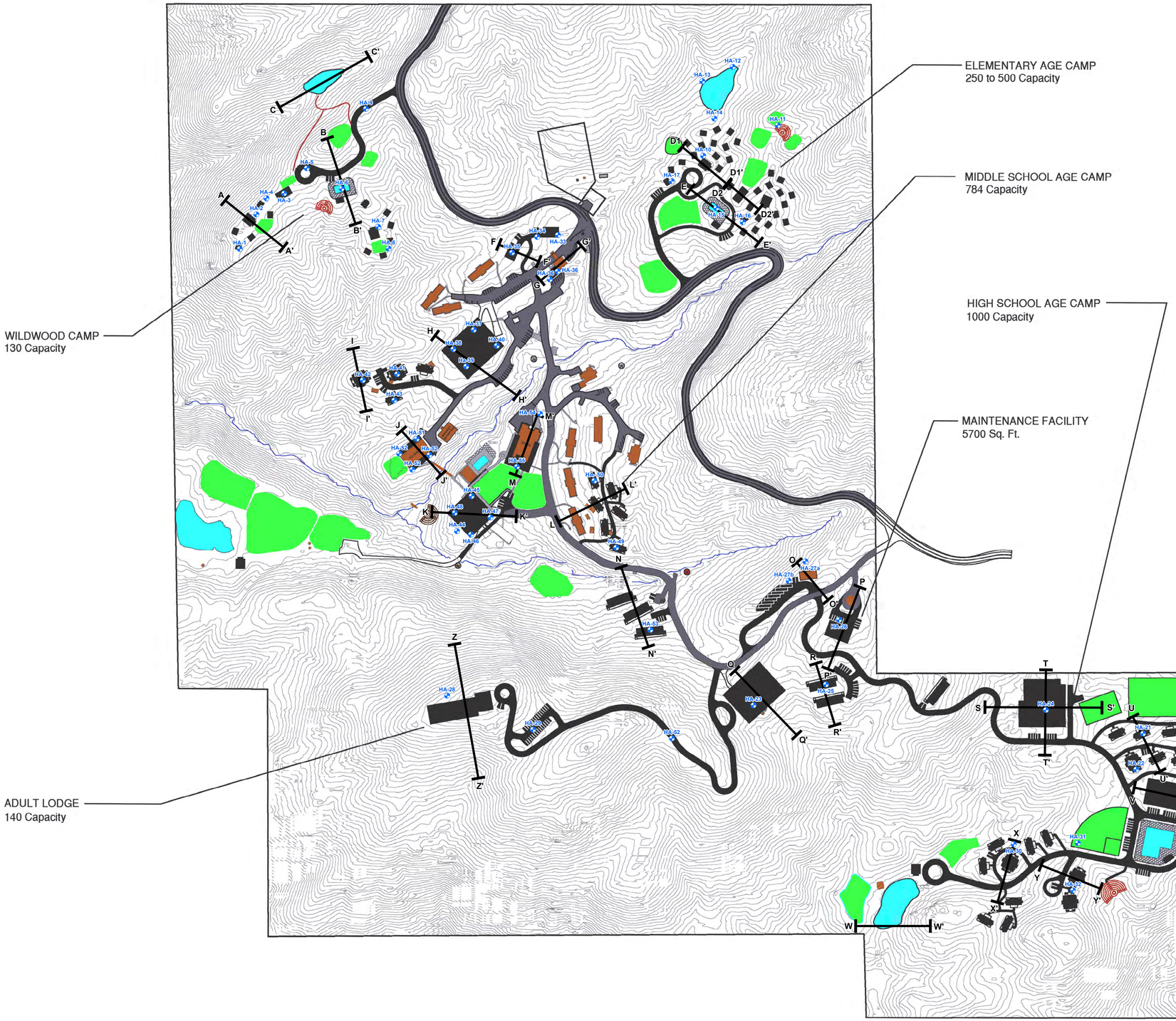
Notes:
1) Sand should have a sand equivalent of 30 or greater and may be densified by water jetting.
2) 1 Cu. ft. per ft. of 1/4- to 1 1/2-inch size gravel wrapped in filter fabric
3) Pipe type should be ASTM D1527 Acrylonitrile Butadiene Styrene (ABS) SDR35 or ASTM D1785 Polyvinyl Chloride plastic (PVC), Schedule 40, Armco A2000 PVC, or approved equivalent. Pipe should be installed with perforations down. Perforations should be 3/8 inch in diameter placed at the ends of a 120-degree arc in two rows at 3-inch on center (staggered)
4) Filter fabric should be Mirafi 140NC or approved equivalent.
5) Weephole should be 3-inch minimum diameter and provided at 10-foot maximum intervals. If exposure is permitted, weepholes should be located 12 inches above finished grade. If exposure is not permitted such as for a wall adjacent to a sidewalk/curb, a pipe under the sidewalk to be discharged through the curb face or equivalent should be provided. For a basement-type wall, a proper subdrain outlet system should be provided.
6) Retaining wall plans should be reviewed and approved by the geotechnical engineer.
7) Walls over six feet in height are subject to a special review by the geotechnical engineer and modifications to the above requirements.

FIGURE 7

RETAINING WALL BACKFILL AND SUBDRAIN DETAIL

WHEN NATIVE MATERIAL HAS EXPANSION INDEX OF >50

Leighton



LEGEND

HA-55 Approximate location auger boring

Z Z' Geologic Cross Section

N

0 200 400

Feet

GEOTECHNICAL MAP

Hume SoCal
Green Valley Lake, California

Leighton

PLATE 1
Scale: 1 " = 200 feet
Date: December 2023
Proj: 13655.001
Eng/Geol: JLH

Base Map: Preliminary Plan, January 9, 2023

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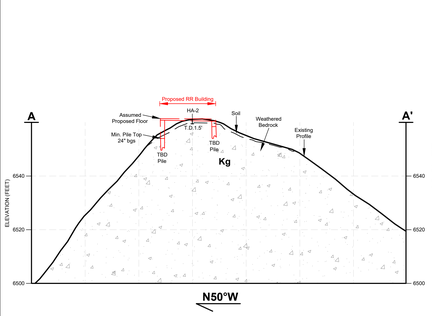

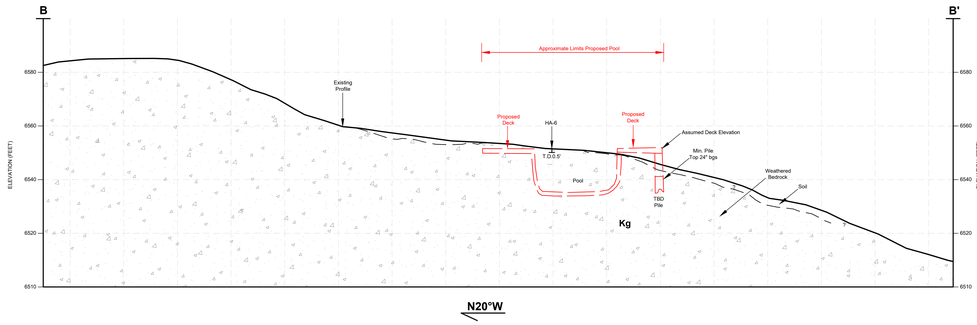

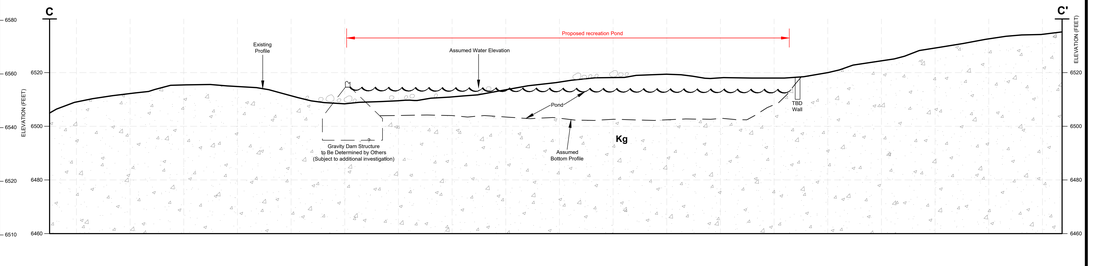

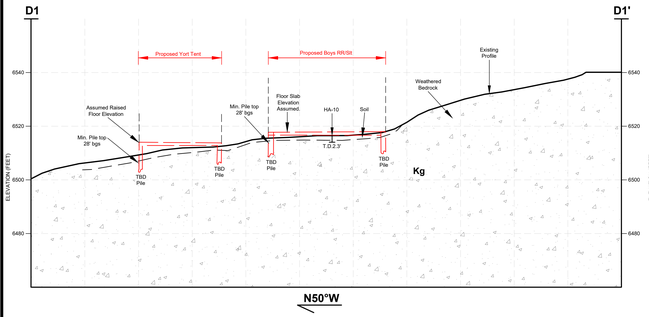

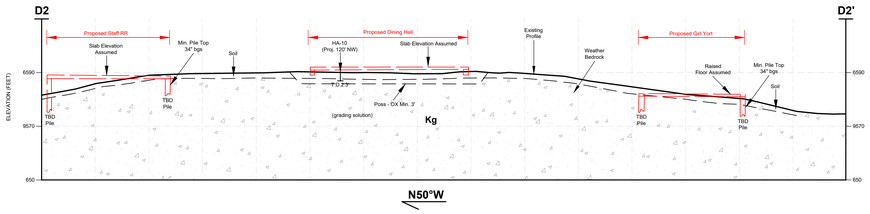

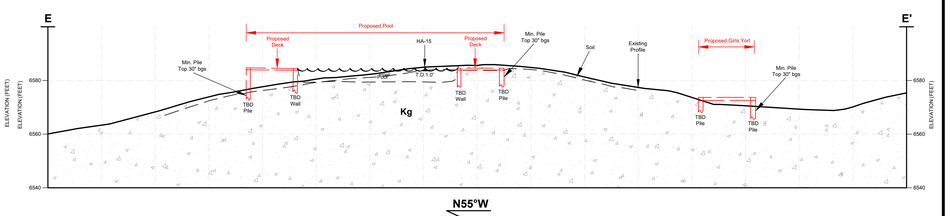

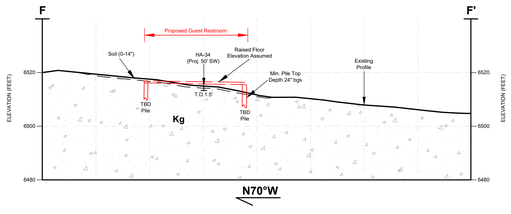

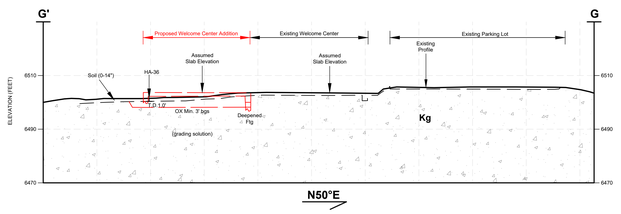

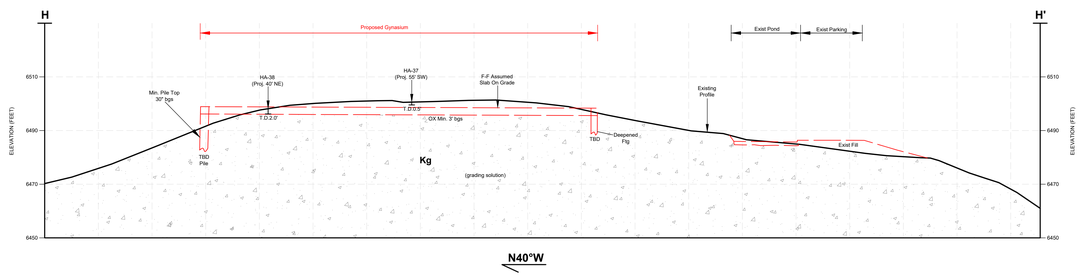

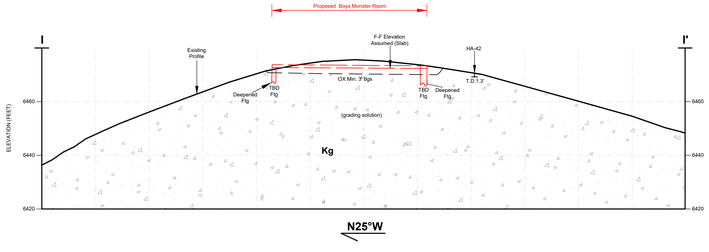

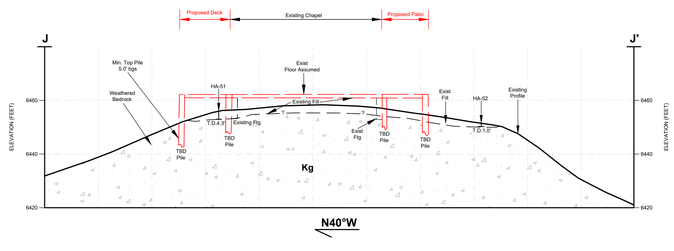

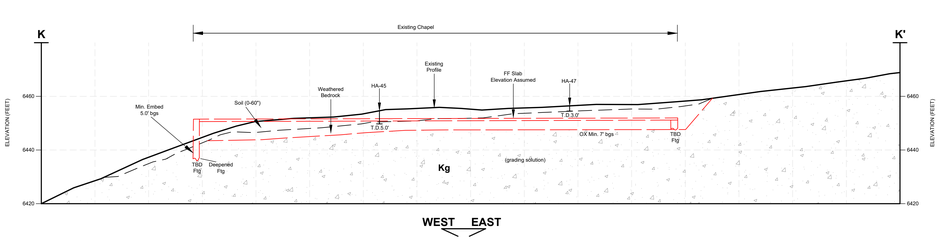

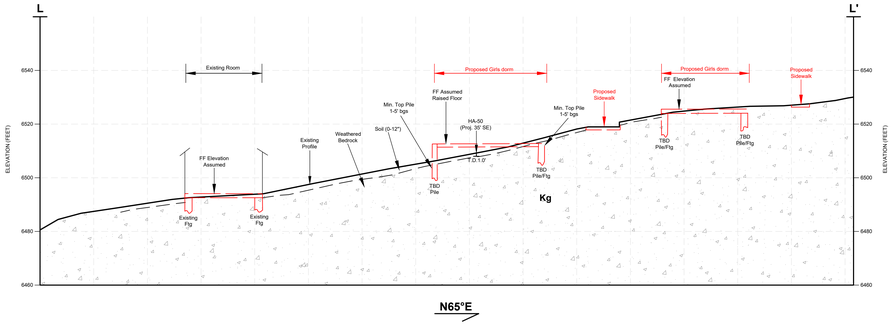

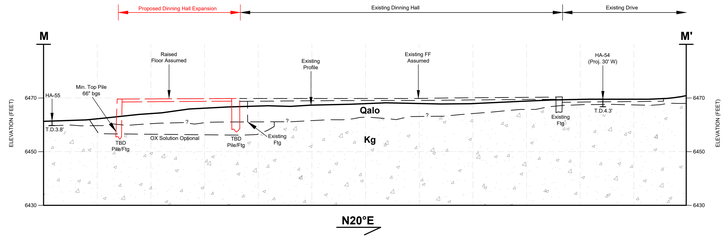

GEOTECHNICAL CROSS SECTIONS A-A' THROUGH M-M' Hume Socal Green Valley Lake, California	PLATE 2
	Scale: 1"=20'
	Date: December 2023
Leighton	Proj: 13655.001
	Eng/Geol: JLH

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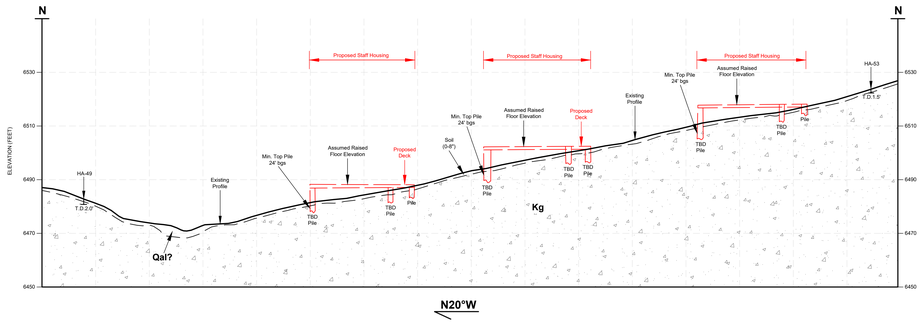

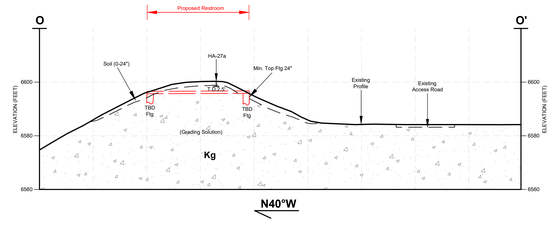

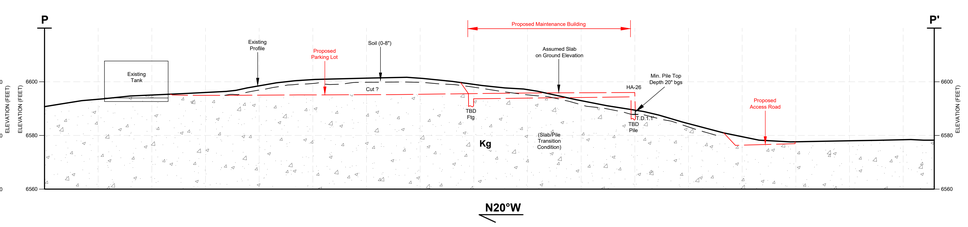

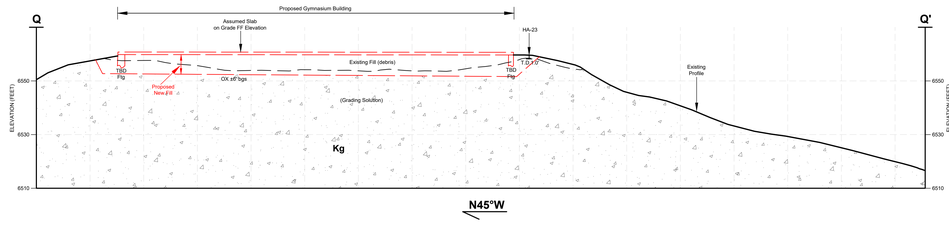

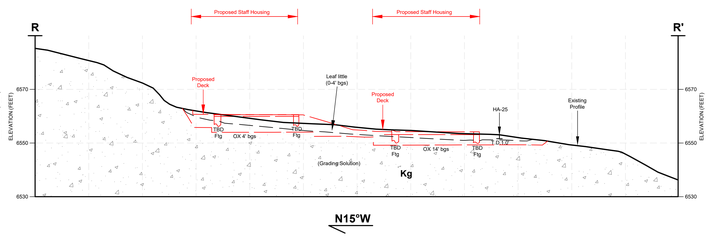

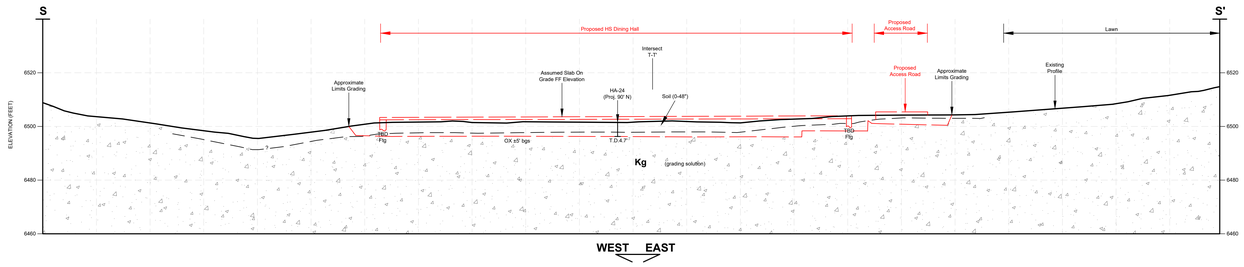

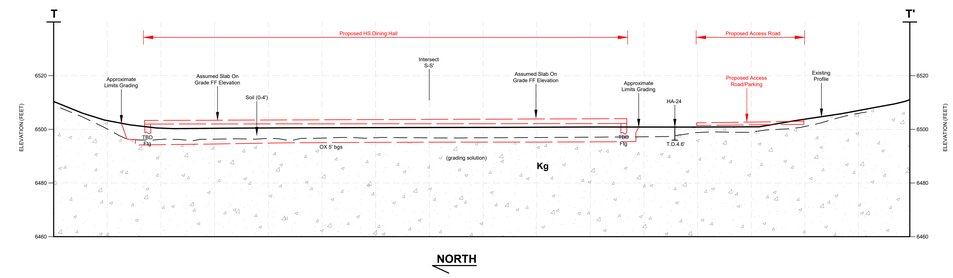

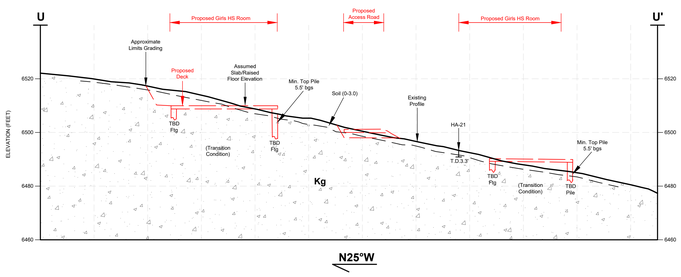

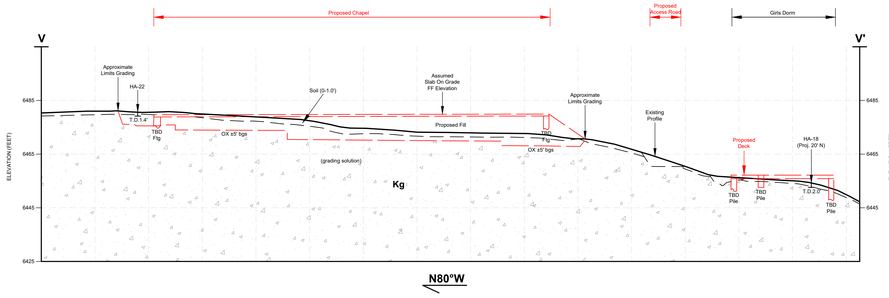

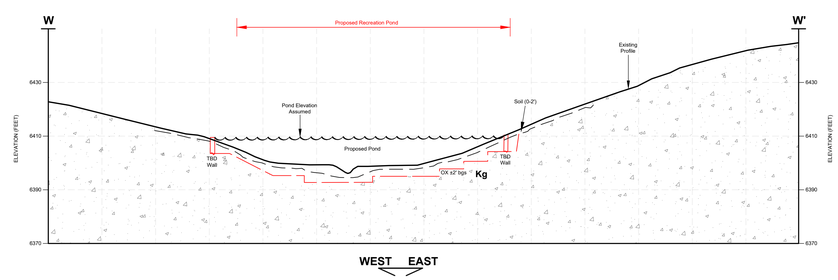

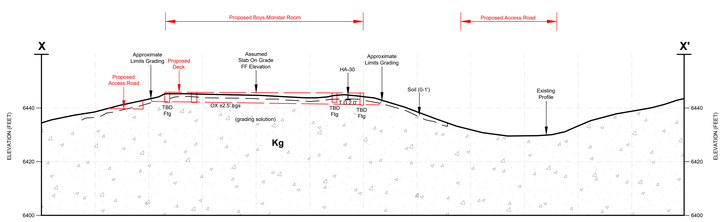

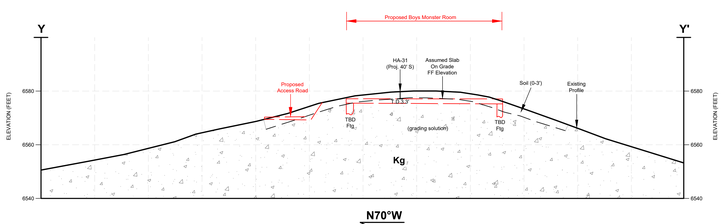

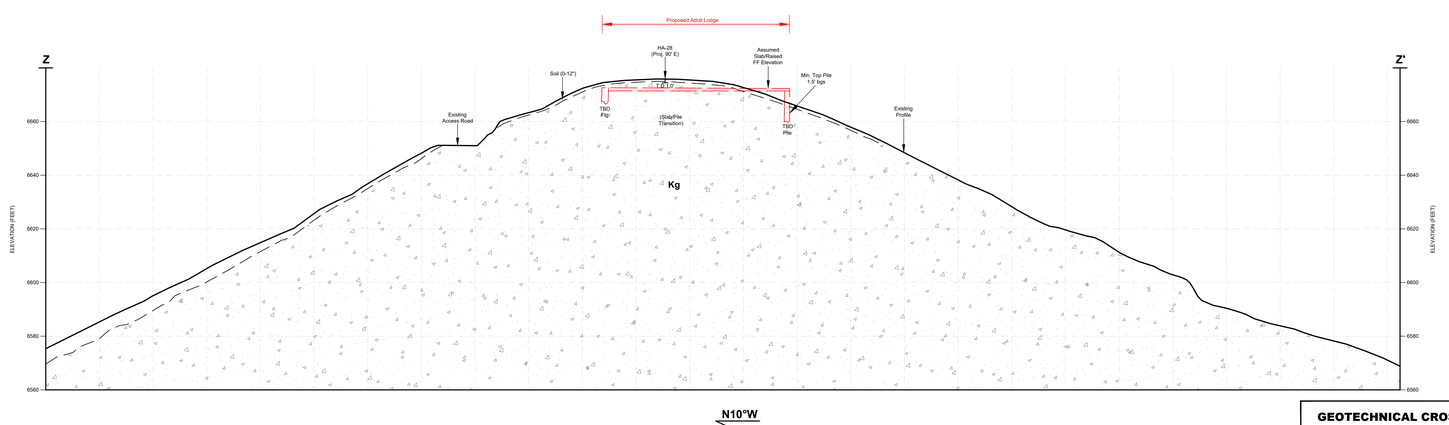

GEOTECHNICAL CROSS SECTIONS N-N' THROUGH Z-Z'

Hume Socal
Green Valley Lake, California

PLATE 3

Scale: 1"=20'

Date: December 2023

Leighton

Proj: 13655.001

Eng/Geol: JLH

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APPENDIX A

REFERENCES

APPENDIX A

REFERENCES

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APPENDIX B1

AUGER BORING SUMMARY

APPENDIX B - AUGER BORING SUMMARY

	Boring No.	TD (inches)	Soil (inches)	Weathered Bedrock	Harder Bedrock (inches)	Contingent Harder Bedrock (+6 inches) Top Pile Embedment	Location	Condition	Sample	Reference Cross Section	Prefered Structrual Support Solution
WILDWOOD CAMP	HA-1	16	0-10	10-16	16	22	Girls Dorm	Ridgeline Nose TOS			
	HA-2	18	0-16	16-18	18	24	Girls Restroom/Showers	Ridgeline TOS		A-A'	Piles
	HA-3	20	0-20	20-24	24	30	G. Dining Canopy	Ridgeline TOS to SE Facing 3:1	MB-1		
	HA-4	12	0-6	6-12	12	18	Girls Dorm	Ridgeline TOS to SE Facing 3:1			
	HA-5a/b	12	0-8	8-12	12	18	Access Road	Ridgeline TOS	MB-2/3		
	HA-6	6	0-6	6-8	8	14	Pool	Mid-Slope Terrace		B-B'	piles & grading
	HA-7	24	0-12	12-24	24	30	Boys Restroom/Showers	Mid-Slope Terrace			
	HA-8	28	0-20	20-28	28	34	Boys Dorm	S. Facing Slope 3:1			
	HA-9	6	6	0-6	6	12	Access Road	Existing Road level	MB-4a/b/c		
							Dining Hall			D2-D2'	grading
							Staff Restroom			D2-D2'	piles
							Girls Yort			D2-D2'	piles
ELEMENTARY CAMP	HA-10	28	0-24	24-28	28	34	Boys Restroom/Showers		MB-5	D1-D1'	piles & grading
	HA-11	20	0-16	16-20	20	26	Theater	2:1 west facing slope			
	HA-12	12	0-12		12	18	Pond	crk axis			
	HA-13	16	0-16	72"?	72"?	78?	Pond	n. side pond	refusal		
	HA-14	48	0-40	40-48	48	54	Pond	W. pond			
	HA-15	0-12	0-12	12-24	24	30	Pool	6:1 slope	MB-6	E-E'	grading
	HA-16						Girls Dorm				
	HA-17	54	0-42	54	54	60	Access Road		MB-7a/b		
HS CAMP	HA-18	24	0-24	24-36	36	42	Girls Dorm				
	HA-19								MB-8		
	HA-20	6	0-6	6	6	12	Girls Dorm	gentle slope			
	HA-21	40	0-36	36-40	60	66	Girls Dorm	4:1 slope	MB-9	U-U'	piles & grading
	HA-22	14	0-6	6-14	14	20	Chapel	False knob topo	MB-10	V-V'	grading
	HA-23	8	0-8	8	8	14	Gynmasium	toe of ridge slope		Q-Q'	grading
	HA-24	56	0-48	48-56	60	66	Dining	upper ponded channel lea area	MB-11	S-S'	grading
	HA-25	12	0-12	12	12	18	Staff Housing	Gently slopes	MB-12a/b	R-R'	grading
	HA-26	13	0-8	8-13	13	19	Maintenance Facility	4:1 slope	MB-13	P-P'	piles & grading
	HA-27a	30	0-24	24-30	30	36	Bus Pkg Restroom	1:1 to 2:1 slope	MB-14	O-O'	grading
	HA-27b	10	0-6	6-10	10	16	Bus Pkg Lot	channel axis and side slope	MB-15a		
	HA-28	12	0-12	12	12	18	Adult Lodge	nose of ridge 2:1		Z-Z'	piles & grading
	HA-29	36	0-24	24-36	36	42	Adult Lodge Pkg	saddle between peaks	MB-15b		
	HA-30	24	0-12	12-24	24	30	Boys Monster Dorm	axix of dry creek 5:1 to 2:1 slopes	MB-16	X-X'	grading
	HA-31	40	0-36	30-40	40	46	Boys Monster Dorm	amphatheater-like slope topo	MB-17	Y-Y'	grading
	HA-32	24	0-6	6-24	24	30	Boys Monster Dorm	saddle and W. facing 4:1 slope	MB-19		
JH CAMP	HA-33	52	0-42	42-48	48-52	58	Director Housing	meadow low-land	MB-20		
	HA-34	18	0-14	14-18	18	24	Director housing	terrace portion			
	HA-35	40	0-20	20-40	40	46	Guest Speaker housing	6:1 slope			
							Guest Restroom			F-F'	piles
	HA-36	12	0-12	12	12	18	Welcome Ctr Expansion	parking lot area		G-G'	grading
	HA-37						Gymnasium	existing maint/equip yard	gentle mesa slope	H-H'	piles & grading
	HA-38	24	0	0-24	24	30	Gymnasium	existing maint/equip yard	MB-21a	H-H'	piles & grading
	HA-39	48	0-48	48	48	56	Gymnasium	existing maint/equip yard	gentle mesa slope		
	HA-40	48	0-46	46-48	48	56	Gymnasium	existing maint/equip yard	top of 2:1 cut slope		
	HA-41	30	0-12	12-30	30	36	Monster Dorm East	nose of elevated bedrock ridge	existing tent cabin		
	HA-42	16	0-3	3-16			Monster Dorm West	nose of elevated bedrock ridge	MB-21b	I-I'	piles & grading
	HA-43	24	0	0-24	24	30	Dorm south	side slope 3:1	MB-22		
	HA-44	46	0-30	30-46	46	52	Chapel	level adja existing bldg	MB-24		
	HA-45	60	0-48	48-60	60	66	Chapel	level adja existing bldg	MB-23	K-K'	piles & grading
	HA-46	48	0-48	48-60	60	66	Chapel	TOP OF SLOPE			
	HA-47	36	0-36	36	36	42	Chapel	level adja existing bldg			
	HA-48	24	0-18	18-24	24	30	Chapel	sloped area perimeter			
	HA-49	24	0-3	3-24	24	30	Girls Dorm	sloped area w. 3:1	MB-25		
	HA-50	12	0-3	3-12	12	18	Girls Dorm	sloped area w. 3:1	MB-26	L-L'	piles
	HA-51	52	0-52	52	56	62	NW Chapel Deck	flat mesa	MB-27		
	HA-52a	12	0-12	12	12	18	NE Chapel Deck	flat mesa		J-J'	piles
	HA-52d	6	0	0-6	6	12	Adult Lodge Access Rd	flat mesa	MB-28		
	HA-53	18	0-8	8-18	18	24	Staff Housing	4:1 slope	MB-29	N-N'	piles
	HA-54	54	0-36	36-54	54	60	NE Dining Hall	2:1 slope	MB-30		
	HA-55	44	0-60	60	60	66	Staff Dining Hall	sloped terrace	MB-31	M-M'	grading

APPENDIX B2

FIELD EXPLORATION

Our exploration included a reconnaissance of accessible site areas to evaluate access and observe general geologic conditions and potential hazards. Once a conceptual site plan become available, our staff advanced a total of 55 small diameter borings were advanced using manual hand auger equipment and breaker bar efforts. The borings were cited in areas of planned improvements, and are generally representative of surrounding conditions. The borings were drilled until refusal in bedrock was encountered, typically less than 5 feet below the existing ground surface. Encountered soils were continuously logged in the field by our representative and described in accordance with the Unified Soil Classification System (ASTM D2488). A description of soil properties encountered in each boring and other related information are documented in a spreadsheet attached as Appendix B, *Auger Boring Log Summary*. Boring locations are plotted on attached Plate 1, *Geotechnical Map*.

Bulk samples of native soil and/or artificial fill were collected from the borings. In addition to representative soils, samples of bedrock were also collected for physical strength testing. Soil samples were transported to our Irvine geotechnical laboratory for geotechnical testing. After sampling and logging, all borings were immediately backfilled with excavated soils.

Boundaries (depths) between soil or geologic units noted on logs are based on field observations and results of geotechnical laboratory tests. The resultant logs were incorporated into a series of 27 cross sections. The sections depict the existing surface profile, distribution of underlying soil and bedrock, the footprint of proposed buildings with assumed floor elevations, and conceptualized layout of foundation types suitable for the prevailing conditions.

It is possible that passage of time could alter conditions due to environmental changes, fluctuations in groundwater, or occurrence of a significant geological event such as an earthquake.

APPENDIX C

LABORATORY TEST DATA

TESTS for SULFATE CONTENT
CHLORIDE CONTENT and pH of SOILS

Project Name: Hume SoCal Camp | Tested By : GEB/GB | Date: 08/16/23

Project No. : 13655.001 | Checked By: J. Ward | Date: 10/19/23

Boring No.	HA-5a	HA-15	HA-19	HA-27
Sample No.	MB-2a & b	MB-6	MB-8	MB-14
Sample Depth (ft)	0-12"	12-24"	12-16"	24-30"
Soil Identification:	Brownish gray SM, organics	Olive yellow SP	Olive yellow SP, organics	Olive yellow SP
Wet Weight of Soil + Container (g)	131.27	206.97	207.30	202.63
Dry Weight of Soil + Container (g)	129.32	201.06	199.07	198.23
Weight of Container (g)	52.66	57.50	59.21	61.62
Moisture Content (%)	2.54	4.12	5.88	3.22
Weight of Soaked Soil (g)	100.73	100.39	100.15	100.76

SULFATE CONTENT, DOT California Test 417, Part II

Beaker No.	404	5	8	17
Crucible No.	305	6	9	7
Furnace Temperature (°C)	860	860	860	860
Time In / Time Out	8:00/8:45	8:00/8:45	8:00/8:45	8:00/8:45
Duration of Combustion (min)	45	45	45	45
Wt. of Crucible + Residue (g)	60.8511	25.7529	22.5071	22.7095
Wt. of Crucible (g)	60.8494	25.7463	22.5021	22.7072
Wt. of Residue (g) (A)	0.0017	0.0066	0.0050	0.0023
PPM of Sulfate (A) x 41150	69.95	271.59	205.75	94.64
PPM of Sulfate, Dry Weight Basis	**72**	**283**	**219**	**98**

CHLORIDE CONTENT, DOT California Test 422

ml of Extract For Titration (B)	30	15	30	30
ml of $AgNO_3$ Soln. Used in Titration (C)	1.6	0.4	0.7	0.6
PPM of Chloride (C -0.2) * 100 * 30 / B	140	40	50	40
PPM of Chloride, Dry Wt. Basis	**144**	**42**	**53**	**41**

pH TEST, DOT California Test 643

pH Value	**5.68**	**5.33**	**5.37**	**5.88**
Temperature °C	22.0	22.7	22.7	22.5

SOIL RESISTIVITY TEST

DOT CA TEST 643

Project Name:	Hume SoCal Camp		Tested By :	G. Berdy	Date: 08/22/23
Project No. :	13655.001		Checked By:	J. Ward	Date: 10/19/23
Boring No.:	HA-5a		Depth (ft.) :	0-12"	
Sample No. :	MB-2a & b				

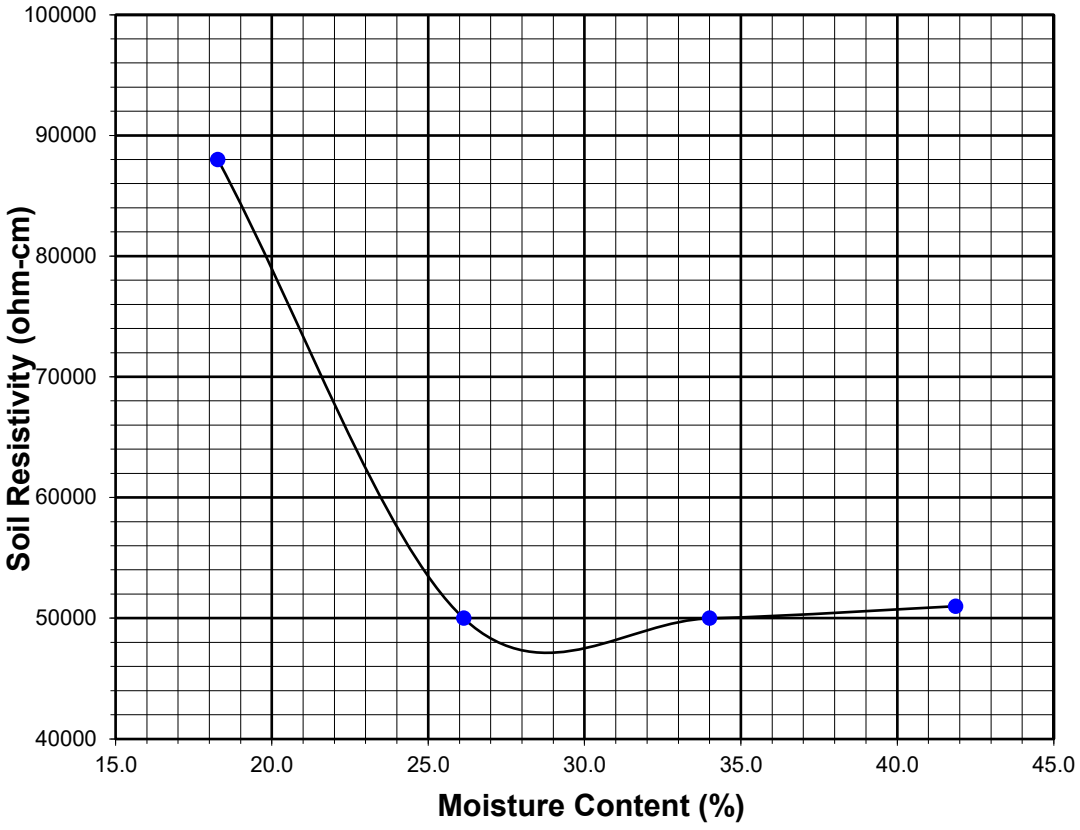
Soil Identification:* Brownish gray SM, organics

*California Test 643 requires soil specimens to consist only of portions of samples passing through the No. 8 US Standard Sieve before resistivity testing. Therefore, this test method may not be representative for coarser materials.

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	20	18.27	88000	88000
2	30	26.14	50000	50000
3	40	34.00	50000	50000
4	50	41.86	51000	51000
5				

Moisture Content (%) (MCi)	2.54
Wet Wt. of Soil + Cont. (g)	131.27
Dry Wt. of Soil + Cont. (g)	129.32
Wt. of Container (g)	52.66
Container No.	
Initial Soil Wt. (g) (Wt)	130.40
Box Constant	1.000
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 643	
47000	**28.8**	**72**	**144**	**5.68**	**22.0**



SOIL RESISTIVITY TEST

DOT CA TEST 643

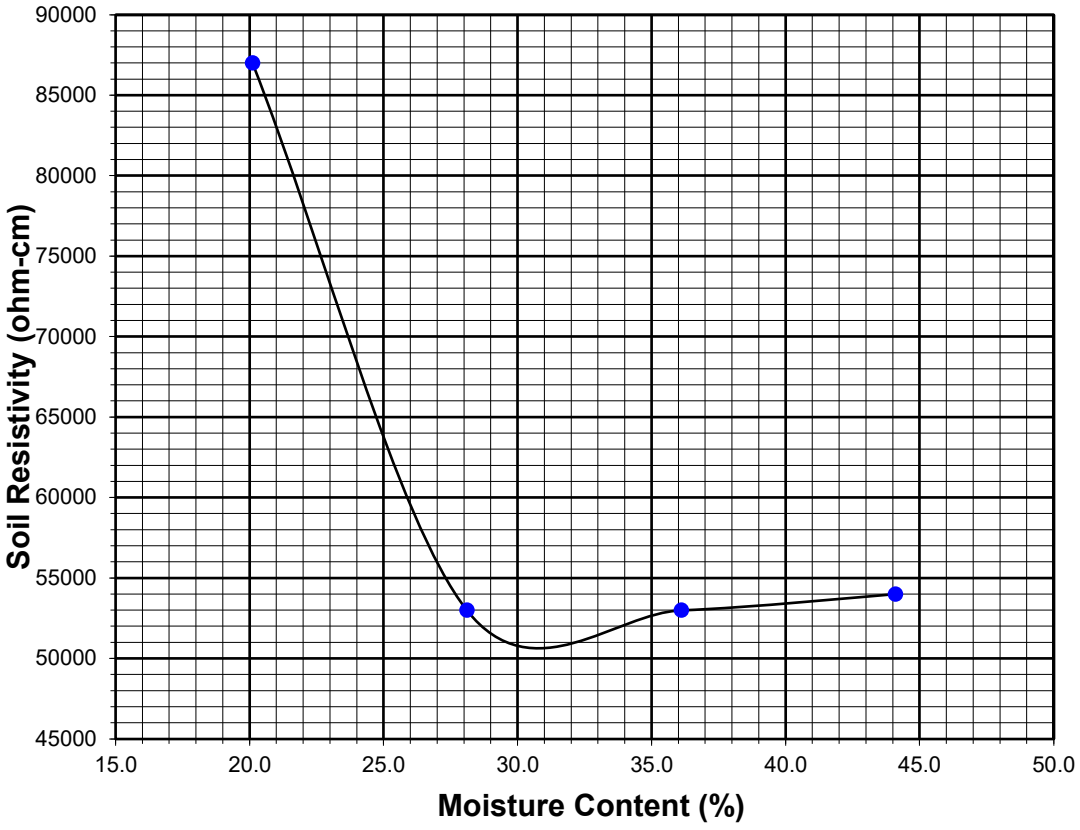
Project Name:	Hume SoCal Camp		Tested By :	G. Berdy	Date: 08/22/23
Project No. :	13655.001		Checked By:	J. Ward	Date: 10/19/23
Boring No.:	HA-15		Depth (ft.) :	12-24"	
Sample No. :	MB-6				
Soil Identification:*	Olive yellow SP				

*California Test 643 requires soil specimens to consist only of portions of samples passing through the No. 8 US Standard Sieve before resistivity testing. Therefore, this test method may not be representative for coarser materials.

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	20	20.11	87000	87000
2	30	28.11	53000	53000
3	40	36.11	53000	53000
4	50	44.11	54000	54000
5				

Moisture Content (%) (MCi)	4.12
Wet Wt. of Soil + Cont. (g)	206.97
Dry Wt. of Soil + Cont. (g)	201.06
Wt. of Container (g)	57.50
Container No.	
Initial Soil Wt. (g) (Wt)	130.18
Box Constant	1.000
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 643	
50500	**30.7**	**283**	**42**	**5.33**	**22.7**



SOIL RESISTIVITY TEST

DOT CA TEST 643

Project Name:	Hume SoCal Camp		Tested By :	G. Berdy	Date: 08/22/23
Project No. :	13655.001		Checked By:	J. Ward	Date: 10/19/23
Boring No.:	HA-19		Depth (ft.) :	12-16"	
Sample No. :	MB-8				

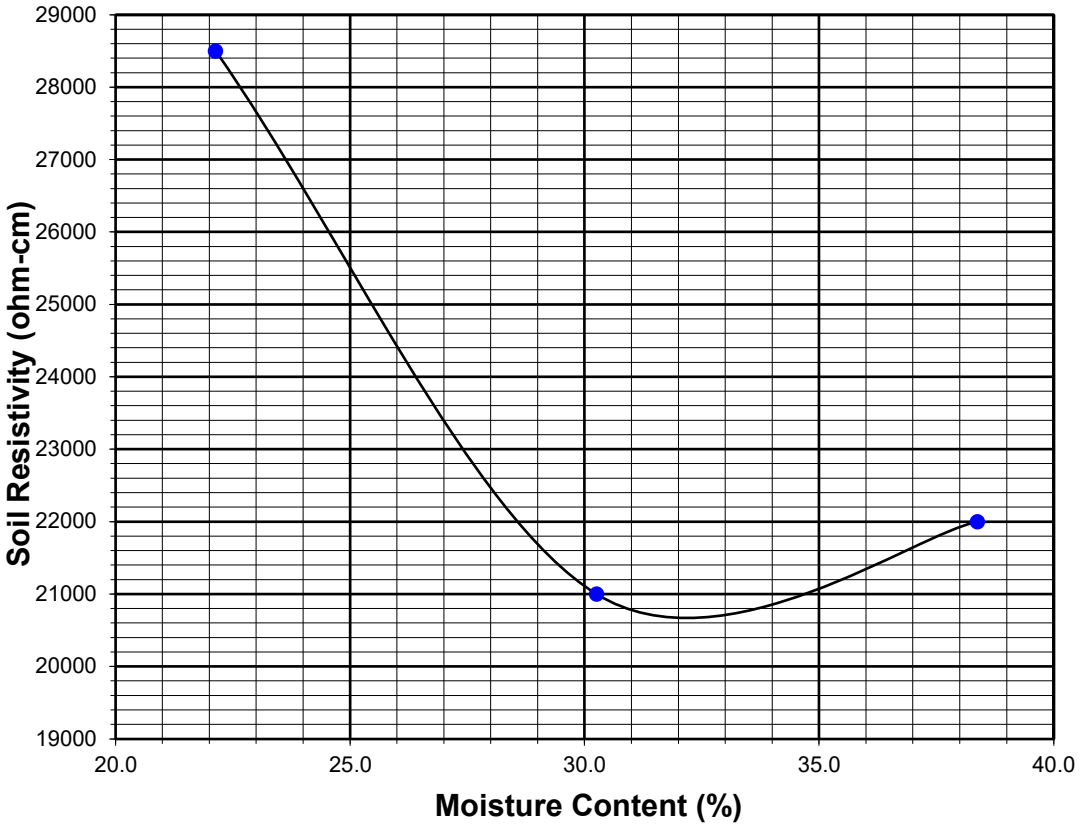
Soil Identification:* Olive yellow SP, organics

*California Test 643 requires soil specimens to consist only of portions of samples passing through the No. 8 US Standard Sieve before resistivity testing. Therefore, this test method may not be representative for coarser materials.

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	20	22.13	28500	28500
2	30	30.25	21000	21000
3	40	38.38	22000	22000
4				
5				

Moisture Content (%) (MCi)	5.88
Wet Wt. of Soil + Cont. (g)	207.30
Dry Wt. of Soil + Cont. (g)	199.07
Wt. of Container (g)	59.21
Container No.	
Initial Soil Wt. (g) (Wt)	130.35
Box Constant	1.000
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 643	
20600	**32.1**	**219**	**53**	**5.37**	**22.7**



SOIL RESISTIVITY TEST

DOT CA TEST 643

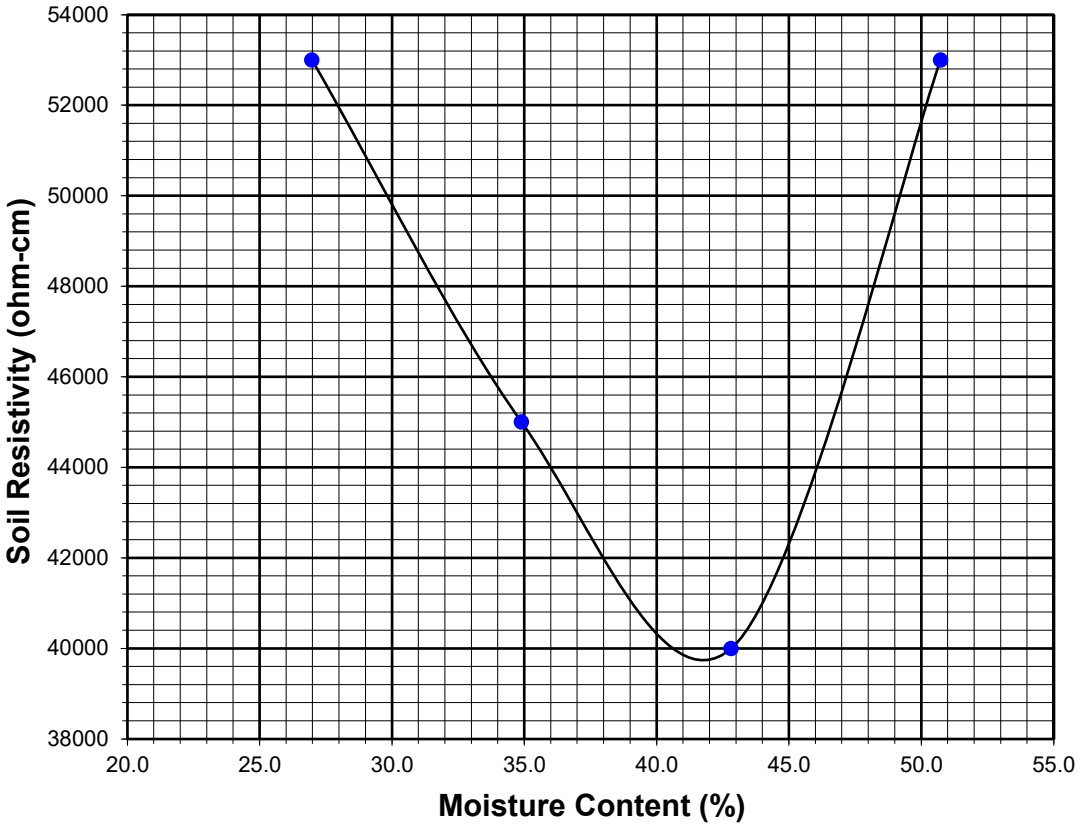
Project Name:	Hume SoCal Camp		Tested By :	G. Berdy	Date: 08/22/23
Project No. :	13655.001		Checked By:	J. Ward	Date: 10/19/23
Boring No.:	HA-27		Depth (ft.) :	24-30"	
Sample No. :	MB-14				
Soil Identification:*	Olive yellow SP				

*California Test 643 requires soil specimens to consist only of portions of samples passing through the No. 8 US Standard Sieve before resistivity testing. Therefore, this test method may not be representative for coarser materials.

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	30	26.98	53000	53000
2	40	34.89	45000	45000
3	50	42.81	40000	40000
4	60	50.73	53000	53000
5				

Moisture Content (%) (MCi)	3.22
Wet Wt. of Soil + Cont. (g)	202.63
Dry Wt. of Soil + Cont. (g)	198.23
Wt. of Container (g)	61.62
Container No.	
Initial Soil Wt. (g) (Wt)	130.36
Box Constant	1.000
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 643	
39600	**41.8**	**98**	**41**	**5.88**	**22.5**



TESTS for SULFATE CONTENT
CHLORIDE CONTENT and pH of SOILS

Project Name: Hume SoCal Camp | Tested By : G. Berdy | Date: 08/16/23

Project No. : 13655.001 | Checked By: J. Ward | Date: 10/19/23

Boring No.	HA-37	HA-17		
Sample No.	MB-22a	MB-31		
Sample Depth (ft)	16-24"	36-40"		
Soil Identification:	Olive yellow SP, organics	Olive yellow SP, organics		
Wet Weight of Soil + Container (g)	159.39	218.25		
Dry Weight of Soil + Container (g)	151.89	211.60		
Weight of Container (g)	59.21	59.16		
Moisture Content (%)	8.09	4.36		
Weight of Soaked Soil (g)	100.12	100.12		

SULFATE CONTENT, DOT California Test 417, Part II

Beaker No.	403	92		
Crucible No.	4	2		
Furnace Temperature (°C)	860	860		
Time In / Time Out	8:00/8:45	8:00/8:45		
Duration of Combustion (min)	45	45		
Wt. of Crucible + Residue (g)	21.6323	28.7231		
Wt. of Crucible (g)	21.6301	28.7190		
Wt. of Residue (g) (A)	0.0022	0.0041		
PPM of Sulfate (A) x 41150	90.53	168.71		
PPM of Sulfate, Dry Weight Basis	**99**	**176**		

CHLORIDE CONTENT, DOT California Test 422

ml of Extract For Titration (B)	30	30		
ml of AgNO3 Soln. Used in Titration (C)	0.6	1.4		
PPM of Chloride (C -0.2) * 100 * 30 / B	40	120		
PPM of Chloride, Dry Wt. Basis	**44**	**125**		

pH TEST, DOT California Test 643

pH Value	**5.33**	**5.40**		
Temperature °C	22.8	22.6		

SOIL RESISTIVITY TEST

DOT CA TEST 643

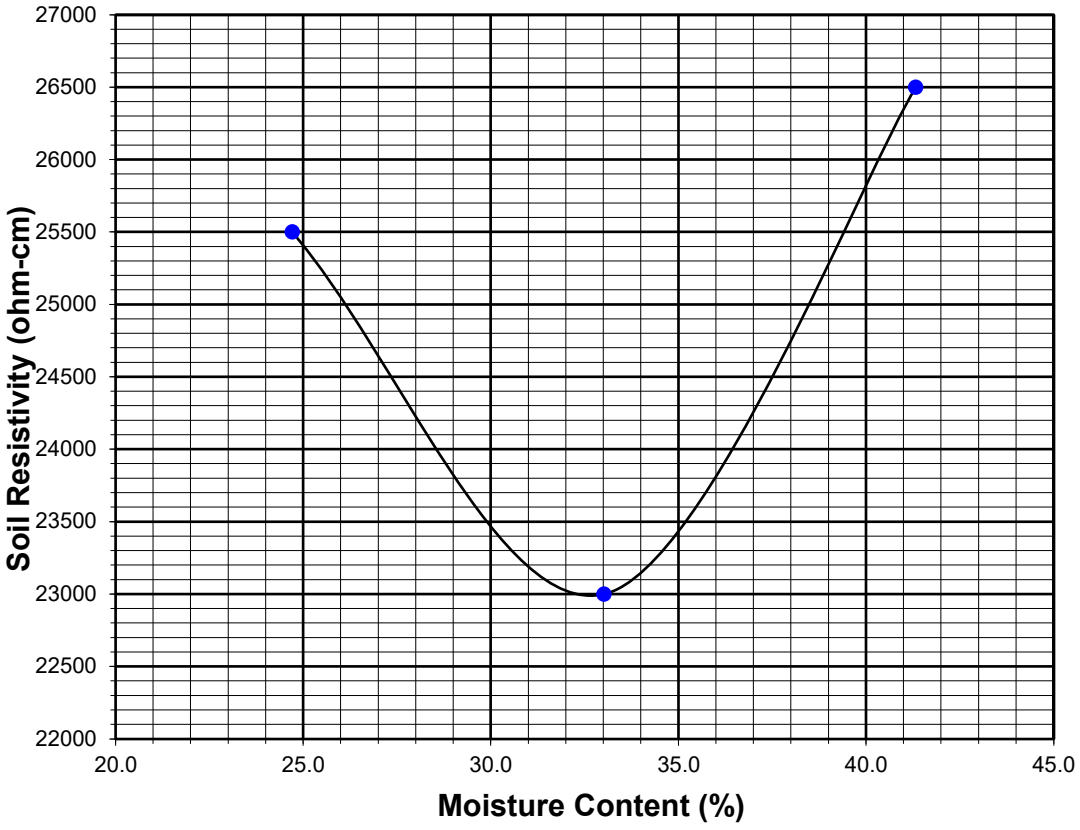
Project Name:	Hume SoCal Camp		Tested By :	G. Berdy	Date: 08/22/23
Project No. :	13655.001		Checked By:	J. Ward	Date: 10/19/23
Boring No.:	HA-37		Depth (ft.) :	16-24"	
Sample No. :	MB-22a				
Soil Identification:*	Olive yellow SP, organics				

*California Test 643 requires soil specimens to consist only of portions of samples passing through the No. 8 US Standard Sieve before resistivity testing. Therefore, this test method may not be representative for coarser materials.

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	20	24.71	25500	25500
2	30	33.02	23000	23000
3	40	41.33	26500	26500
4				
5				

Moisture Content (%) (MCi)	8.09
Wet Wt. of Soil + Cont. (g)	159.39
Dry Wt. of Soil + Cont. (g)	151.89
Wt. of Container (g)	59.21
Container No.	
Initial Soil Wt. (g) (Wt)	130.10
Box Constant	1.000
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 643	
23000	**32.7**	**99**	**44**	**5.33**	**22.8**



SOIL RESISTIVITY TEST

DOT CA TEST 643

Project Name:	Hume SoCal Camp		Tested By :	G. Berdy	Date: 08/22/23
Project No. :	13655.001		Checked By:	J. Ward	Date: 10/19/23
Boring No.:	HA-17		Depth (ft.) :	36-40"	
Sample No. :	MB-31				

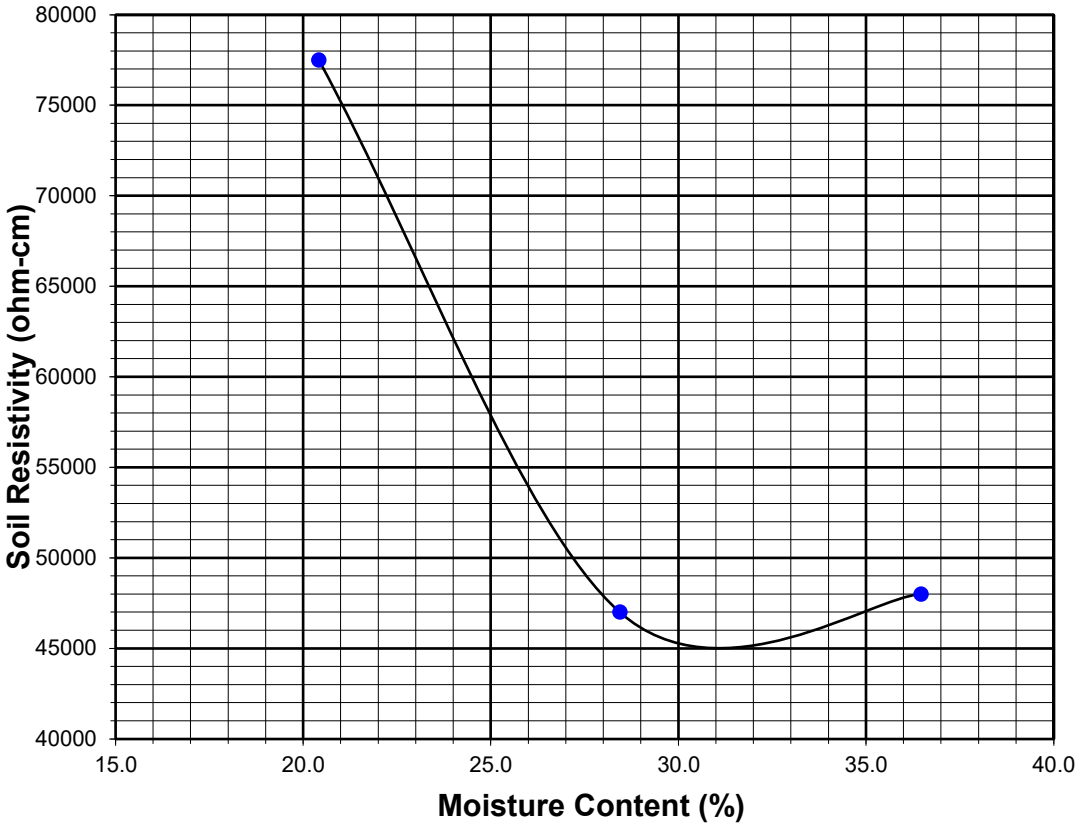
Soil Identification:* Olive yellow SP, organics

*California Test 643 requires soil specimens to consist only of portions of samples passing through the No. 8 US Standard Sieve before resistivity testing. Therefore, this test method may not be representative for coarser materials.

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	20	20.41	77500	77500
2	30	28.44	47000	47000
3	40	36.47	48000	48000
4				
5				

Moisture Content (%) (MCi)	4.36
Wet Wt. of Soil + Cont. (g)	218.25
Dry Wt. of Soil + Cont. (g)	211.60
Wt. of Container (g)	59.16
Container No.	
Initial Soil Wt. (g) (Wt)	130.03
Box Constant	1.000
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 643	
45000	**31.1**	**176**	**125**	**5.40**	**22.6**

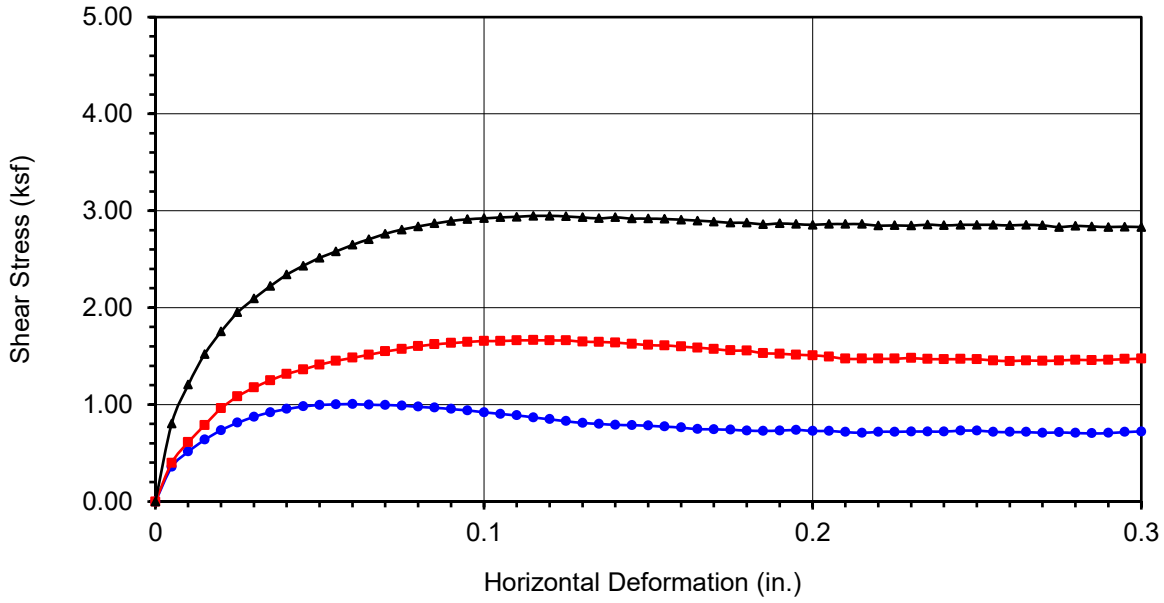


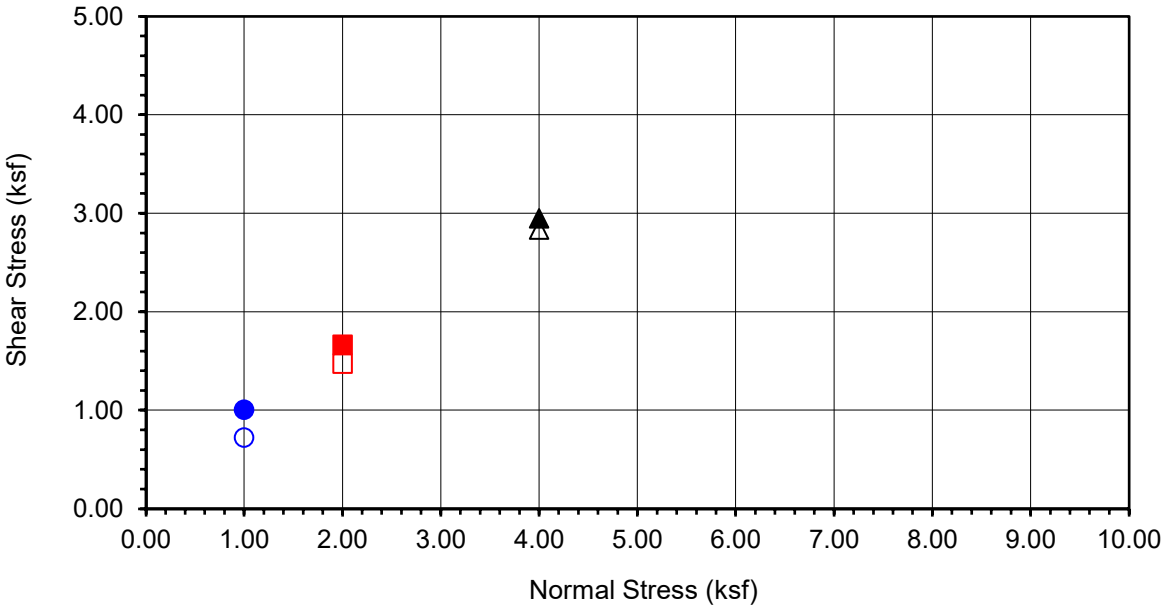
DIRECT SHEAR TEST

Consolidated Drained - ASTM D 3080

Project Name:	Hume SoCal Camp	Tested By:	G. Bathala	Date:	08/18/23
Project No.:	13655.001	Checked By:	J. Ward	Date:	10/19/23
Boring No.:	HA-23, 25a, 25b	Sample Type:	90% Remold		
Sample No.:	MB-11, 12a, 12b	Depth (ft.):	Composite		
Soil Identification:	Dark brown silty sand (SM)				

Sample Diameter(in):	2.415	2.415	2.415
Sample Thickness(in.):	1.000	1.000	1.000
Weight of Sample + ring(gm):	190.07	190.17	189.52
Weight of Ring(gm):	45.53	45.47	44.56
Before Shearing			
Weight of Wet Sample+Cont.(gm):	237.08	237.08	237.08
Weight of Dry Sample+Cont.(gm):	218.92	218.92	218.92
Weight of Container(gm):	64.19	64.19	64.19
Vertical Rdg.(in): Initial	0.2569	0.2315	0.0000
Vertical Rdg.(in): Final	0.2728	0.2531	-0.0276
After Shearing			
Weight of Wet Sample+Cont.(gm):	199.95	220.06	216.26
Weight of Dry Sample+Cont.(gm):	178.70	199.11	195.60
Weight of Container(gm):	52.01	71.79	67.68
Specific Gravity (Assumed):	2.70	2.70	2.70
Water Density(pcf):	62.43	62.43	62.43





Boring No.	**HA-23, 25a, 25b**
Sample No.	**MB-11, 12a, 12b**
Depth (ft)	**Composite**
Sample Type: 90% Remold	
Soil Identification: Dark brown silty sand (SM)	

Normal Stress (kip/ft²)	1.000	2.000	4.000
Peak Shear Stress (kip/ft²)	● 1.006	■ 1.666	▲ 2.949
Shear Stress @ End of Test (ksf)	○ 0.723	□ 1.474	△ 2.833
Deformation Rate (in./min.)	0.0025	0.0025	0.0025
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	11.74	11.74	11.74
Dry Density (pcf)	107.6	107.7	107.9
Saturation (%)	55.9	56.1	56.4
Soil Height Before Shearing (in.)	0.9841	0.9784	0.9724
Final Moisture Content (%)	16.8	16.5	16.2

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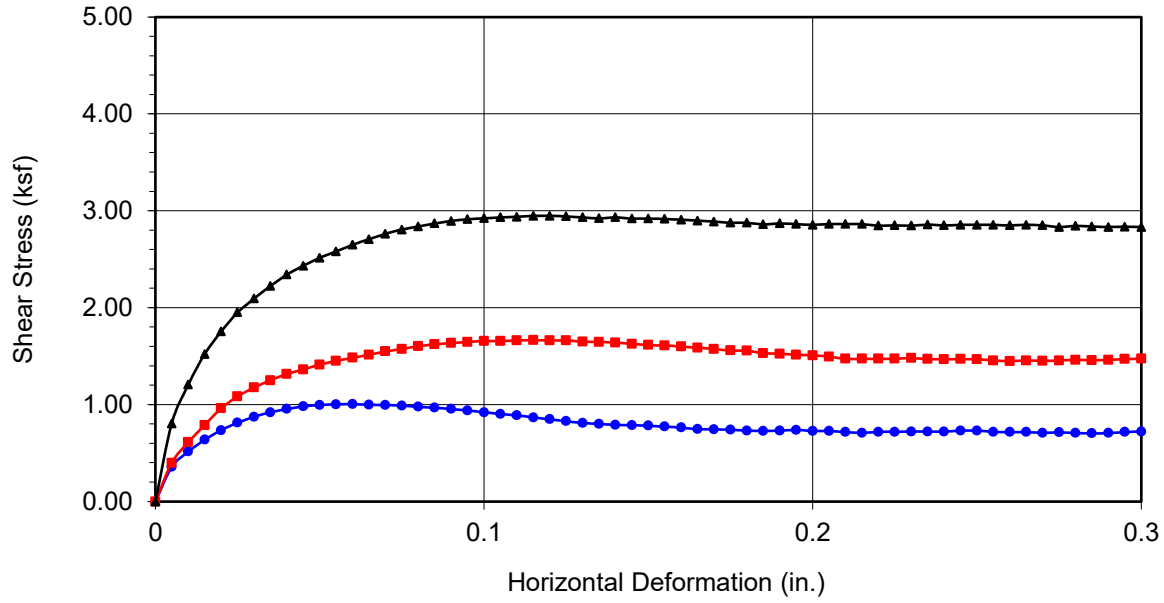
DIRECT SHEAR TEST RESULTS

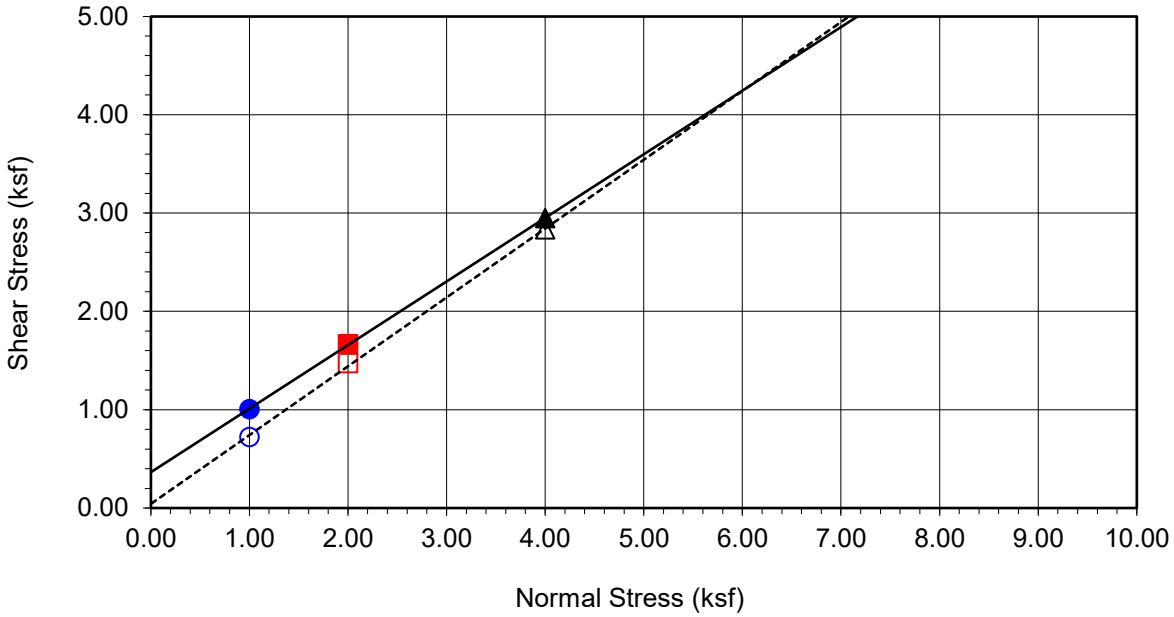
Consolidated Drained - ASTM D 3080

Project No.: 13655.001

Hume SoCal Camp

08-23





Boring No.	**HA-23, 25a, 25b**
Sample No.	**MB-11, 12a, 12b**
Depth (ft)	**Composite**
Sample Type:	90% Remold
Soil Identification:	Dark brown silty sand (SM)

Strength Parameters

	C (psf)	ϕ (°)
Peak	365	33
Ultimate	44	35

Normal Stress (kip/ft²)	1.000	2.000	4.000
Peak Shear Stress (kip/ft²)	● 1.006	■ 1.666	▲ 2.949
Shear Stress @ End of Test (ksf)	○ 0.723	□ 1.474	△ 2.833
Deformation Rate (in./min.)	0.0025	0.0025	0.0025
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	11.74	11.74	11.74
Dry Density (pcf)	107.6	107.7	107.9
Saturation (%)	55.9	56.1	56.4
Soil Height Before Shearing (in.)	0.9841	0.9784	0.9724
Final Moisture Content (%)	16.8	16.5	16.2

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DIRECT SHEAR TEST RESULTS

Consolidated Drained - ASTM D 3080

Project No.: 13655.001

Hume SoCal Camp

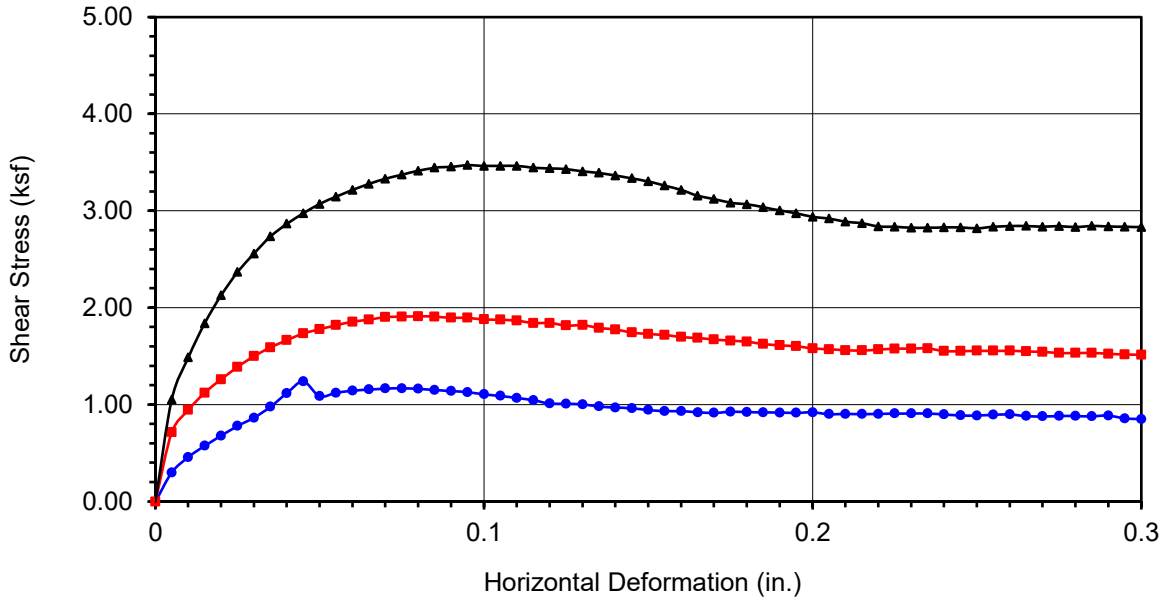
08-23

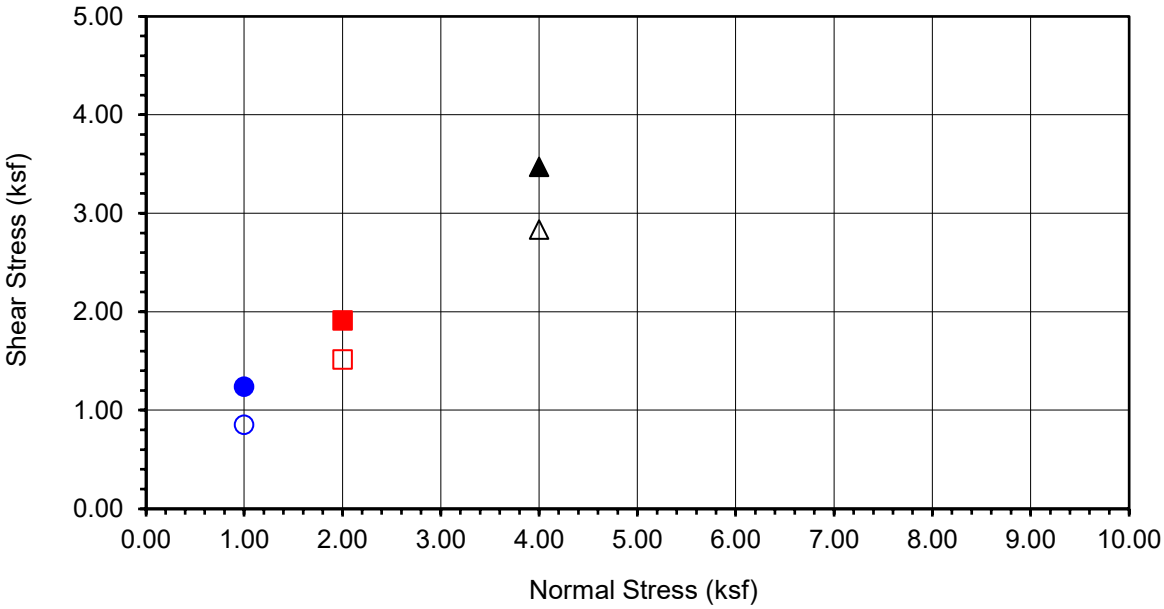
DIRECT SHEAR TEST

Consolidated Drained - ASTM D 3080

Project Name:	Hume SoCal Camp	Tested By:	G. Bathala	Date:	08/18/23
Project No.:	13655.001	Checked By:	J. Ward	Date:	10/19/23
Boring No.:	HA-31, 32, 30	Sample Type:	90% Remold		
Sample No.:	MB-18, 19, 30	Depth (ft.):	Composite		
Soil Identification:	Light brown silty sand (SM)				

Sample Diameter(in):	2.415	2.415	2.415
Sample Thickness(in.):	1.000	1.000	1.000
Weight of Sample + ring(gm):	191.74	190.98	192.11
Weight of Ring(gm):	45.38	44.61	45.58
Before Shearing			
Weight of Wet Sample+Cont.(gm):	168.49	168.49	168.49
Weight of Dry Sample+Cont.(gm):	158.00	158.00	158.00
Weight of Container(gm):	55.81	55.81	55.81
Vertical Rdg.(in): Initial	0.0000	0.2561	0.2530
Vertical Rdg.(in): Final	-0.0109	0.2780	0.2880
After Shearing			
Weight of Wet Sample+Cont.(gm):	219.68	216.64	206.79
Weight of Dry Sample+Cont.(gm):	199.25	196.91	187.37
Weight of Container(gm):	69.44	68.11	57.95
Specific Gravity (Assumed):	2.70	2.70	2.70
Water Density(pcf):	62.43	62.43	62.43





Boring No.	**HA-31, 32, 30**
Sample No.	**MB-18, 19, 30**
Depth (ft)	**Composite**
Sample Type:	
90% Remold	
Soil Identification:	
Light brown silty sand (SM)	

Normal Stress (kip/ft²)	1.000	2.000	4.000
Peak Shear Stress (kip/ft²)	● 1.239	■ 1.911	▲ 3.471
Shear Stress @ End of Test (ksf)	○ 0.852	□ 1.515	△ 2.833
Deformation Rate (in./min.)	0.0033	0.0033	0.0033
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	10.27	10.27	10.27
Dry Density (pcf)	110.4	110.4	110.5
Saturation (%)	52.6	52.6	52.8
Soil Height Before Shearing (in.)	0.9891	0.9781	0.9650
Final Moisture Content (%)	15.7	15.3	15.0

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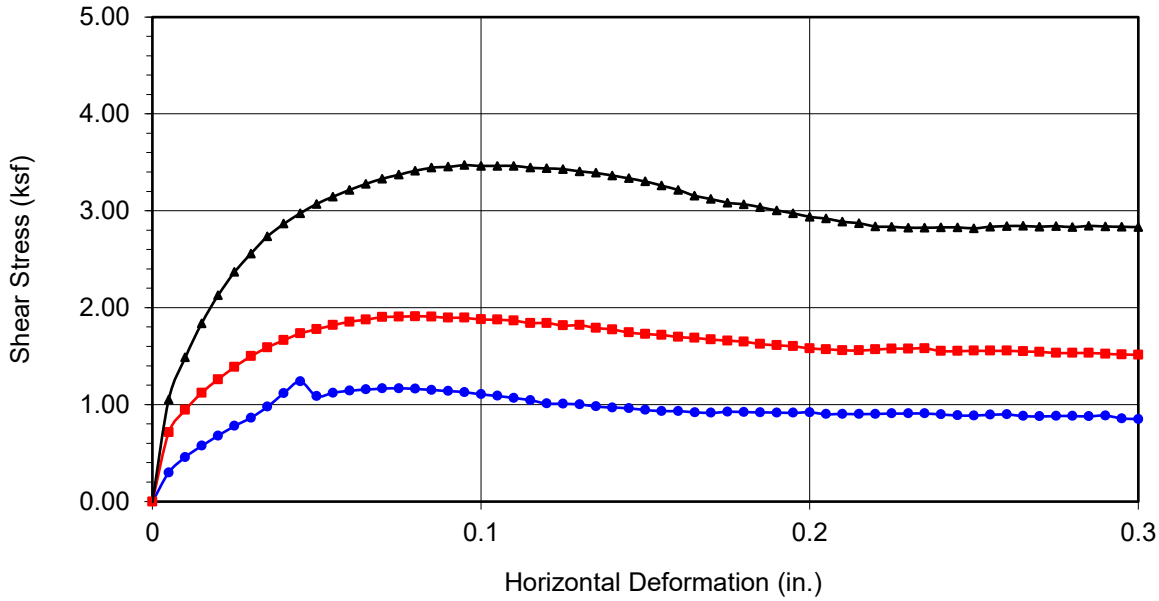
DIRECT SHEAR TEST RESULTS

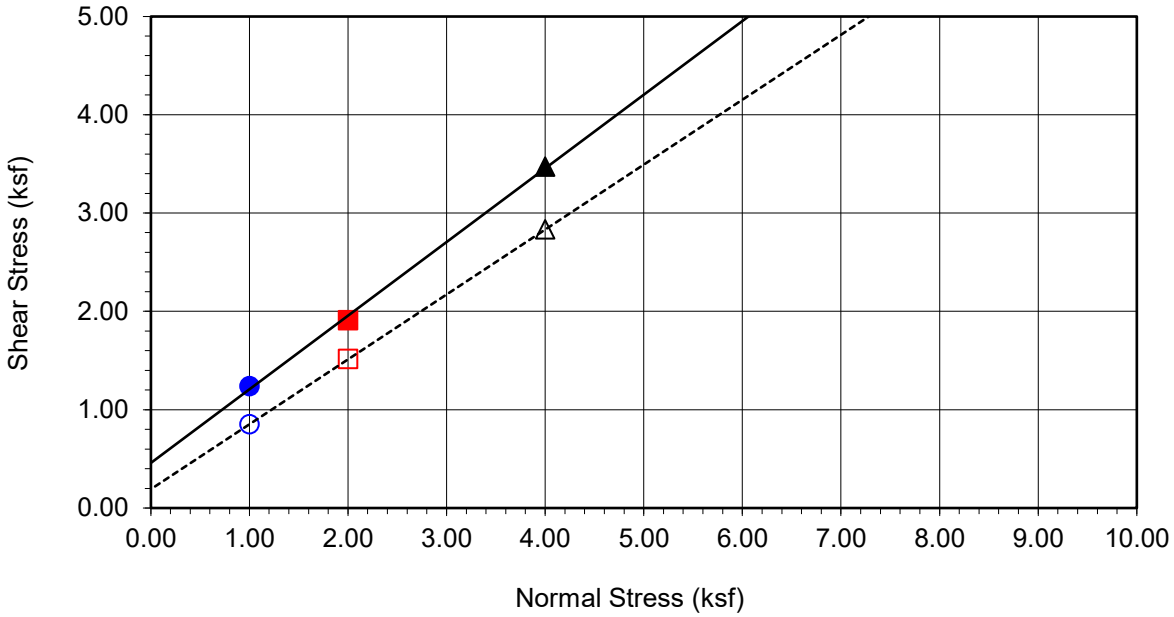
Consolidated Drained - ASTM D 3080

Project No.: 13655.001

Hume SoCal Camp

08-23





Boring No.	**HA-31, 32, 30**
Sample No.	**MB-18, 19, 30**
Depth (ft)	**Composite**
Sample Type:	90% Remold
Soil Identification:	Light brown silty sand (SM)

Strength Parameters

	C (psf)	ϕ (°)
Peak	459	37
Ultimate	193	33

Normal Stress (kip/ft²)	1.000	2.000	4.000
Peak Shear Stress (kip/ft²)	● 1.239	■ 1.911	▲ 3.471
Shear Stress @ End of Test (ksf)	○ 0.852	□ 1.515	△ 2.833
Deformation Rate (in./min.)	0.0033	0.0033	0.0033
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	10.27	10.27	10.27
Dry Density (pcf)	110.4	110.4	110.5
Saturation (%)	52.6	52.6	52.8
Soil Height Before Shearing (in.)	0.9891	0.9781	0.9650
Final Moisture Content (%)	15.7	15.3	15.0

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DIRECT SHEAR TEST RESULTS

Consolidated Drained - ASTM D 3080

Project No.: 13655.001

Hume SoCal Camp

08-23

MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Project Name:	Hume SoCal Camp	Tested By:	A. Santos	Date:	08/17/23
Project No.:	13655.001	Checked By:	ACS/JHW	Date:	08/18/23
Boring No.:	HA-23, HA-25a, HA-25b	Depth (ft.):	Composite		
Sample No.:	MB-11, MB-12a, MB-12b				
Soil Identification:	Dark brown silty sand (SM)				

Note: Corrected dry density calculation assumes specific gravity of 2.70 and moisture content of 1.0% for oversize particles

Preparation Method:	X	Moist	
		Dry	
Compaction Method	X	Mechanical Ram	
		Manual Ram	

Scalp Fraction (%)	
#3/4	
#3/8	
#4	6.1

Rammer Weight (lb.) = 10.0

Height of Drop (in.) = 18.0

Mold Volume (ft³) 0.03320

TEST NO.	1	2	3	4	5	6
Wt. Compacted Soil + Mold (g)	3747	3819	3774			
Weight of Mold (g)	1808	1808	1808			
Net Weight of Soil (g)	1939	2011	1966			
Wet Weight of Soil + Cont. (g)	402.3	418.9	475.4			
Dry Weight of Soil + Cont. (g)	370.1	378.2	421.7			
Weight of Container (g)	39.7	39.2	37.2			
Moisture Content (%)	9.75	12.01	13.97			
Wet Density (pcf)	128.8	133.5	130.5			
Dry Density (pcf)	117.3	119.2	114.6			

Maximum Dry Density (pcf) 119.5

Corrected Dry Density (pcf) 121.7

Optimum Moisture Content (%) 11.4

Corrected Moisture Content (%) 10.8

[X] **Procedure A**
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

[ ] **Procedure B**
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if +#4 is >20% and +3/8 in. is 20% or less

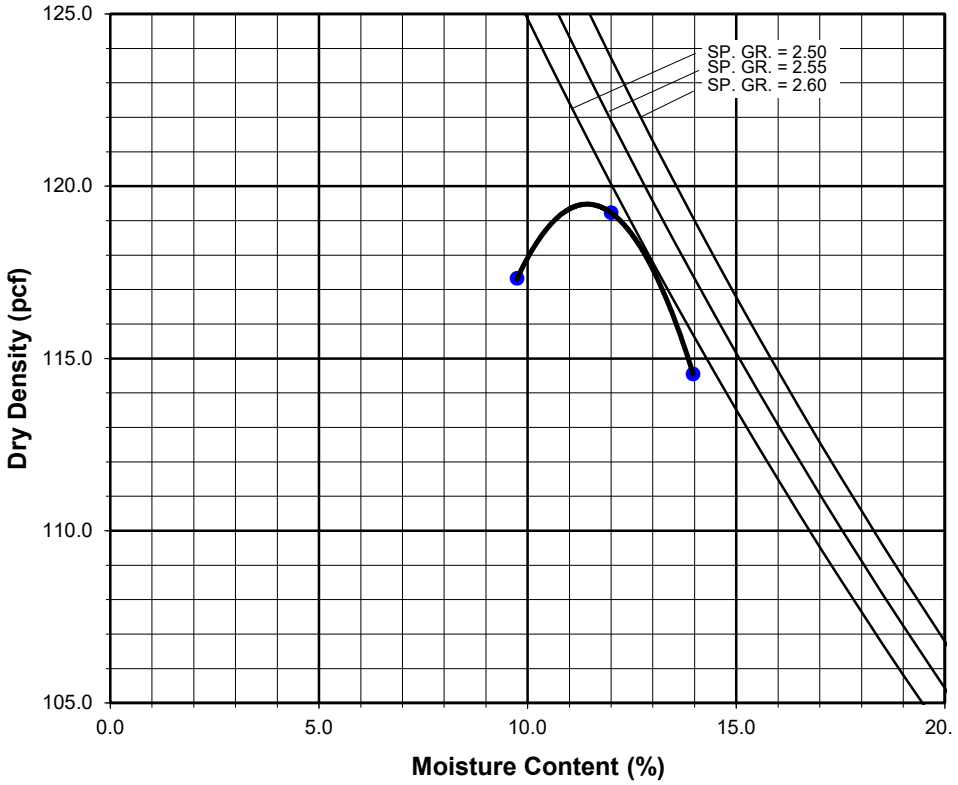
[ ] **Procedure C**
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%

Particle-Size Distribution:

GR:SA:FI

Atterberg Limits:

LL,PL,PI



MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Project Name:	Hume SoCal Camp	Tested By:	A. Santos	Date:	08/17/23
Project No.:	13655.001	Checked By:	ACS/JHW	Date:	08/18/23
Boring No.:	HA-31, HA-32, HA-30	Depth (ft.):	Composite		
Sample No.:	MB-18, MB-19, MB-30				
Soil Identification:	Light brown silty sand (SM)				

Note: Corrected dry density calculation assumes specific gravity of 2.70 and moisture content of 1.0% for oversize particles

Preparation Method:	X	Moist	
		Dry	
Compaction Method	X	Mechanical Ram	
		Manual Ram	

Scalp Fraction (%)	
#3/4	
#3/8	
#4	8.4

Rammer Weight (lb.) = 10.0

Height of Drop (in.) = 18.0

Mold Volume (ft³) 0.03320

TEST NO.	1	2	3	4	5	6
Wt. Compacted Soil + Mold (g)	3737	3834	3844			
Weight of Mold (g)	1808	1808	1808			
Net Weight of Soil (g)	1929	2026	2036			
Wet Weight of Soil + Cont. (g)	623.2	433.7	465.9			
Dry Weight of Soil + Cont. (g)	585.0	397.7	418.8			
Weight of Container (g)	76.7	39.0	39.8			
Moisture Content (%)	7.52	10.03	12.43			
Wet Density (pcf)	128.1	134.5	135.2			
Dry Density (pcf)	119.1	122.3	120.2			

Maximum Dry Density (pcf) 122.3

Corrected Dry Density (pcf) 125.2

Optimum Moisture Content (%) 10.3

Corrected Moisture Content (%) 9.5

[X] **Procedure A**
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

[ ] **Procedure B**
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if +#4 is >20% and +3/8 in. is 20% or less

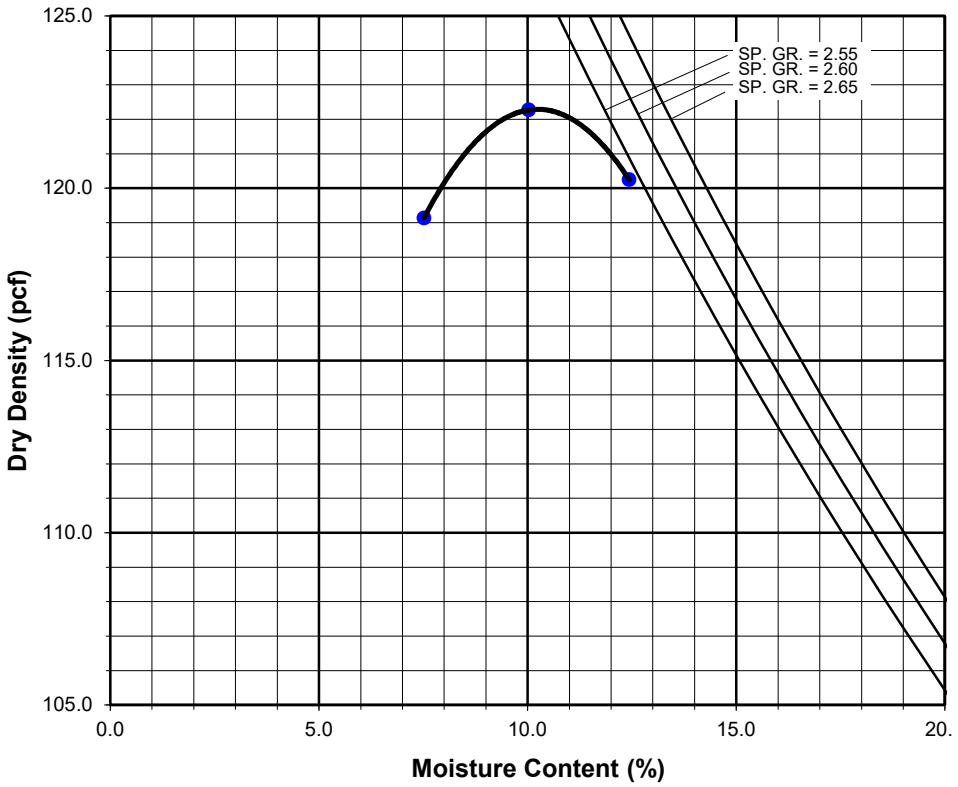
[ ] **Procedure C**
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%

Particle-Size Distribution:

GR:SA:FI

Atterberg Limits:

LL,PL,PI



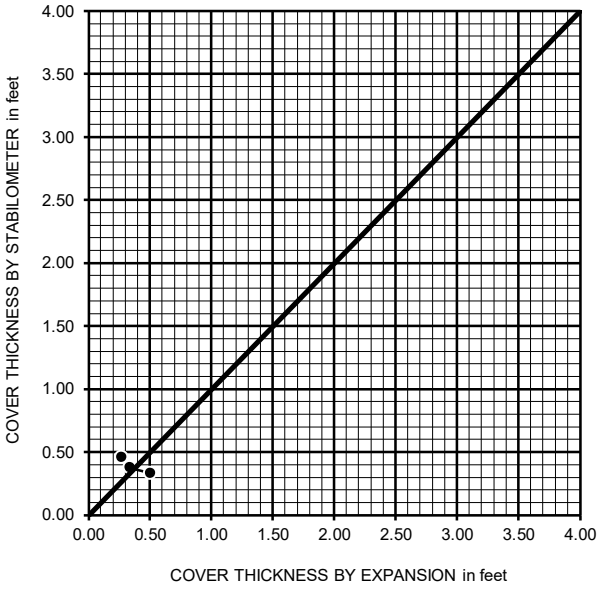
R-VALUE TEST RESULTS
DOT CA Test 301

PROJECT NAME:	Hume SoCal Camp	PROJECT NUMBER:	13655.001
BORING NUMBER:	HA-3, HA-5b, HA-9	DEPTH (FT.):	Composite
SAMPLE NUMBER:	MB-1, MB-3, MB-4	TECHNICIAN:	O. Figueroa
SAMPLE DESCRIPTION:	Brown poorly-graded sand with silt (SP-SM)	DATE COMPLETED:	8/23/2023

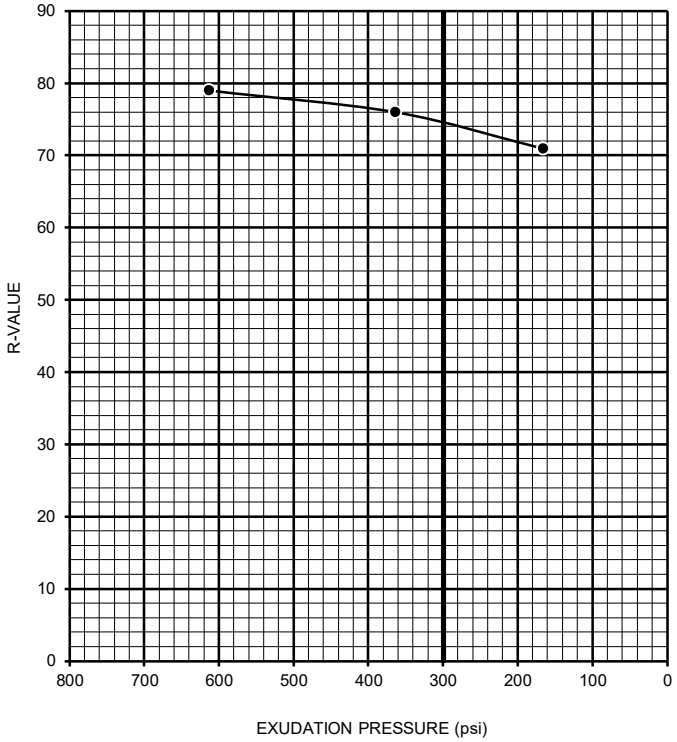
TEST SPECIMEN	a	b	c
MOISTURE AT COMPACTION %	10.5	11.1	12.0
HEIGHT OF SAMPLE, Inches	2.48	2.49	2.49
DRY DENSITY, pcf	117.0	116.8	114.9
COMPACTOR PRESSURE, psi	350	300	250
EXUDATION PRESSURE, psi	613	364	166
EXPANSION, Inches x 10exp-4	15	10	8
STABILITY Ph 2,000 lbs (160 psi)	18	20	24
TURNS DISPLACEMENT	5.35	5.65	5.92
R-VALUE UNCORRECTED	79	76	71
R-VALUE CORRECTED	79	76	71

DESIGN CALCULATION DATA	a	b	c
GRAVEL EQUIVALENT FACTOR	1.0	1.0	1.0
TRAFFIC INDEX	5.0	5.0	5.0
STABILOMETER THICKNESS, ft.	0.34	0.38	0.46
EXPANSION PRESSURE THICKNESS, ft.	0.50	0.33	0.27

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



R-VALUE BY EXPANSION:	77
R-VALUE BY EXUDATION:	74
EQUILIBRIUM R-VALUE:	74

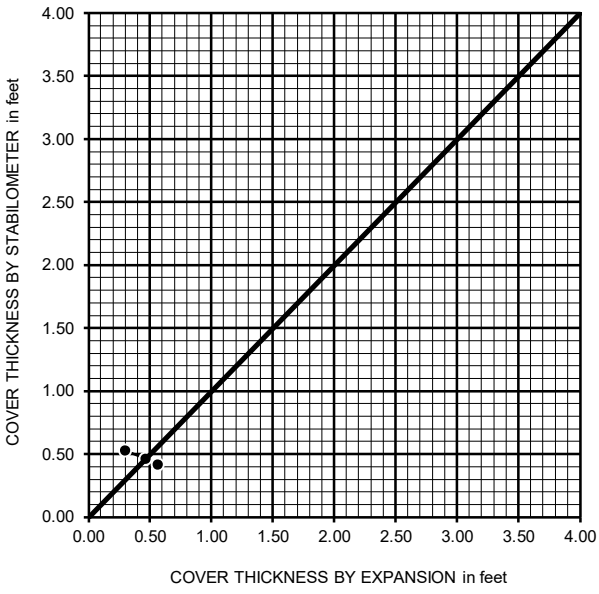
R-VALUE TEST RESULTS
DOT CA Test 301

PROJECT NAME:	Hume SoCal Camp	PROJECT NUMBER:	13655.001
BORING NUMBER:	HA-10, HA-17a, HA-17b	DEPTH (FT.):	Composite
SAMPLE NUMBER:	MB-5, MB-7a, MB-7b	TECHNICIAN:	O. Figueroa
SAMPLE DESCRIPTION:	Very dark brown silty sand (SM)	DATE COMPLETED:	8/18/2023

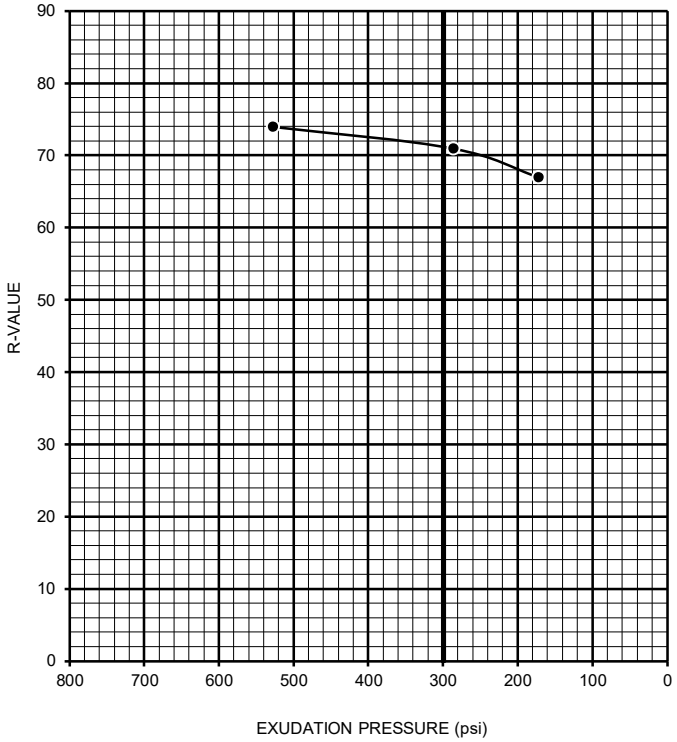
TEST SPECIMEN	a	b	c
MOISTURE AT COMPACTION %	12.5	13.4	14.1
HEIGHT OF SAMPLE, Inches	2.50	2.50	2.54
DRY DENSITY, pcf	111.8	110.5	108.9
COMPACTOR PRESSURE, psi	350	300	250
EXUDATION PRESSURE, psi	527	286	172
EXPANSION, Inches x 10exp-4	17	14	9
STABILITY Ph 2,000 lbs (160 psi)	23	26	30
TURNS DISPLACEMENT	5.25	5.38	5.41
R-VALUE UNCORRECTED	74	71	67
R-VALUE CORRECTED	74	71	67

DESIGN CALCULATION DATA	a	b	c
GRAVEL EQUIVALENT FACTOR	1.0	1.0	1.0
TRAFFIC INDEX	5.0	5.0	5.0
STABILOMETER THICKNESS, ft.	0.42	0.46	0.53
EXPANSION PRESSURE THICKNESS, ft.	0.57	0.47	0.30

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



R-VALUE BY EXPANSION:	71
R-VALUE BY EXUDATION:	71
EQUILIBRIUM R-VALUE:	71

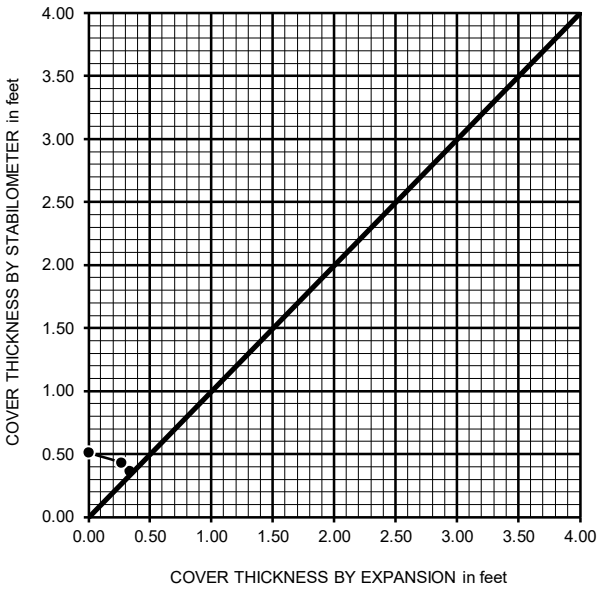
R-VALUE TEST RESULTS
DOT CA Test 301

PROJECT NAME:	Hume SoCal Camp	PROJECT NUMBER:	13655.001
BORING NUMBER:	HA-29	DEPTH (FT.):	6-36"
SAMPLE NUMBER:	MB-15	TECHNICIAN:	O. Figueroa
SAMPLE DESCRIPTION:	Dark brown silty sand (SM)	DATE COMPLETED:	8/23/2023

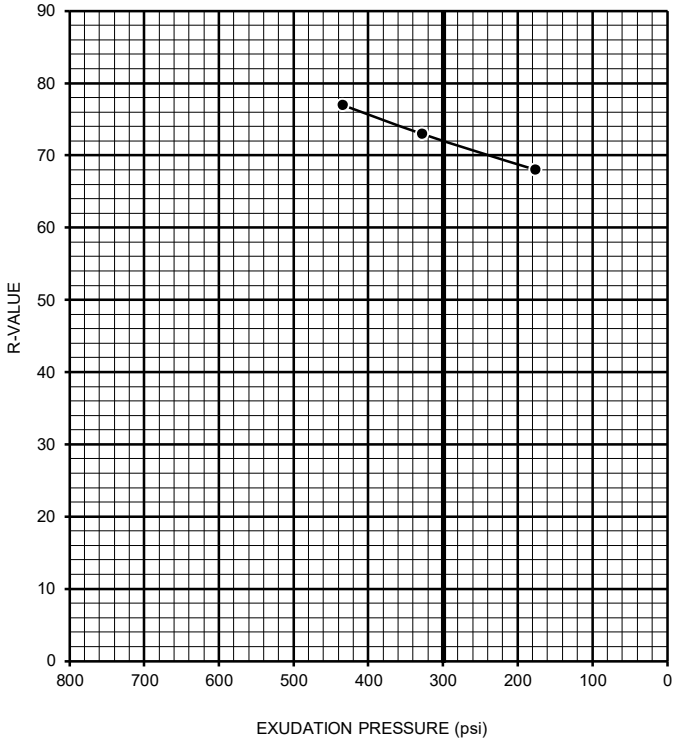
TEST SPECIMEN	a	b	c
MOISTURE AT COMPACTION %	13.0	13.4	14.3
HEIGHT OF SAMPLE, Inches	2.52	2.53	2.55
DRY DENSITY, pcf	110.9	110.2	108.0
COMPACTOR PRESSURE, psi	350	300	250
EXUDATION PRESSURE, psi	434	328	177
EXPANSION, Inches x 10exp-4	10	8	0
STABILITY Ph 2,000 lbs (160 psi)	20	23	28
TURNS DISPLACEMENT	5.10	5.40	5.65
R-VALUE UNCORRECTED	77	73	68
R-VALUE CORRECTED	77	73	68

DESIGN CALCULATION DATA	a	b	c
GRAVEL EQUIVALENT FACTOR	1.0	1.0	1.0
TRAFFIC INDEX	5.0	5.0	5.0
STABILOMETER THICKNESS, ft.	0.37	0.43	0.51
EXPANSION PRESSURE THICKNESS, ft.	0.33	0.27	0.00

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



R-VALUE BY EXPANSION:	78
R-VALUE BY EXUDATION:	72
EQUILIBRIUM R-VALUE:	72

16691 Millikan Ave.
Irvine, CA 92606
Tel. (949) 222-5321

Unconfined Compressive Strength

Project Name:	Hume SoCal Camp	Project No.	13655.001
Sampled By:	Jeff Hull	Sample Date:	7/21/2023

MATERIAL SAMPLE TYPE

Rock	Granite	Soil Cement	Concrete
X			

FOR LAB USE ONLY	DATE RECEIVED: 7/31/2023	By: Ryan Densmore

Laboratory Test Data

Laboratory No.	Age Days	Test Date	Height (in)	Diam. (in)	Area (sq. in.)	Load (lbs.)	Compr. (psi)	H/D Ratio	Corr. Factor	Compr. (psi)	Failure Type
A1	139	12/07/23	4.00	1.99	3.11	10590	3410	2.01	1.00	3410	N/A
A2	139	12/07/23	3.89	1.99	3.11	11470	3690	1.95	1.00	3690	N/A
B1	139	12/07/23	3.87	1.99	3.11	20800	6690	1.94	1.00	6690	N/A
B2	139	12/07/23	3.83	1.99	3.11	22030	7080	1.92	0.99	7010	N/A

Locations: A1, A2: Adult Lodge
B1, B2: RR at Existing Pond

APPENDIX D

GENERAL EARTHWORK AND GRADING GUIDE SPECIFICATIONS

Leighton
a verdantas company

LEIGHTON AND ASSOCIATES, INC.

GENERAL EARTHWORK AND GRADING SPECIFICATIONS FOR ROUGH GRADING

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1.0 General

1.1 Intent

These General Earthwork and Grading Specifications are for the grading and earthwork shown on the approved grading plan(s) and/or indicated in the geotechnical report(s). These Specifications are a part of the recommendations contained in the geotechnical report(s). In case of conflict, the specific recommendations in the geotechnical report shall supersede these more general Specifications. Observations of the earthwork by the project Geotechnical Consultant during the course of grading may result in new or revised recommendations that could supersede these specifications or the recommendations in the geotechnical report(s).

1.2 The Geotechnical Consultant of Record

Prior to commencement of work, the owner shall employ the Geotechnical Consultant of Record (Geotechnical Consultant). The Geotechnical Consultants shall be responsible for reviewing the approved geotechnical report(s) and accepting the adequacy of the preliminary geotechnical findings, conclusions, and recommendations prior to the commencement of the grading.

Prior to commencement of grading, the Geotechnical Consultant shall review the "work plan" prepared by the Earthwork Contractor (Contractor) and schedule sufficient personnel to perform the appropriate level of observation, mapping, and compaction testing.

During the grading and earthwork operations, the Geotechnical Consultant shall observe, map, and document the subsurface exposures to verify the geotechnical design assumptions. If the observed conditions are found to be significantly different than the interpreted assumptions during the design phase, the Geotechnical Consultant shall inform the owner, recommend appropriate changes in design to accommodate the observed conditions, and notify the review agency where required. Subsurface areas to be geotechnically observed, mapped, elevations recorded, and/or tested include natural ground after it has been cleared for receiving fill but before fill is placed, bottoms of all "remedial removal" areas, all key bottoms, and benches made on sloping ground to receive fill.

The Geotechnical Consultant shall observe the moisture-conditioning and processing of the subgrade and fill materials and perform relative compaction testing of fill to determine the attained level of compaction. The Geotechnical Consultant shall provide the test results to the owner and the Contractor on a routine and frequent basis.

1.3 The Earthwork Contractor

The Earthwork Contractor (Contractor) shall be qualified, experienced, and knowledgeable in earthwork logistics, preparation and processing of ground to receive fill, moisture-conditioning and processing of fill, and compacting fill. The Contractor shall review and accept the plans, geotechnical report(s), and these Specifications prior to commencement of grading. The Contractor shall be solely responsible for performing the grading in accordance with the plans and specifications.

The Contractor shall prepare and submit to the owner and the Geotechnical Consultant a work plan that indicates the sequence of earthwork grading, the number of "spreads" of work and the estimated quantities of daily earthwork contemplated for the site prior to commencement of grading. The Contractor shall inform the owner and the Geotechnical Consultant of changes in work schedules and updates to the work plan at least 24 hours in advance of such changes so that appropriate observations and tests can be planned and accomplished. The Contractor shall not assume that the Geotechnical Consultant is aware of all grading operations.

The Contractor shall have the sole responsibility to provide adequate equipment and methods to accomplish the earthwork in accordance with the applicable grading codes and agency ordinances, these Specifications, and the recommendations in the approved geotechnical report(s) and grading plan(s). If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as unsuitable soil, improper moisture condition, inadequate compaction, insufficient buttress key size, adverse weather, etc., are resulting in a quality of work less than required in these specifications, the Geotechnical Consultant shall reject the work and may recommend to the owner that construction be stopped until the conditions are rectified.

2.0 Preparation of Areas to be Filled

2.1 Clearing and Grubbing

Vegetation, such as brush, grass, roots, and other deleterious material shall be sufficiently removed and properly disposed of in a method acceptable to the owner, governing agencies, and the Geotechnical Consultant.

The Geotechnical Consultant shall evaluate the extent of these removals depending on specific site conditions. Earth fill material shall not contain more than 1 percent of organic materials (by volume). No fill lift shall contain more than 5 percent of organic matter. Nesting of the organic materials shall not be allowed.

If potentially hazardous materials are encountered, the Contractor shall stop work in the affected area, and a hazardous material specialist shall be informed immediately for proper evaluation and handling of these materials prior to continuing to work in that area.

As presently defined by the State of California, most refined petroleum products (gasoline, diesel fuel, motor oil, grease, coolant, etc.) have chemical constituents that are considered to be hazardous waste. As such, the indiscriminate dumping or spillage of these fluids onto the ground may constitute a misdemeanor, punishable by fines and/or imprisonment, and shall not be allowed.

2.2 Processing

Existing ground that has been declared satisfactory for support of fill by the Geotechnical Consultant shall be scarified to a minimum depth of 6 inches. Existing ground that is not satisfactory shall be overexcavated as specified in the following section. Scarification shall continue until soils are broken down and free of large clay lumps or clods and the working surface is reasonably uniform, flat, and free of uneven features that would inhibit uniform compaction.

2.3 Overexcavation

In addition to removals and overexcavations recommended in the approved geotechnical report(s) and the grading plan, soft, loose, dry, saturated, spongy, organic-rich, highly fractured or otherwise unsuitable ground shall be overexcavated to competent ground as evaluated by the Geotechnical Consultant during grading.

2.4 Benching

Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal to vertical units), the ground shall be stepped or benched. The lowest bench or key shall be a minimum of 15 feet wide and at least 2 feet deep, into competent material as evaluated by the Geotechnical Consultant. Other benches shall be excavated a minimum height of 4 feet into competent material or as otherwise recommended by the Geotechnical Consultant. Fill placed on ground sloping flatter than 5:1 shall also be benched or otherwise overexcavated to provide a flat subgrade for the fill.

2.5 Evaluation/Acceptance of Fill Areas

All areas to receive fill, including removal and processed areas, key bottoms, and benches, shall be observed, mapped, elevations recorded, and/or tested prior to being accepted by the Geotechnical Consultant as suitable to receive fill. The Contractor shall obtain a written acceptance from the Geotechnical Consultant prior to fill placement. A licensed surveyor shall provide the survey control for determining elevations of processed areas, keys, and benches.

3.0 Fill Material

3.1 General

Material to be used as fill shall be essentially free of organic matter and other deleterious substances evaluated and accepted by the Geotechnical Consultant prior to placement. Soils of poor quality, such as those with unacceptable gradation, high expansion potential, or low strength shall be placed in areas acceptable to the Geotechnical Consultant or mixed with other soils to achieve satisfactory fill material.

3.2 Oversize

Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 8 inches, shall not be buried or placed in fill unless location, materials, and placement methods are specifically accepted by the Geotechnical Consultant. Placement operations shall be such that nesting of oversized material does not occur and such that oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 vertical feet of finish grade or within 2 feet of future utilities or underground construction.

3.3 Import

If importing of fill material is required for grading, proposed import material shall meet the requirements of Section 3.1. The potential import source shall be given to the Geotechnical Consultant at least 48 hours (2 working days) before importing begins so that its suitability can be determined and appropriate tests performed.

4.0 Fill Placement and Compaction

4.1 Fill Layers

Approved fill material shall be placed in areas prepared to receive fill (per Section 3.0) in near-horizontal layers not exceeding 8 inches in loose thickness. The Geotechnical Consultant may accept thicker layers if testing indicates the grading procedures can adequately compact the thicker layers. Each layer shall be spread evenly and mixed thoroughly to attain relative uniformity of material and moisture throughout.

4.2 Fill Moisture Conditioning

Fill soils shall be watered, dried back, blended, and/or mixed, as necessary to attain a relatively uniform moisture content at or slightly over optimum. Maximum density and optimum soil moisture content tests shall be performed in accordance with the American Society of Testing and Materials (ASTM Test Method D1557).

4.3 Compaction of Fill

After each layer has been moisture-conditioned, mixed, and evenly spread, it shall be uniformly compacted to not less than 90 percent of maximum dry density (ASTM Test Method D1557). Compaction equipment shall be adequately sized and be either specifically designed for soil compaction or of proven reliability to efficiently achieve the specified level of compaction with uniformity.

4.4 Compaction of Fill Slopes

In addition to normal compaction procedures specified above, compaction of slopes shall be accomplished by backrolling of slopes with sheepsfoot rollers at increments of 3 to 4 feet in fill elevation, or by other methods producing satisfactory results acceptable to the Geotechnical Consultant. Upon completion of grading, relative compaction of the fill, out to the slope face, shall be at least 90 percent of maximum density per ASTM Test Method D1557.

4.5 Compaction Testing

Field-tests for moisture content and relative compaction of the fill soils shall be performed by the Geotechnical Consultant. Location and frequency of tests shall be at the Consultant's discretion based on field conditions encountered. Compaction test locations will not necessarily be selected on a random basis. Test locations shall be selected to verify adequacy of compaction levels in areas that are judged to be prone to inadequate compaction (such as close to slope faces and at the fill/bedrock benches).

4.6 Frequency of Compaction Testing

Tests shall be taken at intervals not exceeding 2 feet in vertical rise and/or 1,000 cubic yards of compacted fill soils embankment. In addition, as a guideline, at least one test shall be taken on slope faces for each 5,000 square feet of slope face and/or each 10 feet of vertical height of slope. The Contractor shall assure that fill construction is such that the testing schedule can be accomplished by the Geotechnical Consultant. The Contractor shall stop or slow down the earthwork construction if these minimum standards are not met.

4.7 Compaction Test Locations

The Geotechnical Consultant shall document the approximate elevation and horizontal coordinates of each test location. The Contractor shall coordinate with the project surveyor to assure that sufficient grade stakes are established so that the Geotechnical Consultant can determine the test locations with sufficient accuracy. At a minimum, two grade stakes within a horizontal distance of 100 feet and vertically less than 5 feet apart from potential test locations shall be provided.

5.0 Subdrain Installation

Subdrain systems shall be installed in accordance with the approved geotechnical report(s), the grading plan. The Geotechnical Consultant may recommend additional subdrains and/or changes in subdrain extent, location, grade, or material depending on conditions encountered during grading. All subdrains shall be surveyed by a land surveyor/civil engineer for line and grade after installation and prior to burial. Sufficient time should be allowed by the Contractor for these surveys.

6.0 Excavation

Excavations, as well as over-excavation for remedial purposes, shall be evaluated by the Geotechnical Consultant during grading. Remedial removal depths shown on geotechnical plans are estimates only. The actual extent of removal shall be determined by the Geotechnical Consultant based on the field evaluation of exposed conditions during grading. Where fill-over-cut slopes are to be graded, the cut portion of the slope shall be made, evaluated, and accepted by the Geotechnical Consultant prior to placement of materials for construction of the fill portion of the slope, unless otherwise recommended by the Geotechnical Consultant.

7.0 Trench Backfills

7.1 Safety

The Contractor shall follow all OSHA and Cal/OSHA requirements for safety of trench excavations.

7.2 Bedding and Backfill

All bedding and backfill of utility trenches shall be performed in accordance with the applicable provisions of Standard Specifications of Public Works Construction. Bedding material shall have a Sand Equivalent greater than 30 (SE>30). The bedding shall be placed to 1 foot over the top of the conduit and densified by jetting. Backfill shall be placed and densified to a minimum of 90 percent of relative compaction from 1 foot above the top of the conduit to the surface.

The Geotechnical Consultant shall test the trench backfill for relative compaction. At least one test should be made for every 300 feet of trench and 2 feet of fill.

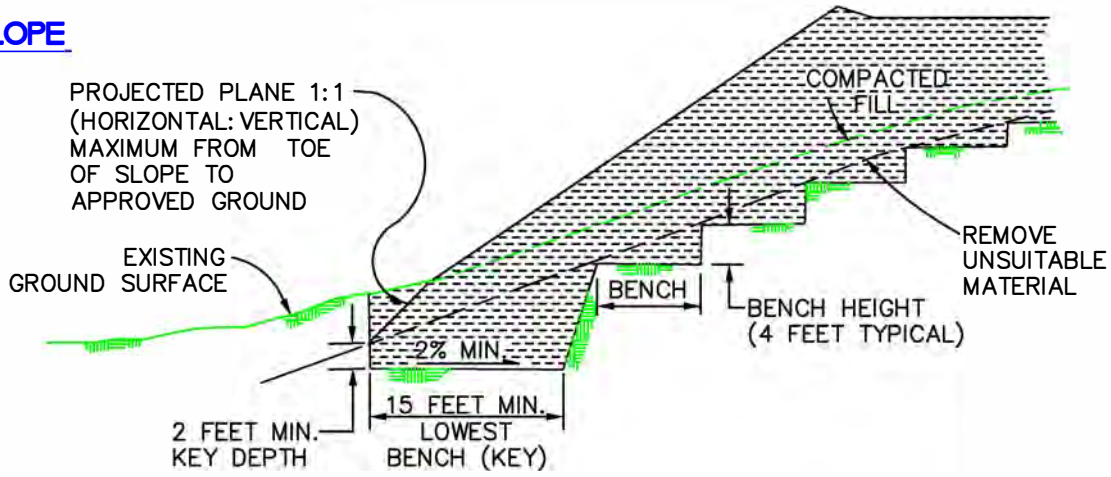
7.3 Lift Thickness

Lift thickness of trench backfill shall not exceed those allowed in the Standard Specifications of Public Works Construction unless the Contractor can demonstrate to the Geotechnical Consultant that the fill lift can be compacted to the minimum relative compaction by his alternative equipment and method.

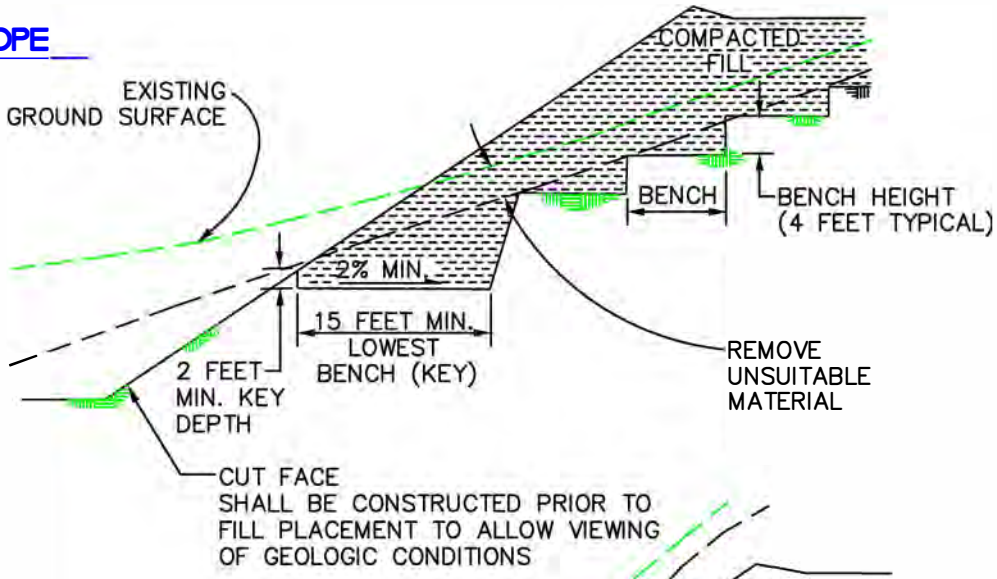
7.4 Observation and Testing

The jetting of the bedding around the conduits shall be observed by the Geotechnical Consultant.

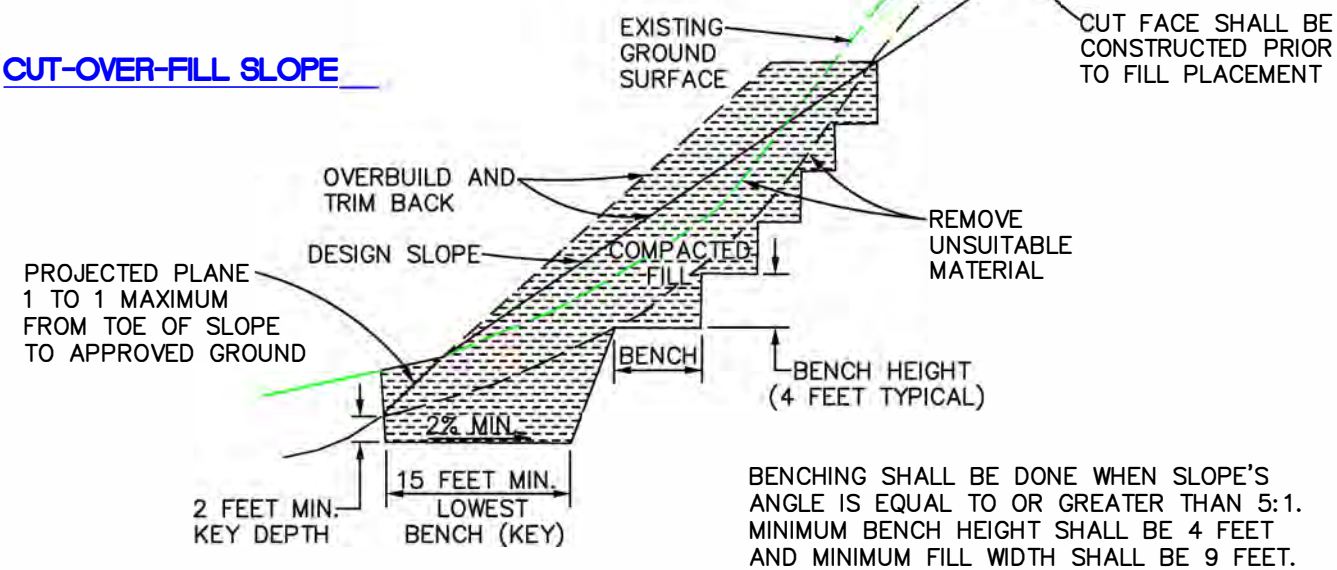
FILL SLOPE



FILL-OVER-CUT SLOPE

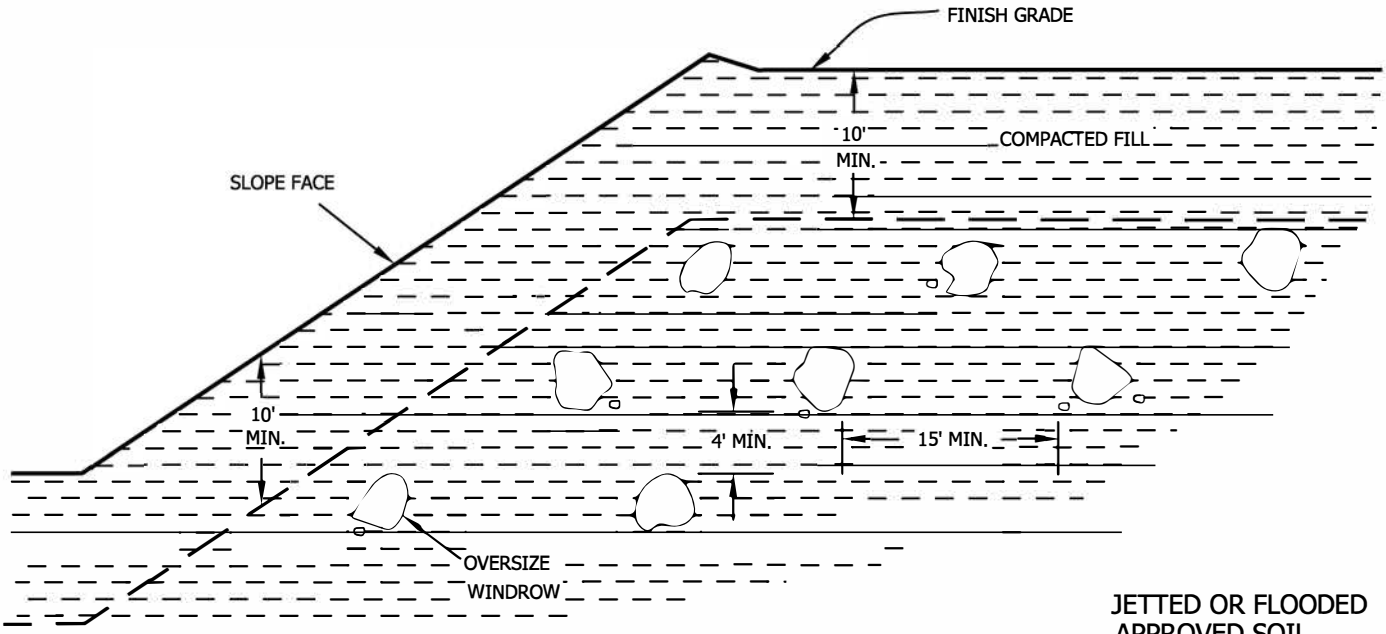


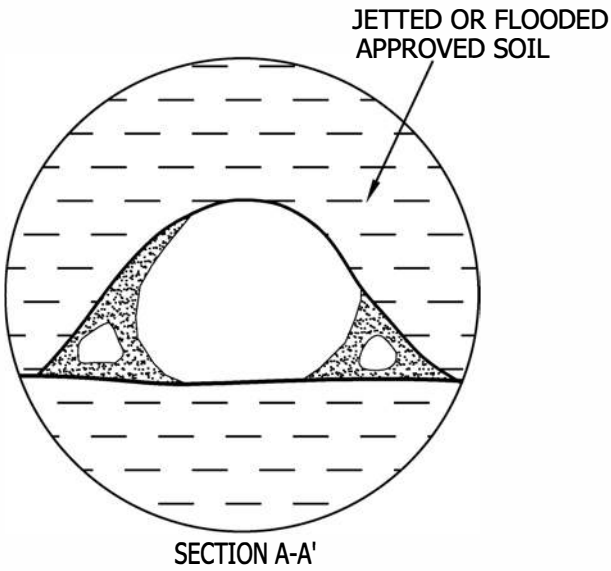
CUT-OVER-FILL SLOPE



BENCHING SHALL BE DONE WHEN SLOPE'S ANGLE IS EQUAL TO OR GREATER THAN 5:1. MINIMUM BENCH HEIGHT SHALL BE 4 FEET AND MINIMUM FILL WIDTH SHALL BE 9 FEET.

KEYING AND BENCHING	GENERAL EARTHWORK AND GRADING SPECIFICATIONS STANDARD DETAILS A	Leighton a verdantas company

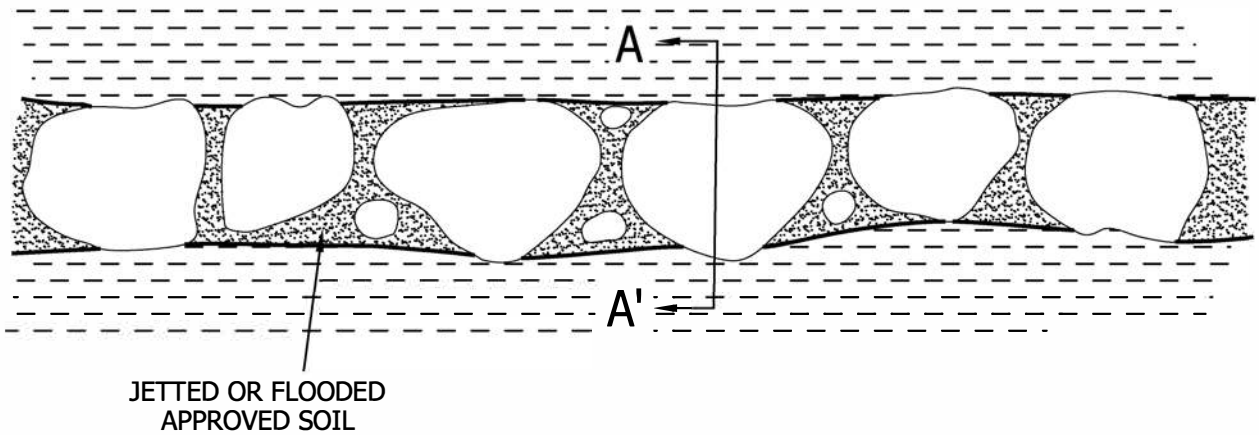




SECTION A-A'

- Oversize rock is larger than 8 inches in largest dimension.
- Backfill with approved soil jetted or flooded in place to fill all the voids.
- Do not bury rock within 10 feet of finish grade.
- Windrow of buried rock shall be parallel to the finished slope face.

PROFILE ALONG WINDROW



OVERSIZE ROCK DISPOSAL

GENERAL EARTHWORK AND GRADING SPECIFICATIONS
STANDARD DETAILS B

Leighton

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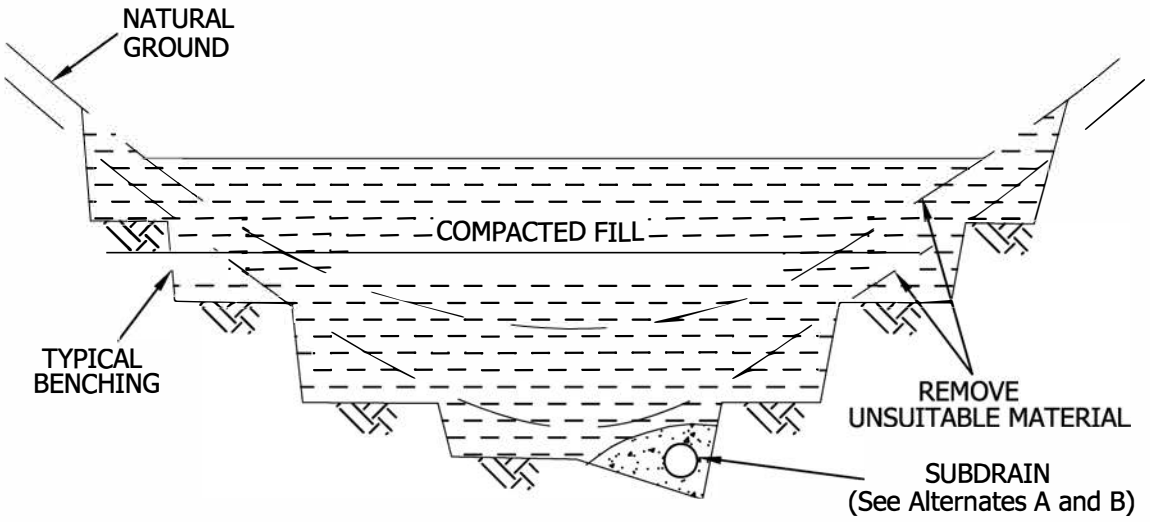
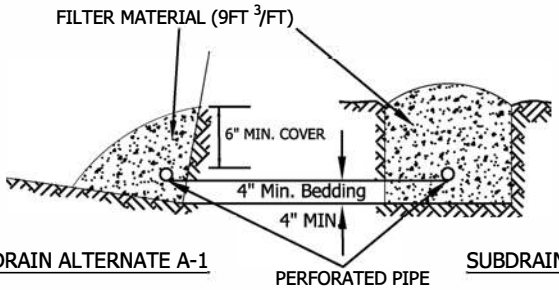


SUBDRAIN ALTERNATE A

PERFORATED PIPE SURROUNDED WITH FILTER MATERIAL



SUBDRAIN ALTERNATE A-1 SUBDRAIN ALTERNATE A-2

FILTER MATERIAL

FILTER MATERIAL SHALL BE CLASS 2 PERMEABLE MATERIAL PER STATE OF CALIFORNIA STANDARD SPECIFICATION, OR APPROVED ALTERNATE. CLASS 2 GRADING AS FOLLOWS:

Sieve Size	Percent Passing
1"	100
3/4"	90-100
3/8"	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

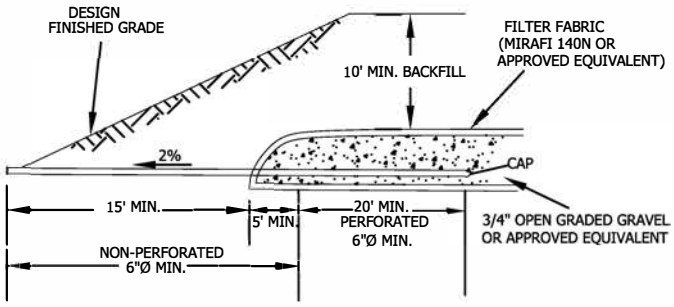
SUBDRAIN ALTERNATE B



ALTERNATE B-1 ALTERNATE B-2

○ PERFORATED PIPE IS OPTIONAL PER GOVERNING AGENCY'S REQUIREMENTS

DETAIL OF CANYON SUBDRAIN TERMINAL



CANYON SUBDRAIN

GENERAL EARTHWORK AND GRADING SPECIFICATIONS STANDARD DETAILS C

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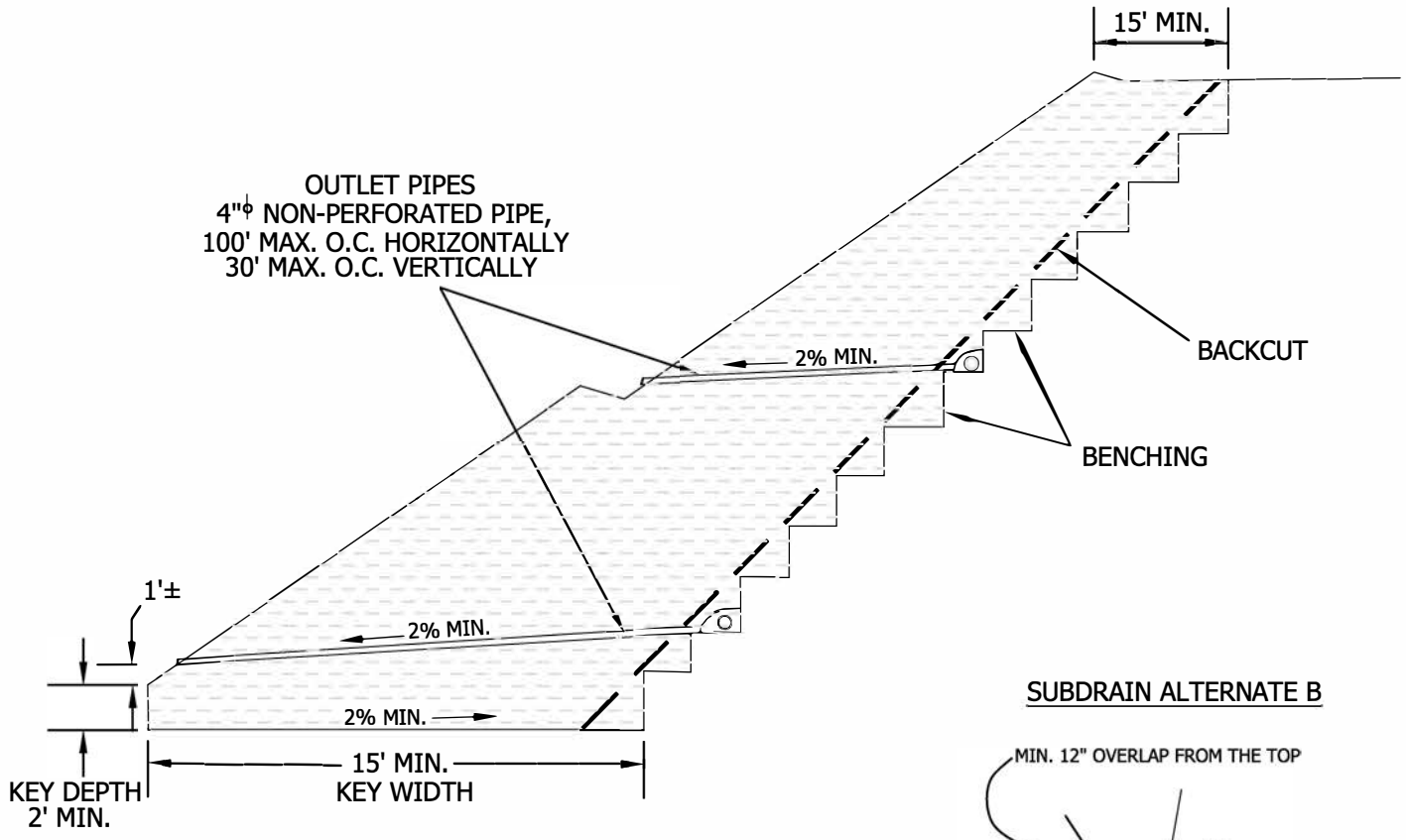
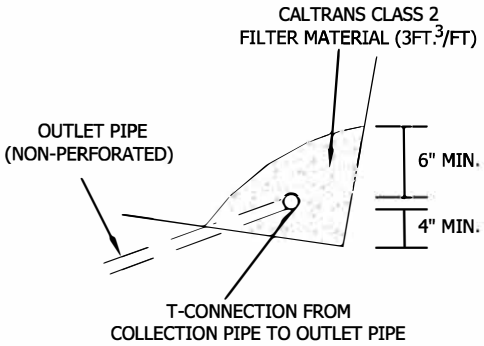
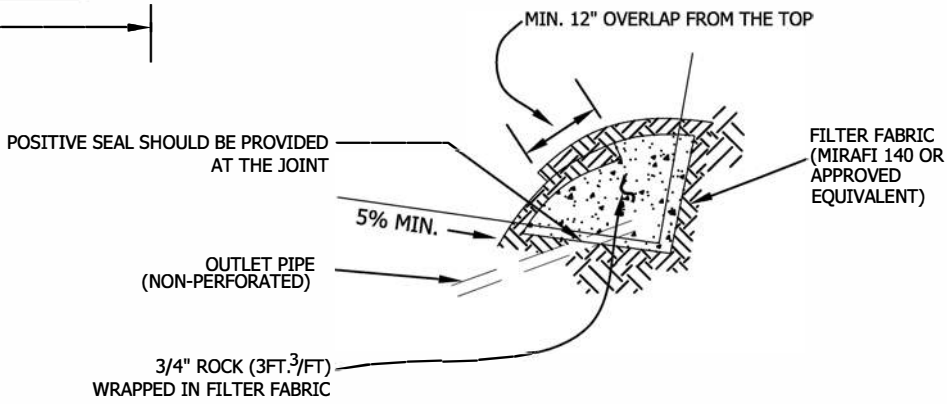


SUBDRAIN ALTERNATE A



SUBDRAIN ALTERNATE B



- SUBDRAIN INSTALLATION - Subdrain collector pipe shall be installed with perforations down or, unless otherwise designated by the geotechnical consultant. Outlet pipes shall be non-perforated pipe. The subdrain pipe shall have at least 8 perforations uniformly spaced per foot. Perforation shall be 1/4" to 1/2" if drilled holes are used. All subdrain pipes shall have a gradient at least 2% towards the outlet.
- SUBDRAIN PIPE - Subdrain pipe shall be ASTM D2751, ASTM D1527 (Schedule 40) or SDR 23.5 ABS pipe or ASTM D3034 (Schedule 40) or SDR 23.5 PVC pipe.
- All outlet pipe shall be placed in a trench and, after fill is placed above it, rodded to verify integrity.

BUTTRESS OR REPLACEMENT FILL SUBDRAINS	GENERAL EARTHWORK AND GRADING SPECIFICATIONS STANDARD DETAILS D	Leighton a verdantas company

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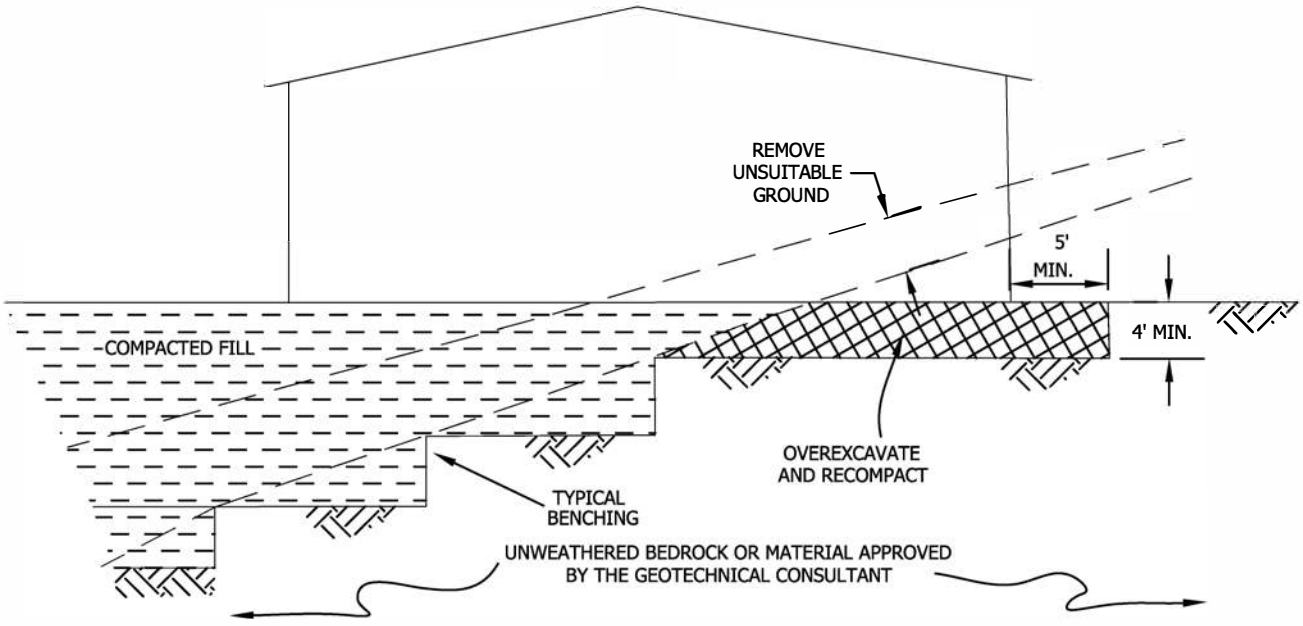
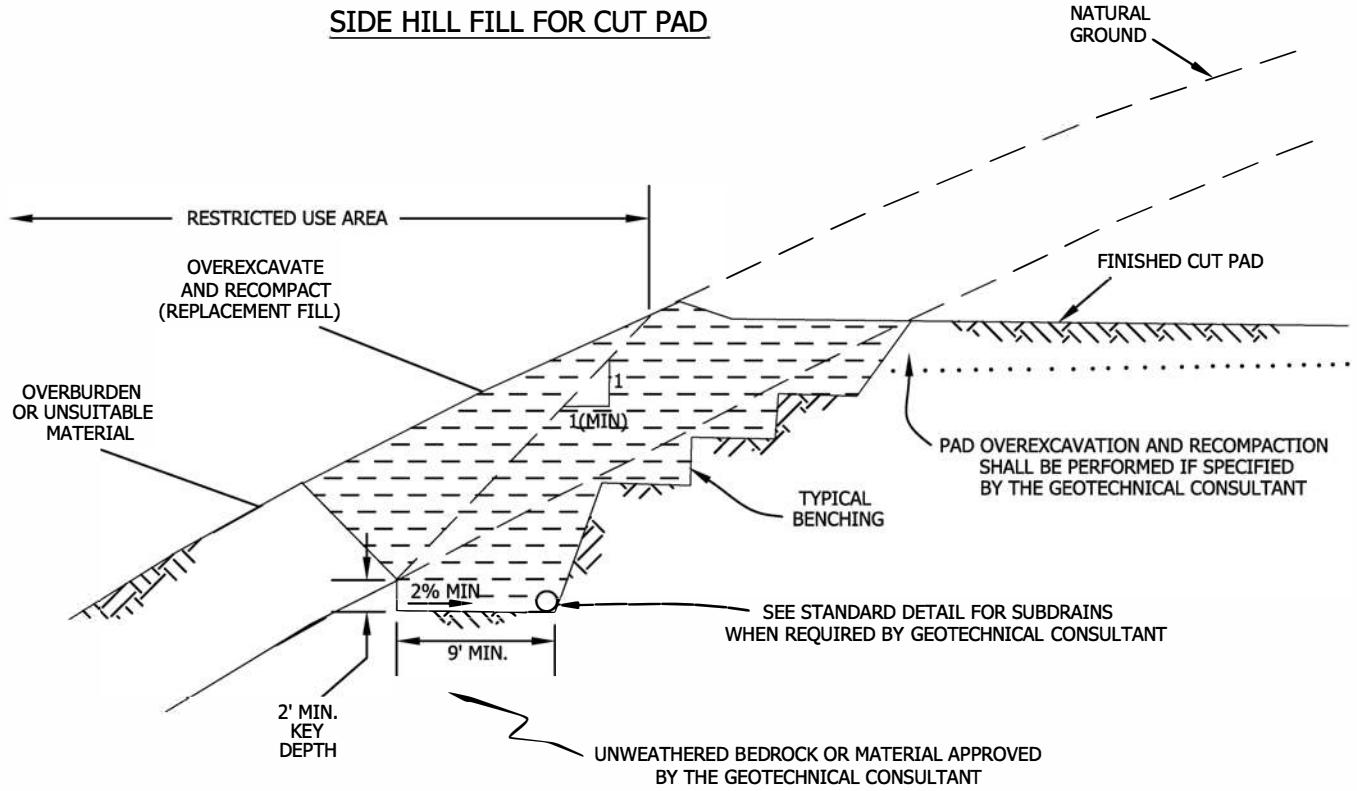
CUT-FILL TRANSITION LOT OVEREXCAVATION



SIDE HILL FILL FOR CUT PAD



TRANSITION LOT FILLS AND SIDE HILL FILLS

GENERAL EARTHWORK AND GRADING SPECIFICATIONS
STANDARD DETAILS E

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APPENDIX E

GBA GEOTECHNICAL INSERT

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific imes

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept*

responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependen

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals' plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for information purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mol

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer's services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration*** by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

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Appendix G

Reference Materials

NOAA Atlas 14, Volume 6, Version 2
Location name: Green Valley Lake, California, USA*
Latitude: 34.2257°, Longitude: -117.0941°
Elevation: 6464 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	2.18 (1.81-2.65)	2.96 (2.46-3.61)	4.01 (3.31-4.91)	4.88 (4.00-6.02)	6.10 (4.82-7.76)	7.04 (5.46-9.18)	8.03 (6.07-10.7)	9.07 (6.67-12.5)	10.5 (7.42-15.0)	11.7 (7.93-17.3)
10-min	1.56 (1.30-1.90)	2.12 (1.76-2.59)	2.87 (2.38-3.52)	3.50 (2.87-4.31)	4.37 (3.46-5.57)	5.05 (3.92-6.58)	5.75 (4.36-7.69)	6.50 (4.78-8.92)	7.53 (5.31-10.8)	8.35 (5.69-12.4)
15-min	1.26 (1.04-1.54)	1.71 (1.42-2.09)	2.32 (1.92-2.84)	2.82 (2.31-3.48)	3.52 (2.79-4.49)	4.07 (3.16-5.30)	4.64 (3.51-6.20)	5.24 (3.85-7.20)	6.07 (4.28-8.69)	6.73 (4.58-9.98)
30-min	0.884 (0.734-1.08)	1.20 (0.996-1.47)	1.63 (1.34-1.99)	1.98 (1.62-2.44)	2.47 (1.96-3.15)	2.86 (2.22-3.72)	3.26 (2.46-4.35)	3.68 (2.70-5.05)	4.26 (3.01-6.10)	4.72 (3.22-7.01)
60-min	0.624 (0.517-0.760)	0.848 (0.702-1.03)	1.15 (0.948-1.40)	1.40 (1.14-1.72)	1.74 (1.38-2.22)	2.02 (1.56-2.62)	2.30 (1.74-3.07)	2.59 (1.91-3.56)	3.00 (2.12-4.30)	3.33 (2.27-4.94)
2-hr	0.473 (0.393-0.577)	0.638 (0.529-0.778)	0.862 (0.712-1.05)	1.05 (0.860-1.29)	1.31 (1.04-1.68)	1.52 (1.18-1.99)	1.74 (1.32-2.33)	1.98 (1.46-2.72)	2.31 (1.63-3.30)	2.57 (1.75-3.81)
3-hr	0.408 (0.338-0.497)	0.550 (0.456-0.671)	0.744 (0.614-0.910)	0.907 (0.743-1.12)	1.14 (0.900-1.45)	1.32 (1.02-1.72)	1.51 (1.14-2.02)	1.72 (1.26-2.36)	2.01 (1.42-2.87)	2.24 (1.53-3.32)
6-hr	0.315 (0.261-0.384)	0.428 (0.355-0.522)	0.582 (0.480-0.712)	0.711 (0.582-0.877)	0.892 (0.707-1.14)	1.04 (0.804-1.35)	1.19 (0.899-1.59)	1.35 (0.992-1.85)	1.57 (1.11-2.26)	1.76 (1.20-2.60)
12-hr	0.224 (0.186-0.273)	0.314 (0.260-0.383)	0.433 (0.358-0.530)	0.532 (0.435-0.656)	0.667 (0.528-0.850)	0.772 (0.599-1.01)	0.881 (0.666-1.18)	0.994 (0.731-1.36)	1.15 (0.811-1.65)	1.27 (0.867-1.89)
24-hr	0.161 (0.143-0.186)	0.232 (0.206-0.268)	0.326 (0.288-0.377)	0.402 (0.352-0.469)	0.506 (0.428-0.609)	0.585 (0.486-0.720)	0.667 (0.540-0.839)	0.750 (0.591-0.971)	0.864 (0.654-1.17)	0.953 (0.697-1.33)
2-day	0.100 (0.088-0.115)	0.146 (0.129-0.169)	0.207 (0.183-0.240)	0.258 (0.225-0.300)	0.327 (0.277-0.394)	0.381 (0.316-0.468)	0.436 (0.353-0.549)	0.494 (0.389-0.639)	0.573 (0.434-0.773)	0.636 (0.465-0.887)
3-day	0.073 (0.065-0.084)	0.107 (0.095-0.124)	0.153 (0.135-0.177)	0.191 (0.167-0.223)	0.244 (0.207-0.294)	0.286 (0.237-0.352)	0.329 (0.267-0.415)	0.375 (0.296-0.486)	0.439 (0.332-0.592)	0.489 (0.358-0.683)
4-day	0.059 (0.052-0.068)	0.087 (0.077-0.100)	0.124 (0.109-0.143)	0.155 (0.136-0.181)	0.199 (0.169-0.240)	0.234 (0.194-0.288)	0.271 (0.219-0.341)	0.310 (0.244-0.401)	0.364 (0.276-0.492)	0.408 (0.298-0.570)
7-day	0.039 (0.035-0.045)	0.057 (0.050-0.066)	0.082 (0.072-0.095)	0.103 (0.090-0.120)	0.134 (0.113-0.162)	0.159 (0.132-0.196)	0.186 (0.151-0.235)	0.216 (0.170-0.279)	0.258 (0.195-0.348)	0.293 (0.214-0.409)
10-day	0.029 (0.026-0.034)	0.042 (0.038-0.049)	0.061 (0.054-0.071)	0.077 (0.067-0.090)	0.101 (0.085-0.121)	0.120 (0.100-0.148)	0.141 (0.114-0.178)	0.165 (0.130-0.213)	0.199 (0.150-0.268)	0.227 (0.166-0.317)
20-day	0.018 (0.016-0.021)	0.026 (0.023-0.030)	0.037 (0.032-0.043)	0.046 (0.041-0.054)	0.061 (0.051-0.073)	0.073 (0.060-0.090)	0.086 (0.069-0.108)	0.100 (0.079-0.130)	0.122 (0.092-0.164)	0.139 (0.102-0.195)
30-day	0.014 (0.012-0.016)	0.020 (0.018-0.023)	0.028 (0.025-0.033)	0.036 (0.031-0.042)	0.047 (0.039-0.056)	0.056 (0.046-0.069)	0.066 (0.053-0.083)	0.076 (0.060-0.099)	0.092 (0.070-0.125)	0.106 (0.077-0.148)
45-day	0.011 (0.010-0.013)	0.016 (0.014-0.018)	0.022 (0.020-0.026)	0.028 (0.025-0.033)	0.036 (0.031-0.044)	0.043 (0.036-0.053)	0.051 (0.041-0.064)	0.059 (0.046-0.076)	0.070 (0.053-0.095)	0.080 (0.059-0.112)
60-day	0.010 (0.009-0.011)	0.014 (0.012-0.016)	0.019 (0.017-0.023)	0.024 (0.021-0.028)	0.031 (0.026-0.038)	0.037 (0.030-0.045)	0.043 (0.035-0.054)	0.049 (0.039-0.064)	0.059 (0.044-0.079)	0.066 (0.048-0.093)

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

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

Please refer to NOAA Atlas 14 document for more information.

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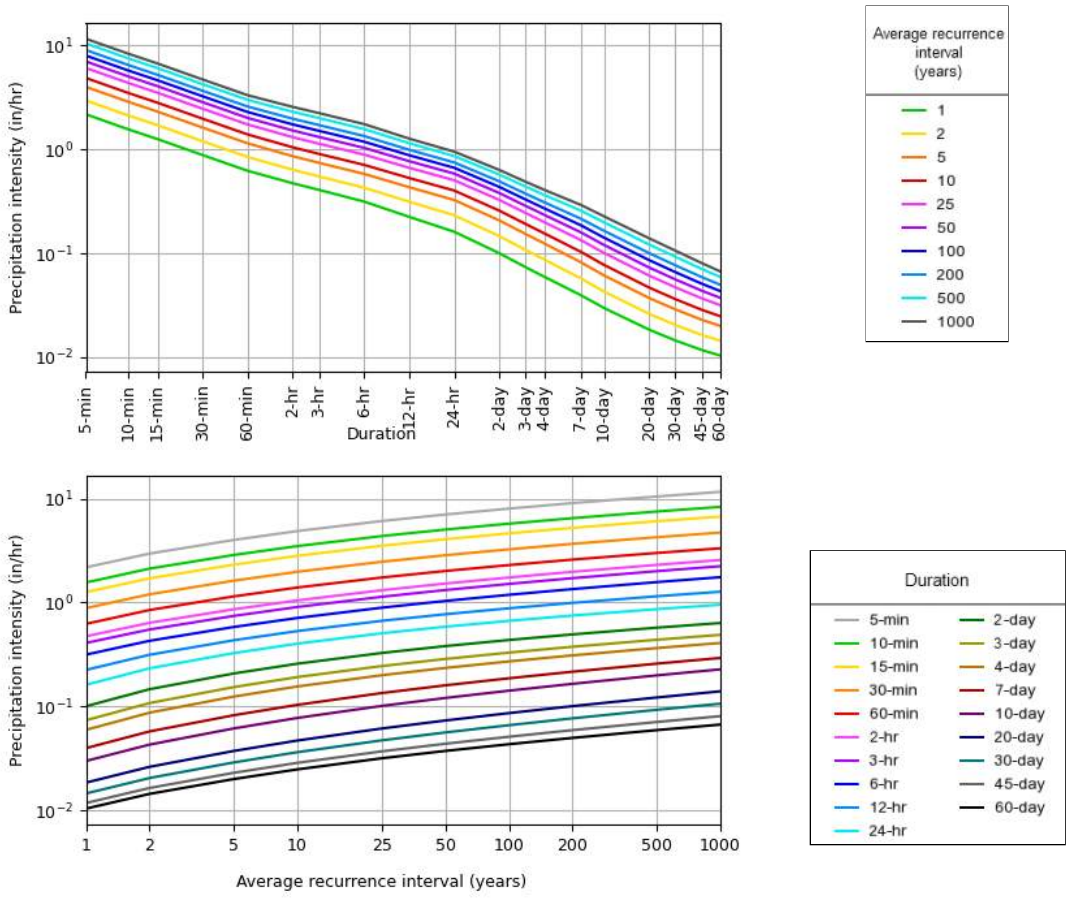
PF graphical

PDS-based intensity-duration-frequency (IDF) curves
Latitude: 34.2257°, Longitude: -117.0941°



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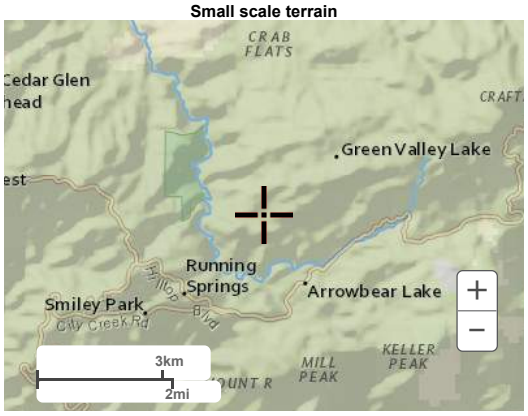
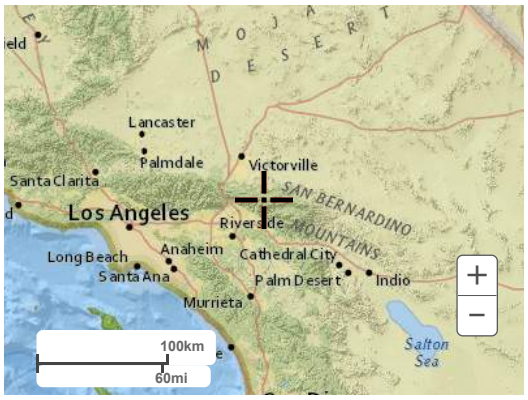
Small scale terrain



Large scale terrain



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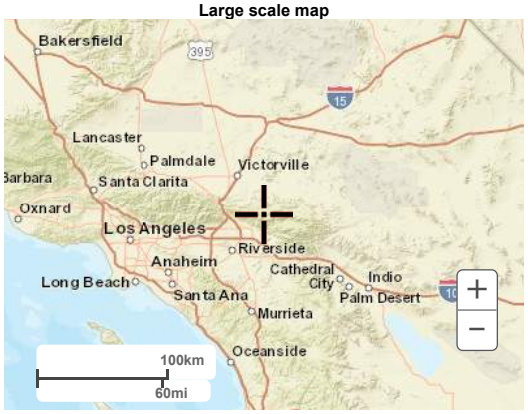

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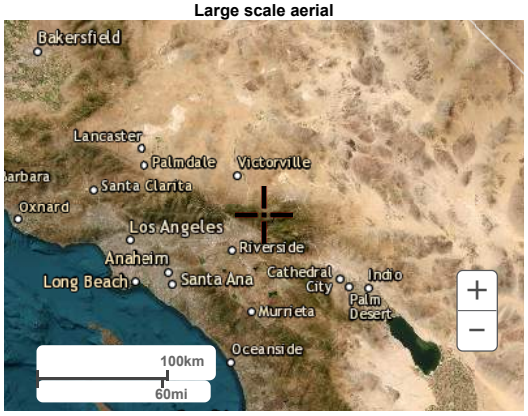

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NOAA Atlas 14, Volume 6, Version 2
Location name: Green Valley Lake, California, USA*
Latitude: 34.2257°, Longitude: -117.0941°
Elevation: 6464 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.182 (0.151-0.221)	0.247 (0.205-0.301)	0.334 (0.276-0.409)	0.407 (0.333-0.502)	0.508 (0.402-0.647)	0.587 (0.455-0.765)	0.669 (0.506-0.893)	0.756 (0.556-1.04)	0.875 (0.618-1.25)	0.971 (0.661-1.44)
10-min	0.260 (0.216-0.317)	0.354 (0.293-0.432)	0.479 (0.396-0.586)	0.583 (0.478-0.719)	0.728 (0.576-0.928)	0.841 (0.653-1.10)	0.959 (0.726-1.28)	1.08 (0.797-1.49)	1.26 (0.885-1.80)	1.39 (0.948-2.06)
15-min	0.315 (0.261-0.384)	0.428 (0.355-0.522)	0.579 (0.479-0.709)	0.705 (0.578-0.870)	0.880 (0.697-1.12)	1.02 (0.789-1.32)	1.16 (0.878-1.55)	1.31 (0.963-1.80)	1.52 (1.07-2.17)	1.68 (1.15-2.50)
30-min	0.442 (0.367-0.539)	0.601 (0.498-0.733)	0.813 (0.672-0.995)	0.990 (0.811-1.22)	1.24 (0.979-1.58)	1.43 (1.11-1.86)	1.63 (1.23-2.17)	1.84 (1.35-2.52)	2.13 (1.50-3.05)	2.36 (1.61-3.50)
60-min	0.624 (0.517-0.760)	0.848 (0.702-1.03)	1.15 (0.948-1.40)	1.40 (1.14-1.72)	1.74 (1.38-2.22)	2.02 (1.56-2.62)	2.30 (1.74-3.07)	2.59 (1.91-3.56)	3.00 (2.12-4.30)	3.33 (2.27-4.94)
2-hr	0.947 (0.786-1.15)	1.28 (1.06-1.56)	1.72 (1.42-2.11)	2.10 (1.72-2.59)	2.63 (2.08-3.35)	3.05 (2.36-3.97)	3.49 (2.64-4.66)	3.96 (2.91-5.44)	4.62 (3.26-6.61)	5.14 (3.50-7.63)
3-hr	1.23 (1.02-1.50)	1.65 (1.37-2.02)	2.24 (1.85-2.73)	2.72 (2.23-3.36)	3.41 (2.70-4.35)	3.96 (3.08-5.16)	4.54 (3.44-6.07)	5.16 (3.80-7.08)	6.03 (4.25-8.63)	6.73 (4.58-9.98)
6-hr	1.89 (1.57-2.30)	2.57 (2.13-3.13)	3.49 (2.88-4.26)	4.26 (3.49-5.25)	5.35 (4.24-6.82)	6.21 (4.82-8.09)	7.12 (5.39-9.50)	8.08 (5.94-11.1)	9.43 (6.65-13.5)	10.5 (7.16-15.6)
12-hr	2.71 (2.25-3.30)	3.79 (3.14-4.62)	5.23 (4.32-6.39)	6.41 (5.25-7.90)	8.04 (6.37-10.3)	9.31 (7.22-12.1)	10.6 (8.03-14.2)	12.0 (8.81-16.5)	13.9 (9.78-19.8)	15.3 (10.5-22.7)
24-hr	3.88 (3.44-4.46)	5.59 (4.95-6.45)	7.83 (6.91-9.06)	9.66 (8.46-11.3)	12.1 (10.3-14.6)	14.1 (11.7-17.3)	16.0 (13.0-20.2)	18.0 (14.2-23.3)	20.8 (15.7-28.0)	22.9 (16.7-31.9)
2-day	4.82 (4.27-5.55)	7.04 (6.23-8.12)	9.97 (8.80-11.5)	12.4 (10.8-14.4)	15.7 (13.3-18.9)	18.3 (15.2-22.5)	21.0 (17.0-26.4)	23.7 (18.7-30.7)	27.5 (20.8-37.1)	30.5 (22.3-42.6)
3-day	5.30 (4.70-6.10)	7.77 (6.87-8.96)	11.1 (9.77-12.8)	13.8 (12.1-16.1)	17.6 (14.9-21.2)	20.6 (17.1-25.4)	23.8 (19.3-29.9)	27.0 (21.3-35.0)	31.6 (23.9-42.6)	35.2 (25.8-49.2)
4-day	5.71 (5.06-6.58)	8.36 (7.40-9.64)	11.9 (10.5-13.8)	15.0 (13.1-17.4)	19.2 (16.3-23.1)	22.5 (18.7-27.7)	26.1 (21.1-32.8)	29.8 (23.5-38.6)	35.0 (26.5-47.2)	39.2 (28.7-54.8)
7-day	6.67 (5.91-7.68)	9.66 (8.55-11.1)	13.8 (12.2-16.0)	17.4 (15.3-20.3)	22.6 (19.2-27.2)	26.8 (22.3-33.0)	31.4 (25.4-39.5)	36.3 (28.6-47.0)	43.4 (32.8-58.5)	49.3 (36.0-68.7)
10-day	7.17 (6.35-8.25)	10.3 (9.12-11.9)	14.7 (13.0-17.1)	18.6 (16.3-21.7)	24.3 (20.6-29.2)	29.0 (24.0-35.6)	34.1 (27.6-42.9)	39.6 (31.3-51.3)	47.8 (36.2-64.5)	54.7 (40.0-76.3)
20-day	8.87 (7.86-10.2)	12.6 (11.1-14.5)	17.9 (15.8-20.7)	22.6 (19.8-26.3)	29.4 (24.9-35.4)	35.2 (29.2-43.2)	41.4 (33.6-52.2)	48.4 (38.1-62.6)	58.6 (44.3-79.0)	67.2 (49.1-93.7)
30-day	10.5 (9.27-12.1)	14.7 (13.1-17.0)	20.8 (18.4-24.1)	26.2 (22.9-30.5)	34.0 (28.8-40.9)	40.5 (33.6-49.8)	47.6 (38.6-59.9)	55.4 (43.7-71.7)	66.9 (50.6-90.2)	76.6 (56.0-107)
45-day	12.7 (11.2-14.6)	17.7 (15.7-20.4)	24.8 (21.9-28.7)	31.0 (27.1-36.1)	39.9 (33.8-48.1)	47.3 (39.2-58.1)	55.2 (44.7-69.5)	63.9 (50.4-82.7)	76.6 (57.9-103)	87.2 (63.7-122)
60-day	15.0 (13.2-17.2)	20.7 (18.4-23.9)	28.8 (25.4-33.3)	35.7 (31.3-41.6)	45.6 (38.7-55.0)	53.7 (44.6-66.1)	62.4 (50.5-78.6)	71.7 (56.6-92.9)	85.2 (64.5-115)	96.4 (70.5-134)

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

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

Please refer to NOAA Atlas 14 document for more information.

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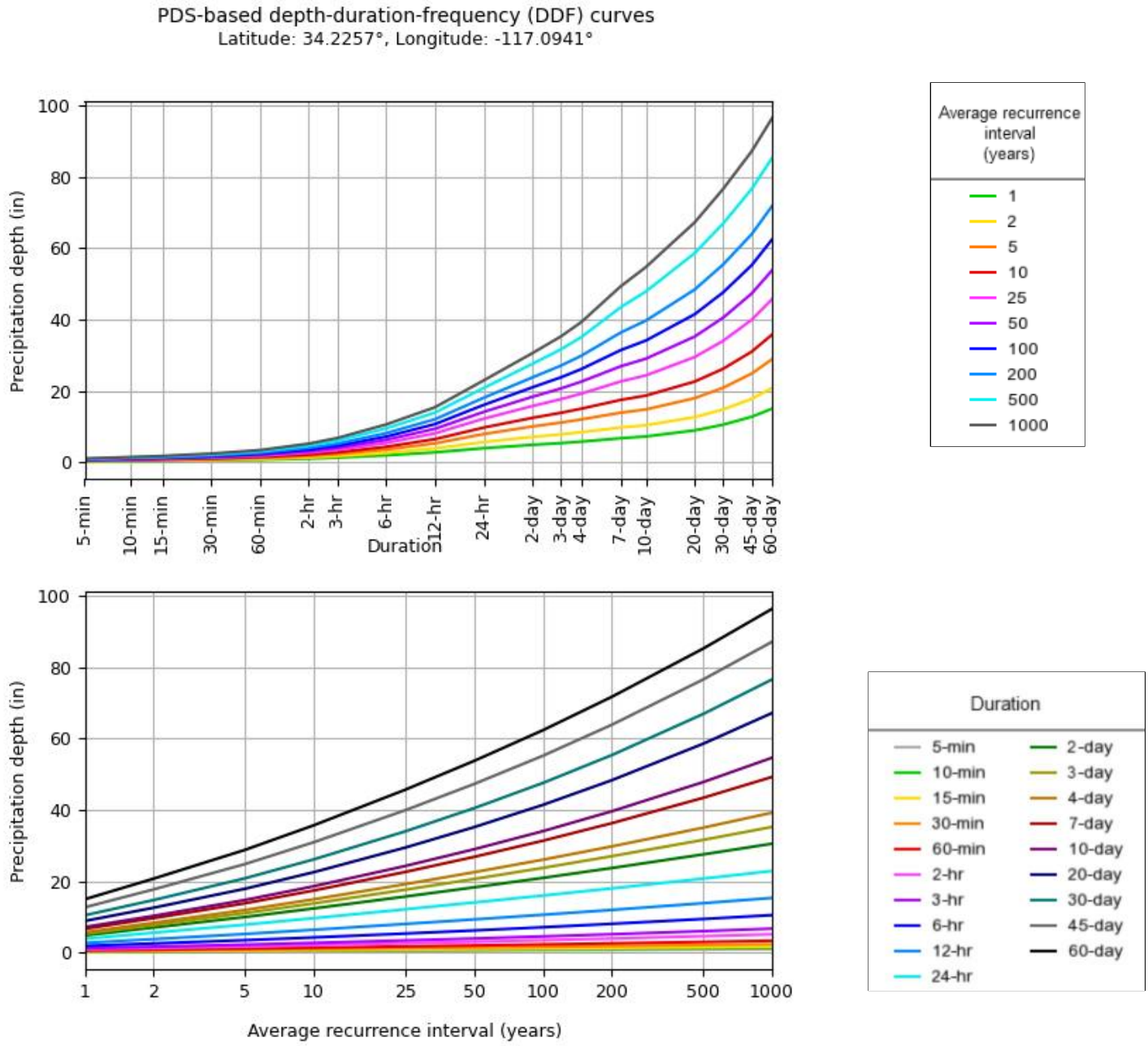
PF graphical



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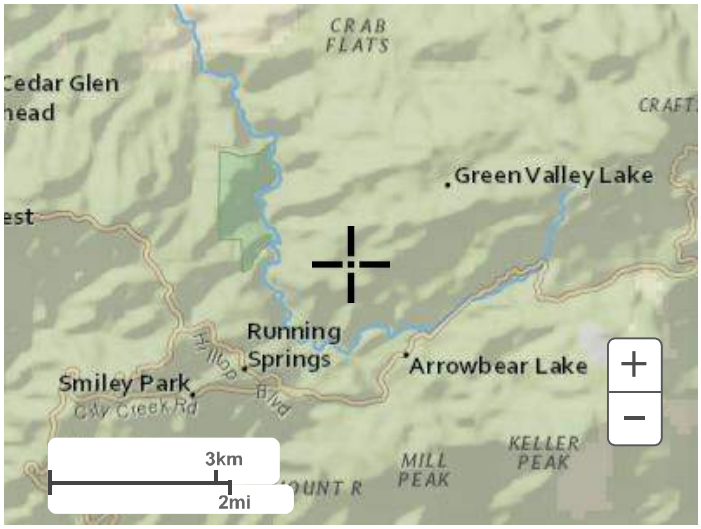
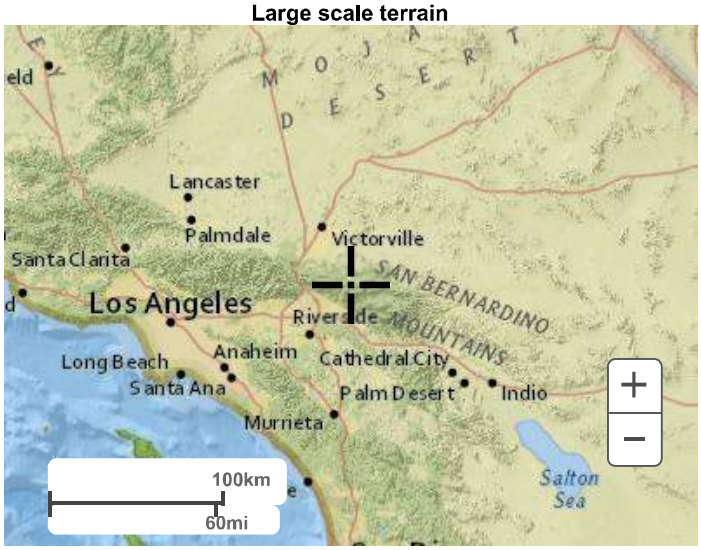
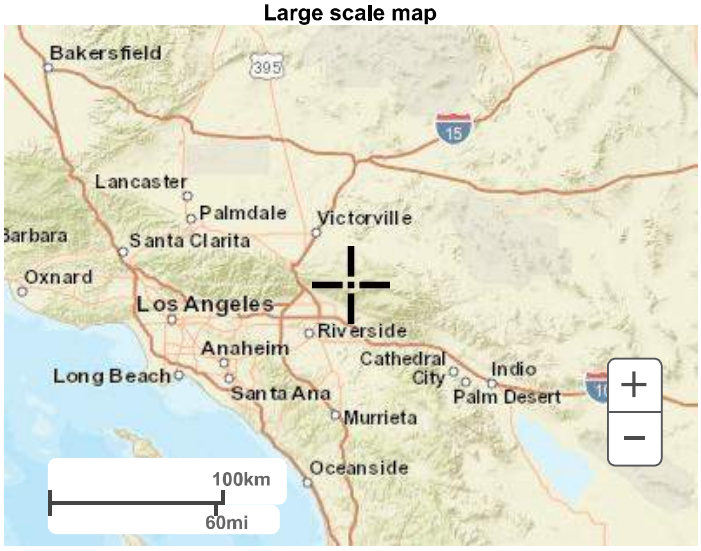
Small scale terrain



Large scale terrain



Large scale map



Large scale aerial



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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for San Bernardino National Forest Area, California



November 13, 2023

Custom Soil Resource Report
Soil Map



Map Scale: 1:10,000 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 100 200 400 600

Feet
0 450 900 1800 2700

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Bernardino National Forest Area, California
Survey Area Data: Version 15, Aug 30, 2023

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

Date(s) aerial images were photographed: Mar 17, 2022—Jun 12, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
106	Cedarpines-Stargazer-Urban land complex, 15 to 30 percent slopes	20.8	5.7%
112	Cedarpines-Plaskett-Stargazer complex, 30 to 50 percent slopes	85.1	23.5%
121	Rock outcrop-Cedarpines-Plaskett complex, 15 to 35 percent slopes	36.3	10.0%
123	Runningsprings-Cedarpines-Plaskett complex, 15 to 35 percent slopes	176.4	48.6%
135	Urban land	10.7	2.9%
DaG	Wapi-Pacifico families-Rock outcrop complex, 50 to 75 percent slopes	33.4	9.2%
Totals for Area of Interest		**362.7**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a

given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

San Bernardino National Forest Area, California

106—Cedarpines-Stargazer-Urban land complex, 15 to 30 percent slopes

Map Unit Setting

National map unit symbol: 2dvlx
Elevation: 4,330 to 6,460 feet
Mean annual precipitation: 26 to 41 inches
Mean annual air temperature: 52 to 55 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Cedarpines and similar soils: 45 percent
Stargazer and similar soils: 25 percent
Urban land: 15 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cedarpines

Setting

Landform: Mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Colluvium and/or residuum weathered from granitoid

Typical profile

A - 0 to 5 inches: cobbly sandy loam
Bw - 5 to 20 inches: cobbly sandy loam
C - 20 to 24 inches: extremely cobbly sand
Cr - 24 to 39 inches: bedrock

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 24 inches to paralithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: F019XG914CA - Loamy Hills >30"ppt
Hydric soil rating: No

Description of Stargazer

Setting

Landform: Mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Colluvium and/or residuum weathered from granitoid

Typical profile

Oe - 0 to 3 inches: moderately decomposed plant material
A - 3 to 16 inches: sandy loam
Bt1 - 16 to 28 inches: clay loam
Bt2 - 28 to 51 inches: loam
Cr - 51 to 61 inches: bedrock

Properties and qualities

Slope: 15 to 30 percent
Surface area covered with cobbles, stones or boulders: 1.0 percent
Depth to restrictive feature: 39 to 69 inches to paralithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: F019XG914CA - Loamy Hills >30"ppt
Hydric soil rating: No

Description of Urban Land

Setting

Landform: Mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Ecological site: F019XG913CA - Loamy Hills <30"ppt

Minor Components

Heapspeak

Percent of map unit: 5 percent
Landform: Ridges

Landform position (two-dimensional): Summit
Landform position (three-dimensional): Mountaintop
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Canyonspring

Percent of map unit: 5 percent
Landform: Mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Runningsprings

Percent of map unit: 5 percent
Landform: Mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

112—Cedarpines-Plaskett-Stargazer complex, 30 to 50 percent slopes

Map Unit Setting

National map unit symbol: 2dvm3
Elevation: 4,080 to 6,820 feet
Mean annual precipitation: 28 to 41 inches
Mean annual air temperature: 50 to 55 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Cedarpines and similar soils: 45 percent
Plaskett and similar soils: 25 percent
Stargazer and similar soils: 15 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cedarpines

Setting

Landform: Mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex

Across-slope shape: Convex
Parent material: Colluvium and/or residuum weathered from granitoid

Typical profile

A - 0 to 5 inches: cobbly sandy loam
Bw - 5 to 20 inches: cobbly sandy loam
C - 20 to 24 inches: extremely cobbly sand
Cr - 24 to 39 inches: bedrock

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 24 inches to paralithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: F019XG914CA - Loamy Hills >30"ppt
Hydric soil rating: No

Description of Plaskett

Setting

Landform: Ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Mountaintop
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Residuum weathered from granitoid

Typical profile

Oi - 0 to 4 inches: slightly decomposed plant material
A - 4 to 13 inches: very gravelly sandy loam
AB - 13 to 23 inches: very gravelly sandy loam
R - 23 to 33 inches: bedrock

Properties and qualities

Slope: 30 to 50 percent
Surface area covered with cobbles, stones or boulders: 10.0 percent
Depth to restrictive feature: 12 to 28 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to low (0.00 to 0.01 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: F019XG914CA - Loamy Hills >30"ppt
Hydric soil rating: No

Description of Stargazer

Setting

Landform: Mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Colluvium and/or residuum weathered from granitoid

Typical profile

Oe - 0 to 3 inches: moderately decomposed plant material
A - 3 to 16 inches: sandy loam
Bt1 - 16 to 28 inches: clay loam
Bt2 - 28 to 51 inches: loam
Cr - 51 to 61 inches: bedrock

Properties and qualities

Slope: 30 to 50 percent
Surface area covered with cobbles, stones or boulders: 1.0 percent
Depth to restrictive feature: 39 to 69 inches to paralithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: F019XG914CA - Loamy Hills >30"ppt
Hydric soil rating: No

Minor Components

Runningsprings

Percent of map unit: 7 percent
Landform: Mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Waterman

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit

Landform position (three-dimensional): Mountaintop
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Rock outcrop

Percent of map unit: 2 percent
Landform: Mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex

Canyonspring

Percent of map unit: 1 percent
Landform: Mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

121—Rock outcrop-Cedarpines-Plaskett complex, 15 to 35 percent slopes

Map Unit Setting

National map unit symbol: 2dvmc
Elevation: 6,080 to 7,070 feet
Mean annual precipitation: 28 to 41 inches
Mean annual air temperature: 49 to 52 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Rock outcrop: 45 percent
Cedarpines and similar soils: 25 percent
Plaskett and similar soils: 15 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rock Outcrop

Setting

Landform: Mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8

Description of Cedarpines

Setting

Landform: Mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Colluvium and/or residuum weathered from granitoid

Typical profile

A - 0 to 5 inches: cobbly sandy loam
Bw - 5 to 20 inches: cobbly sandy loam
C - 20 to 24 inches: extremely cobbly sand
Cr - 24 to 39 inches: bedrock

Properties and qualities

Slope: 15 to 35 percent
Depth to restrictive feature: 24 inches to paralithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: F019XG914CA - Loamy Hills >30"ppt
Hydric soil rating: No

Description of Plaskett

Setting

Landform: Ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Mountaintop
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Residuum weathered from granitoid

Typical profile

Oi - 0 to 4 inches: slightly decomposed plant material
A - 4 to 13 inches: very gravelly sandy loam
AB - 13 to 23 inches: very gravelly sandy loam
R - 23 to 33 inches: bedrock

Properties and qualities

Slope: 15 to 35 percent
Surface area covered with cobbles, stones or boulders: 10.0 percent

Depth to restrictive feature: 12 to 28 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to low (0.00 to 0.01 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: F019XG914CA - Loamy Hills >30"ppt
Hydric soil rating: No

Minor Components

Runningsprings

Percent of map unit: 5 percent
Landform: Mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Canyonspring

Percent of map unit: 5 percent
Landform: Mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Stargazer

Percent of map unit: 5 percent
Landform: Mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

123—Runningsprings-Cedarpines-Plaskett complex, 15 to 35 percent slopes

Map Unit Setting

National map unit symbol: 2dvmf
Elevation: 4,620 to 6,770 feet
Mean annual precipitation: 25 to 43 inches
Mean annual air temperature: 50 to 55 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Runningsprings and similar soils: 45 percent
Cedarpines and similar soils: 25 percent
Plaskett and similar soils: 15 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Runningsprings

Setting

Landform: Mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from granitoid

Typical profile

A - 0 to 9 inches: sandy loam
Bw - 9 to 18 inches: sandy loam
Cr - 18 to 28 inches: bedrock

Properties and qualities

Slope: 15 to 35 percent
Surface area covered with cobbles, stones or boulders: 2.0 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: F019XG914CA - Loamy Hills >30"ppt
Hydric soil rating: No

Description of Cedarpines

Setting

Landform: Mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Colluvium and/or residuum weathered from granitoid

Typical profile

A - 0 to 5 inches: cobbly sandy loam
Bw - 5 to 20 inches: cobbly sandy loam
C - 20 to 24 inches: extremely cobbly sand
Cr - 24 to 39 inches: bedrock

Properties and qualities

Slope: 15 to 35 percent
Depth to restrictive feature: 24 inches to paralithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: F019XG914CA - Loamy Hills >30"ppt
Hydric soil rating: No

Description of Plaskett

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Mountaintop
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from granitoid

Typical profile

Oi - 0 to 4 inches: slightly decomposed plant material
A - 4 to 13 inches: very gravelly sandy loam
AB - 13 to 23 inches: very gravelly sandy loam
R - 23 to 33 inches: bedrock

Properties and qualities

Slope: 15 to 35 percent
Surface area covered with cobbles, stones or boulders: 10.0 percent

Depth to restrictive feature: 12 to 28 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to low (0.00 to 0.01 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: F019XG914CA - Loamy Hills >30"ppt
Hydric soil rating: No

Minor Components

Heapspeak

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Mountaintop
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Stargazer

Percent of map unit: 5 percent
Landform: Mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Canyonspring

Percent of map unit: 3 percent
Landform: Mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Rock outcrop

Percent of map unit: 2 percent
Landform: Mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex

135—Urban land

Map Unit Setting

National map unit symbol: 2dvmt
Elevation: 4,400 to 6,870 feet
Mean annual precipitation: 21 to 42 inches
Mean annual air temperature: 48 to 55 degrees F
Frost-free period: 110 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Ecological site: R019XG911CA - Loamy Fan

Minor Components

Xerorthents

Percent of map unit: 5 percent
Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

DaG—Wapi-Pacifico families-Rock outcrop complex, 50 to 75 percent slopes

Map Unit Setting

National map unit symbol: htrp
Elevation: 4,000 to 7,800 feet
Mean annual precipitation: 20 to 35 inches
Mean annual air temperature: 46 to 54 degrees F
Frost-free period: 120 to 175 days
Farmland classification: Not prime farmland

Map Unit Composition

Wapi family and similar soils: 35 percent
Pacifico family and similar soils: 30 percent
Rock outcrop: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wapi Family

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from granodiorite

Typical profile

H1 - 0 to 7 inches: loamy sand
H2 - 7 to 10 inches: gravelly loamy sand
H3 - 10 to 15 inches: weathered bedrock
H4 - 15 to 19 inches: unweathered bedrock

Properties and qualities

Slope: 50 to 75 percent
Depth to restrictive feature: 10 to 15 inches to paralithic bedrock; 15 to 19 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 0.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D

Ecological site: F019XG915CA - Sandy Hills <30"ppt
Hydric soil rating: No

Description of Pacifico Family

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from granodiorite

Typical profile

H1 - 0 to 3 inches: loamy coarse sand
H2 - 3 to 15 inches: loamy coarse sand
H3 - 15 to 19 inches: weathered bedrock

Properties and qualities

Slope: 50 to 75 percent
Depth to restrictive feature: 15 to 19 inches to paralithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: F019XG915CA - Sandy Hills <30"ppt
Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from granodiorite

Typical profile

H1 - 0 to 4 inches: unweathered bedrock

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8e
Hydric soil rating: No

HUME SOCAL CAMPGROUND PROJECT

SAN BERNARDINO COUNTY, CALIFORNIA

KELLER PEAK USGS 7.5-MINUTE TOPOGRAPHIC QUADRANGLE
SECTIONS 28 AND 33, TOWNSHIP 2 NORTH, RANGE 2 WEST
APN: 0328-071-05, -07, AND -10, AND 0328-121-40 AND -42

Delineation of State and Federal Jurisdictional Waters

Prepared For:

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September 2023

HUME SOCAL CAMPGROUND PROJECT

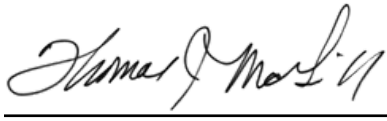
SAN BERNARDINO COUNTY, CALIFORNIA

Delineation of State and Federal Jurisdictional Waters

The undersigned certify that the statements furnished in this report and exhibits present data and information required for this biological evaluation, and the facts, statements, and information presented is a complete and accurate account of the findings and conclusions to the best of our knowledge and beliefs.



Travis J. McGill
Biologist/Director



Thomas J. McGill, Ph.D.
Managing Director

September 2023

Executive Summary

ELMT Consulting (ELMT) has prepared this Delineation of State and Federal Jurisdictional Waters Report for the proposed Hume SoCal Campground Project located within Assessor Parcel Numbers (APNs) 0328-071-05, -07, -10, 121-40, and 121-42 (project site or site) located in the City of Green Valley Lake, San Bernardino County, California. The jurisdictional delineation documents the regulatory authority of the U.S. Army Corps of Engineers (Corps), the Regional Water Quality Control Board (Regional Board), and the California Department of Fish and Wildlife (CDFW) pursuant to Section 401 and 404 of the Federal Clean Water Act (CWA), the California Porter-Cologne Water Quality Control Act, and Sections 1600 *et. seq.* of the California Fish and Game Code.[1]

A total of seven (7) drainage features (Drainages 1-7) were observed within the boundaries of the project site during the field delineation. The on-site drainage features, after flowing off-site, flow into Deep Creek before ultimately flowing into the Mojave River. Therefore, the onsite drainage features would qualify as waters of the United States under the jurisdiction of the Corps, and would qualify as "waters of the State" under the regulatory authority of the Regional Board and CDFW. Refer to Table ES-1 for a summary of on-site jurisdictional areas.

Table ES-1: Jurisdictional Areas

Jurisdictional Feature	Stream Flow	Cowardin Class	Class of Aquatic Resource	Corps/Regional Board Waters of the State		CDFW Streambed		
				On-Site Jurisdiction		On-Site Jurisdictional Streambed		Associated Habitat
				Acreage	Linear Feet	Acreage	Linear Feet	Acreage
Drainage 1	Perennial	Riverine	Non-Section 10 Non-Wetland	0.95	3,382	0.95	3,382	1.48
Drainage 2	Ephemeral	Riverine	Non-Section 10 Non-Wetland	0.18	875	0.18	875	0
Drainage 3	Ephemeral	Riverine	Non-Section 10 Non-Wetland	0.03	303	0.03	303	0
Drainage 4	Perennial	Riverine	Non-Section 10 Non-Wetland	0.28	1,613	0.28	1,613	0.73
Drainage 5	Ephemeral	Riverine	Non-Section 10 Non-Wetland	0.094	1,504	0.094	1,504	0
Drainage 6	Ephemeral	Riverine	Non-Section 10 Non-Wetland	0.055	620	0.055	620	0
Drainage 7	Perennial	Riverine	Non-Section 10 Non-Wetland	0.25	1,523	0.25	1,523	0.75
			TOTALS	**1.839**	**9,820**	**1.839**	**9,820**	**2.96**

[1] The field surveys for this jurisdictional delineation were conducted on November 17, 2021 pursuant to the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region, Version 2.0* (Corps 2008); and *Minimum Standards for Acceptance of Aquatic Resources Delineation Reports* (Corps 2017); *The MESA Field Guide: Mapping Episodic Stream Activity* (CDFW 2014); and a *Review of Stream Processes and Forms in Dryland Watersheds* (CDFW 2010).

Approximately 1.839 acres (9,820 linear feet) of waters of the United States occur on-site. Likewise, the on-site drainage features exhibit characteristics consistent with CDFW's methodology and would be considered CDFW streambed totaling 4.8 acres (9,820 linear feet).

Any impacts to the on-site jurisdictional areas will require a Corps Clean Water Act Section 404 Permit, Regional Board CWA Section 401 Water Quality Certification, and a CDFW Section 1602 Lake and Streambed Alteration Agreement prior to Project implementation. However, based on the proposed project footprint, all of the onsite jurisdictional areas will be avoided and no impacts will occur. Refer to Sections 1-7 for a detailed analysis of site conditions and regulatory requirements.

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APPENDIX

Appendix A Documentation
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Section 1 Introduction

This delineation has been prepared for the Hume SoCal Campground Project (project site, site) located near Green Valley Lake within Assessor Parcel Numbers 0328-071-05, -07, and -10, and 0328-121-40 and -42 in the unincorporated community of Green Valley Lake, San Bernardino County, California (Project) in order to document the potential jurisdictional authority of the U.S. Army Corps of Engineers (Corps), the Regional Water Quality Control Board (Regional Board), and the California Department of Fish and Wildlife (CDFW) pursuant to Section 401 and 404 of the Federal Clean Water Act (CWA), the California Porter-Cologne Water Quality Control Act and Sections 1600 *et seq.* of the California Fish and Game Code. The analysis presented in this report is supported by field surveys and verification of site conditions conducted on July 31, 2023 and August 2, 2023.

This jurisdictional delineation explains the methodology undertaken by ELMT Consulting (ELMT) to define the regulatory authority of the aforementioned regulatory agencies and documents the findings made by ELMT. This report documents the jurisdictional boundaries using the most up-to-date regulations, written policy, and guidance from the regulatory agencies.

1.1 PROJECT LOCATION

The project site is generally located north, west, and south of State Route 18, and southeast of Lake Arrowhead within the San Bernardino Mountains in the unincorporated Community of Green Valley Lake, San Bernardino County, California (Exhibit 1, *Regional Vicinity*). The site is depicted on the *Keller Peak* quadrangle of the United States Geological Survey's (USGS) 7.5-minute topographic map series within Sections 28 and 33 of Township 2 North, Range 2 West (Exhibit 2, *Site Vicinity*). Specifically, the approximately 251-acre project site is transected by Green Valley Lake Road and roughly centered around the existing Hume SoCal campground facility within Assessor's Parcel Numbers (APN) 0328-071-05, -07, and -10, and 0328-121-40 and -42 (Exhibit 3, *Project Site*).

1.2 PROJECT DESCRIPTION

The Project involves the expansion of campground uses for the existing Hume SoCal campground to accommodate up to 2,854 total occupants. This would be accomplished through the continued use of existing campground structures as well as the development of additional campground and recreational structures and uses within a 251-acre area of the Green Valley Lake community. Development of the Project site would be completed in five phases.

Each phase of the Project would include the development of expanded infrastructure, additional amenities, support structures, and buildings necessary to accommodate expanded camper capacity as well as paved parking areas and paved access roadways. Refer to Appendix A, *Site Plans*.

Phase 1 of the Project would involve the development of facilities to be used as a Junior High Camp. Proposed residential structures within the Phase 1 area include an expanded welcome center, private administration and guest speaker residencies, staff housing, and student dormitories. Phase 1 also includes the development of a gymnasium, bus parking, a snack shop, a chapel, converting an existing chapel to a

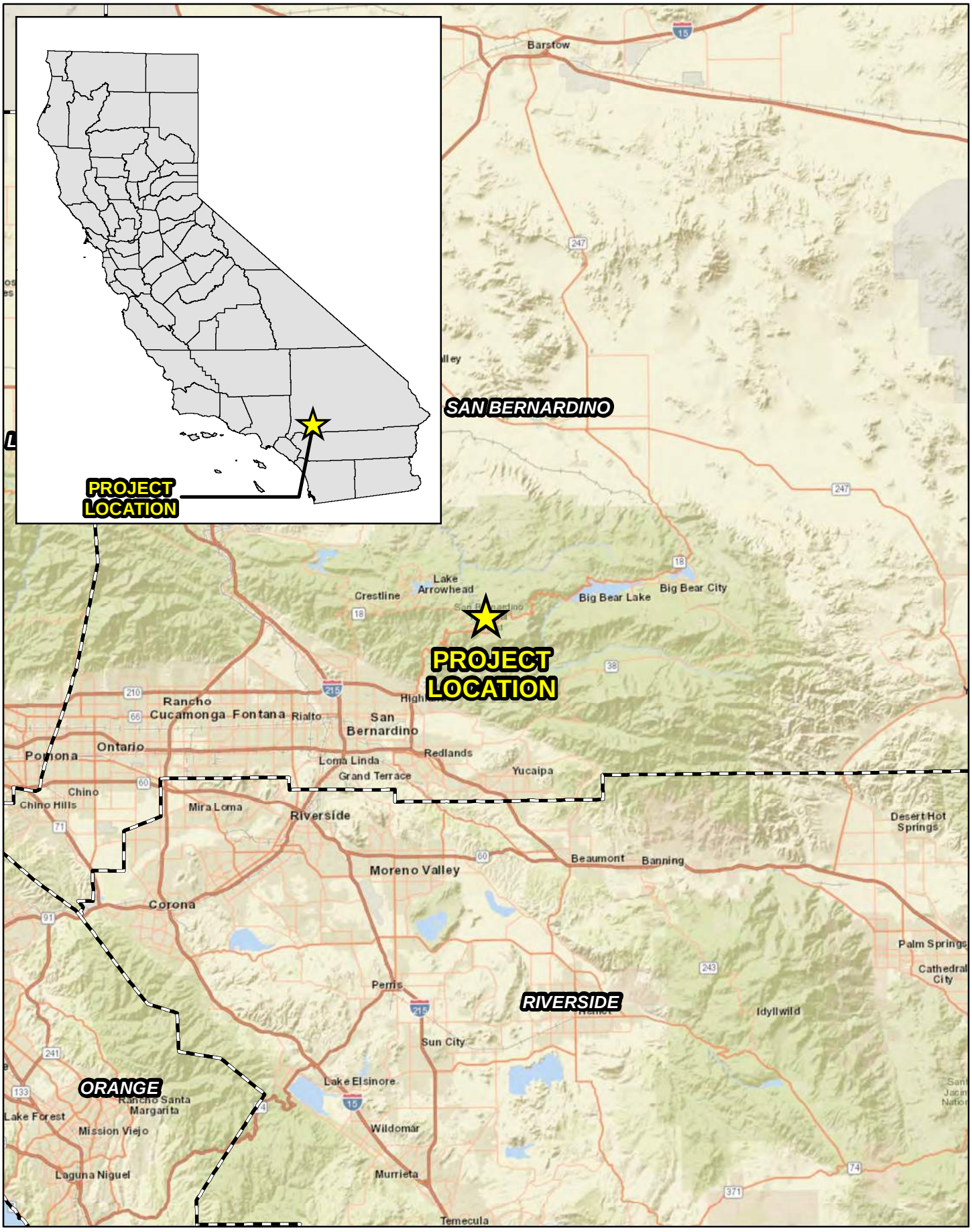
small meeting space, an expansion to the existing dining hall, a maintenance building, an amphitheater, and restrooms. Outdoor recreation facilities include grass quads. Existing and proposed facilities within Phase 1 would accommodate up to 988 guest occupants.

Phase 2 of the Project would involve the development of facilities to be used as a High School Camp. Proposed residential structures within the Phase 2 area include staff housing buildings, and student dormitories. Phase 2 also includes the development of a large dining hall, gymnasium, a chapel, amphitheater, and restrooms. Outdoor recreation facilities include grass quads, a swimming pool, and a recreation pond. Existing and proposed facilities within Phase 2 would accommodate up to 1,096 occupants.

Phase 3 of the Project proposes the development of an Adult Lodge. Phase 3 would include the development of one adult lodge with included access road. Existing and proposed facilities within Phase 3 would accommodate up to 140 occupants.

Phase 4 of the Project would include the development of an Elementary Age Camp and associated facilities. Proposed residential structures within Phase 4 include semi-permanent insulated tent structures for students. Phase 4 also includes the development of restroom facilities with showers and an amphitheater. Outdoor recreation facilities include grass quads, a dining canopy, a swimming pool, and a recreation pond. Existing and proposed facilities within Phase 4 would accommodate up to 500 occupants.

Phase 5 of the Project proposes the creation of a tent-based youth camp, Wildwood Camp. Residential structures proposed for this phase consist of semi-permanent insulated tent structures. Phase 5 also includes the development of restroom facilities with showers and an amphitheater. Outdoor recreation facilities include grass quads, a dining canopy, a swimming pool, and a recreation pond. Existing and proposed facilities within Phase 5 would accommodate up to 130 occupants.



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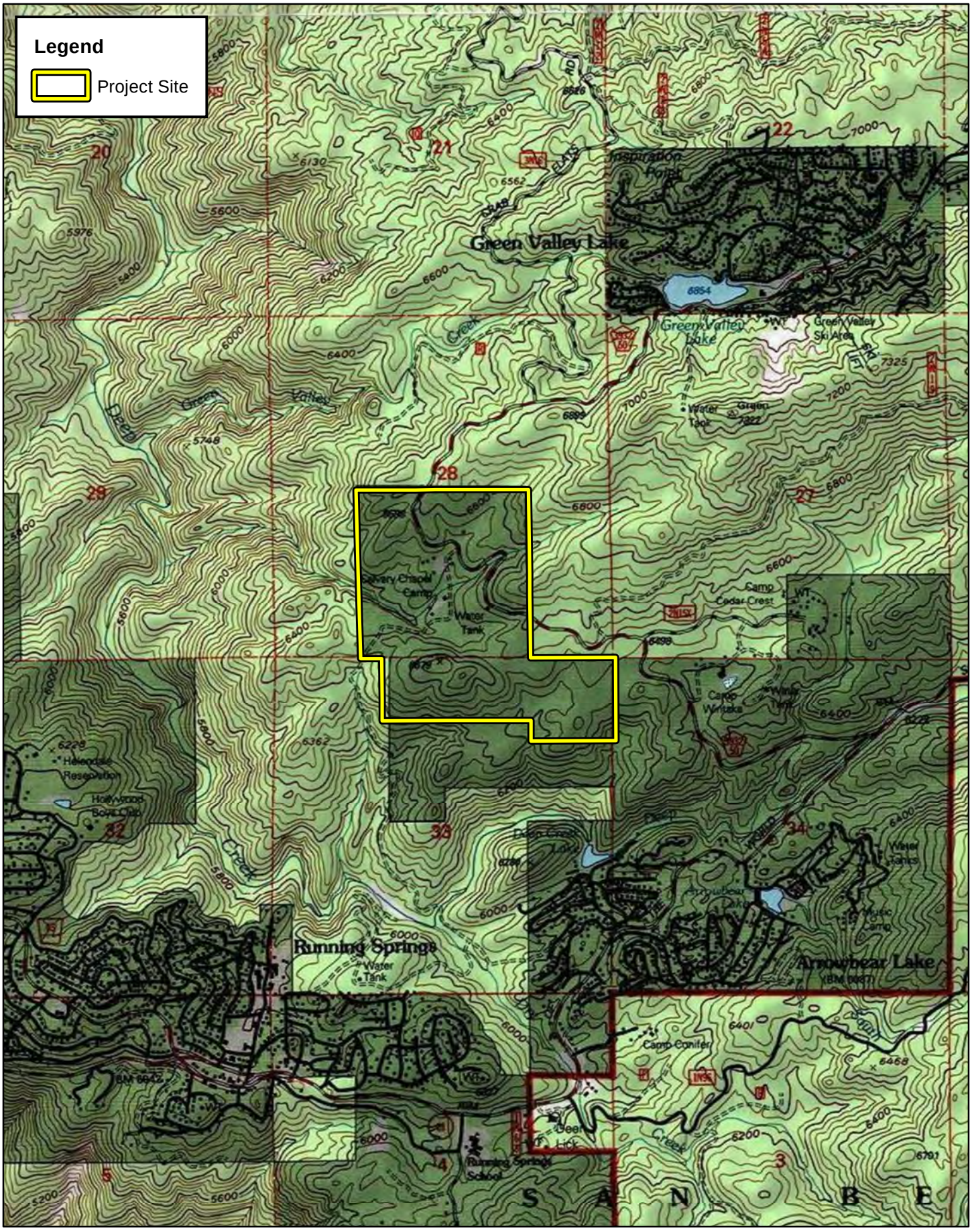
HUME SO CAL CAMPGROUND PROJECT

Regional Vicinity

Exhibit 1



ELMT CONSULTING

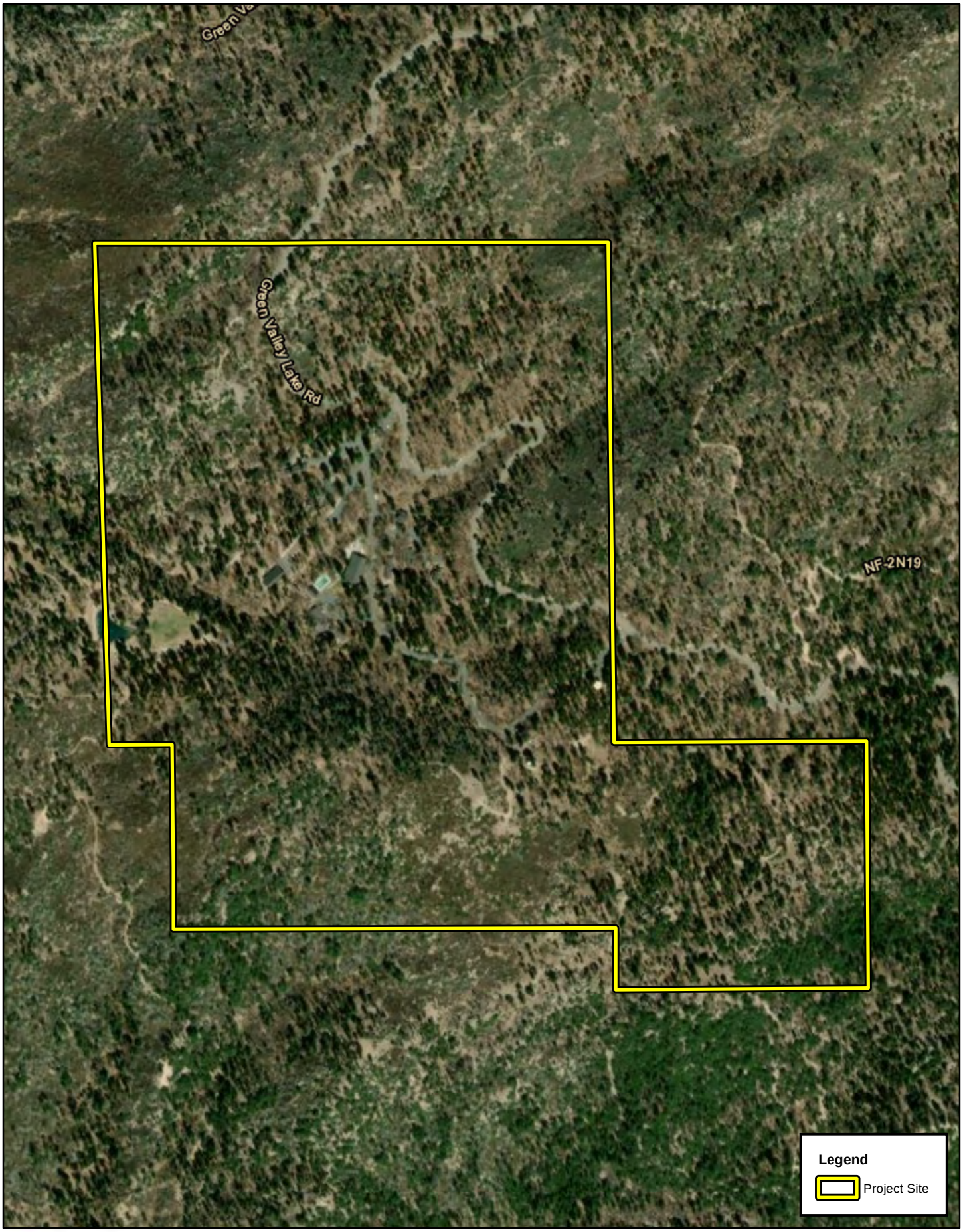
0 1,000 2,000 4,000 Feet

Source: USA Topographic Map, San Bernardino County

HUME SO CAL CAMPGROUND PROJECT

Site Vicinity

Exhibit 2



ELMT CONSULTING

0 500 1,000 2,000 Feet

HUME SO CAL CAMPGROUND PROJECT

Project Site

Source: ESRI Aerial Imagery, San Bernardino County

Exhibit 3

Section 2 Regulations

There are three key agencies that regulate activities within inland streams, wetlands, and riparian areas in California. The Corps Regulatory Division regulates activities pursuant to Section 404 of the CWA, Section 10 of the Rivers and Harbors Act, and Section 103 of the Marine Protection, Research, and Sanctuaries Act. The Regional Board regulates activities pursuant to Section 401 of the CWA and the California Porter-Cologne Water Quality Control Act and the CDFW regulates activities under Sections 1600 *et seq*. of the California Fish and Game Code.

2.1 U.S. ARMY CORPS OF ENGINEERS

Since 1972, the Corps and U.S. Environmental Protection Agency (EPA) have jointly regulated the discharge of dredged or fill material into waters of the United States, including wetlands, pursuant to Section 404 of the CWA. The Corps and EPA define "fill material" to include any "material placed in waters of the United States where the material has the effect of: (i) replacing any portion of a water of the United States with dry land; or (ii) changing the bottom elevation of any portion of the waters of the United States." Examples include, but are not limited to, sand, rock, clay, construction debris, wood chips, and "materials used to create any structure or infrastructure in the waters of the United States."

2.2 REGIONAL WATER QUALITY CONTROL BOARD

Pursuant to Section 401 of the CWA, any applicant for a federal license or permit to conduct any activity which may result in any discharge to waters of the United States must provide certification from the State or Indian tribe in which the discharge originates. This certification provides for the protection of the physical, chemical, and biological integrity of waters, addresses impacts to water quality that may result from issuance of federal permits and helps insure that federal actions will not violate water quality standards of the State or Indian tribe. In California, there are nine Regional Boards that issue or deny certification for discharges to waters of the United States and waters of the State, including wetlands, within their geographical jurisdiction. The State Water Resources Control Board (SWRCB) assumes this responsibility when a project has the potential to result in the discharge to waters within multiple Regional Boards.

Additionally, the California Porter-Cologne Water Quality Control Act gives the State very broad authority to regulate waters of the State, which are defined as any surface water or groundwater, including saline waters. The Porter-Cologne Water Quality Control Act has become an important tool post *Solid Waste Agency of Northern Cook County vs. United States Corps of Engineers*[2] (SWANCC) and *Rapanos v. United States*[3] (Rapanos) court cases with respect to the State's regulatory authority over isolated and insignificant waters. Generally, any applicant proposing to discharge waste into a water body must file a Report of Waste Discharge in the event that there is no Section 404/401 nexus. Although "waste" is partially defined as any waste substance associated with human habitation, the Regional Board also interprets this to include discharge of dredged and fill material into water bodies.

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2 Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers, 531 U.S. 159 (2001)
3 Rapanos v. United States, 547 U.S. 715 (2006)

Under the State Water Resources Control Board Sate Wetland Definition, an area is a wetland if, under normal circumstances, (1) the area has continuous or recurrent saturation of the upper substrate caused by groundwater, or shallow surface water, or both; (2) the duration of such saturation is sufficient to cause anaerobic conditions in the upper substrate; and (3) the area's vegetation is dominated by hydrophytes or the area lacks vegetation.

2.3 CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

Sections 1600 *et seq.* of the California Fish and Game Code establishes a fee-based process to ensure that projects conducted in and around lakes, rivers, or streams do not substantially adversely impact fish and wildlife resources, or, when adverse impacts cannot be avoided, ensures that adequate mitigation and/or compensation is provided. Pursuant to Section 1602 of the California Fish and Game Code, a notification must be submitted to the CDFW for any activity that will divert or obstruct the natural flow or alter the bed, channel, or bank (which may include associated biological resources) of a river or stream or use material from a streambed. One CDFW guidance document, although not a formally adopted rule or policy, requires notification for activities taking place within rivers or streams that flow perennially or episodically and that are defined by the area in which surface water currently flows, or has flowed, over a given course during the historic hydrologic regime, and where the width of its course can reasonably be identified by physical and biological indicators. If the project will not "substantially adversely affect an existing fish or wildlife resource," following notification to CDFW, the project may commence without an agreement with CDFW. (Fish & G. Code, § 1602(a)(4)(A)(i).)

Section 3 Methodology

The analysis presented in this report is supported by field surveys and verification of site conditions conducted on July 31, 2023 and August 2, 2023. ELMT conducted a field delineation to determine the jurisdictional limits of "waters of the State" and jurisdictional streambed (including potential wetlands), located within the boundaries of the project site. While in the field, jurisdictional features were recorded on an aerial base map at a scale of 1" = 50' using topographic contours and visible landmarks as guidelines. Data points were obtained with a Garmin Map62 Global Positioning System to record and identify specific widths for ordinary high water mark (OHWM) indicators and the locations of photographs, soil pits, and other pertinent jurisdictional features, if present. This data was then transferred as a .shp file and added to the Project's jurisdictional exhibits. The jurisdictional exhibits were prepared using ESRI ArcInfo Version 10 software.

3.1 WATERS OF THE UNITED STATES

In the absence of adjacent wetlands, the limits of the Corps jurisdiction in non-tidal waters extend to the OHWM, which is defined as "*. . . that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.*"[4] Indicators of an OHWM are defined in *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (Corps 2008). An OHWM can be determined by the observation of a natural line impressed on the bank; shelving; changes in the character of the soil; destruction of terrestrial vegetation; presence of litter and debris; wracking; vegetation matted down, bent, or absent; sediment sorting; leaf litter disturbed or washed away; scour; deposition; multiple observed flow events; bed and banks; water staining; and/or change in plant community. The Regional Board shares the Corps' jurisdictional methodology, unless SWANCC or Rapanos conditions are present. In the latter case, the Regional Board considers such drainage features to be jurisdictional waters of the State.

In accordance with the Revised Definition of "Waters of the United States"; Conforming (September 8, 2023), "waters of the United Sates" are defined as follows:

(a) ***Waters of the United States*** means:

(1) Waters which are:
(i) Currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
(ii) The territorial seas; or
(iii) Interstate waters;

[4] CWA regulations 33 CFR §328.3(e).

(2) Impoundments of waters otherwise defined as waters of the United States under this definition, other than impoundments of waters identified under paragraph (a)(5) of this section;

(3) Tributaries of waters identified in paragraph (a)(1) or (2) of this section that are relatively permanent, standing or continuously flowing bodies of water;

(4) Wetlands adjacent to the following waters:
(i) Waters identified in paragraph (a)(1) of this section; or
(ii) Relatively permanent, standing or continuously flowing bodies of water identified in paragraph (a)(2) or (a)(3) of this section and with a continuous surface connection to those waters;

(5) Intrastate lakes and ponds not identified in paragraphs (a)(1) through (4) of this section that are relatively permanent, standing or continuously flowing bodies of water with a continuous surface connection to the waters identified in paragraph (a)(1) or (a)(3) of this section

(b) The following are not "waters of the United States" even where they otherwise meet the terms of paragraphs (a)(2) through (5) of this section:

(1) Waste treatment systems, including treatment ponds or lagoons, designed to meet the requirements of the Clean Water Act;

(2) Prior converted cropland designated by the Secretary of Agriculture. The exclusion would cease upon a change of use, which means that the area is no longer available for the production of agricultural commodities. Notwithstanding the determination of an area's status as prior converted cropland by any other Federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with EPA;

(3) Ditches (including roadside ditches) excavated wholly in and draining only dry land and that do not carry a relatively permanent flow of water;

(4) Artificially irrigated areas that would revert to dry land if the irrigation ceased;
(5) Artificial lakes or ponds created by excavating or diking dry land to collect and retain water and which are used exclusively for such purposes as stock watering, irrigation, settling basins, or rice growing;
(6) Artificial reflecting or swimming pools or other small ornamental bodies of water created by excavating or diking dry land to retain water for primarily aesthetic reasons;

(7) Waterfilled depressions created in dry land incidental to construction activity and pits excavated in dry land for the purpose of obtaining fill, sand, or gravel unless and until the construction or excavation operation is abandoned and the resulting body of water meets the definition of waters of the United States; and

(8) Swales and erosional features (*e.g.,* gullies, small washes) characterized by low volume, infrequent, or short duration flow.

(c) In this section, the following definitions apply:

(1) ***Wetlands*** means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

(2) ***Adjacent*** means having a continuous surface connection

(3) ***High tide line*** means the line of intersection of the land with the water's surface at the maximum height reached by a rising tide. The high tide line may be determined, in the absence of actual data, by a line of oil or scum along shore objects, a more or less continuous deposit of fine shell or debris on the foreshore or berm, other physical markings or characteristics, vegetation lines, tidal gages, or other suitable means that delineate the general height reached by a rising tide. The line encompasses spring high tides and other high tides that occur with periodic frequency but does not include storm surges in which there is a departure from the normal or predicted reach of the tide due to the piling up of water against a coast by strong winds such as those accompanying a hurricane or other intense storm.

(4) ***Ordinary high water mark*** means that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

(5) ***Tidal waters*** means those waters that rise and fall in a predictable and measurable rhythm or cycle due to the gravitational pulls of the moon and sun. Tidal waters end where the rise and fall of the water surface can no longer be practically measured in a predictable rhythm due to masking by hydrologic, wind, or other effects.

Pursuant to the Corps Wetland Delineation Manual (Corps 1987), the identification of wetlands is based on a three-parameter approach involving indicators of hydrophytic vegetation, hydric soils, and wetland hydrology. In order to qualify as a wetland, a feature must exhibit at least minimal characteristics within each of these three parameters. It should also be noted that both the Regional Board and CDFW follow the methods utilized by the Corps to identify wetlands. For this project location, Corps jurisdictional wetlands are delineated using the methods outlined in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region, Version 2.0* (Corps 2008).

3.2 WATERS OF THE STATE

3.2.1 REGIONAL WATER QUALITY CONTROL BOARD

The California *Porter-Cologne Water Quality Control Act* gives the Regional Board very broad authority to regulate waters of the State, which are defined as any surface water or groundwater, including saline waters. The Regional Board shares the Corps' methodology for delineating the limits of jurisdiction based on the identification of OHWM indicators and utilizing the three parameter approach for wetlands.

3.2.2 CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

Sections 1600 *et seq*. of the California Fish and Game Code applies to all perennial, intermittent, and ephemeral rivers, streams, and lakes in the State. CDFW Regulations define "stream" as "a body of water that flows at least periodically or intermittently through a bed or channel having banks and that supports fish or other aquatic life. This includes watercourses having a surface or subsurface flow that supports or has supported riparian vegetation." (14 Cal. Code Regs., § 1.72.) For this project location, CDFW jurisdictional limits were delineated using this definition of "stream."

Section 4 Literature Review

ELMT conducted a thorough review of relevant literature and materials to preliminarily identify areas that may fall under the jurisdiction of the regulatory agencies. A summary of materials utilized during ELMT's literature review is provided below and in Appendix A, *Documentation*. In addition, refer to Section 8 for a complete list of references used throughout the course of this delineation.

4.1 WATERSHED REVIEW

The project site is located near the southern limits of the Mojave Watershed (HUC 18090208). The Mojave Watershed is a large, closed basin in the western Mojave Desert that occurs within central and western San Bernardino County and drains approximately 4,500 square miles. The primary geographic and hydrologic feature of the Mojave Watershed is the Mojave River, which occurs approximately 11.2 miles to the northwest of the site. The headwaters of the Mojave River are in the San Bernardino Mountains, which annually receives greater than forty inches of precipitation at its highest elevations. Much of the winter precipitation in the San Bernardino Mountains falls in the form of snow, which provides spring recharge to the Mojave River system. This results in an annual recharge to the Mojave River of approximately 75,000 acre-feet. The Mojave River transects the watershed north and east to its terminus at Silver Lake, just north of the Community of Baker. Elevations within the watershed range from 8,500 feet above mean sea level at Butler Peak in the San Bernardino Mountains to 1,400 feet above mean sea level at Afton Canyon near the terminus of the Mojave River. There are multiple intermittent or ephemeral waterways in the eastern portion of the watershed which convey surface water runoff to Silver Lake during extreme rain events. Silver Lake remains dry most of the year. Aside from extreme rain events, the Mojave River channel is typically dry downstream of the Mojave Forks Dam, except in certain locations where groundwater is forced to the surface by geologic influences.

South of Mojave Forks Dam, the Mojave River is fed by the West Fork Mojave River to the west, which also forms the Mojave River Forks Reservoir, and Deep Creek to the east. The headwater tributaries of Deep Creek occur within the surrounding 2 to 3 miles surrounding the site, and the nearest portions of Deep Creek to the site occur approximately 0.22 miles to the south and 0.46 miles to the west, circling around the site along local topography before flowing northward.

4.2 LOCAL CLIMATE

Southwestern San Bernardino County features a somewhat cooler version of a Mediterranean climate, or semi-arid climate, with warm, sunny, dry summers and cool, rainy, mild winters. Relative to other areas in Southern California, the upper elevations of the San Bernardino Mountains are influenced by a steppe climate, with colder, snowy winters and cold morning temperatures common. Climatological data obtained for the nearby City of Big Bear Lake indicates the annual precipitation averages 12.56 inches per year. The majority of precipitation in the form of rain occurs in the months between December and March, with hardly any occurring between the months of May and June. The wettest months are January and February, with monthly average total precipitation of 1.93 and 2.24 inches, respectively, and the driest months are May and June, with monthly average total precipitation of 0.47 and 0.20 inches, respectively. The average maximum and minimum temperatures are 61.1- and 41.1-degrees Fahrenheit (° F), respectively, with July

(monthly average high 77.7° F) being the hottest month and February (monthly average lows 29.5° F) being the coldest. The temperature during both site visits was in the mid-70s ° F with clear skies and calm winds.

4.3 USGS TOPOGRAPHIC QUADRANGLE

The USGS 7.5 Minute Series Topographic Quadrangle maps show geological formations and their characteristics, describing the physical setting of an area through contour lines and major surface features including lakes, rivers, streams, buildings, landmarks, and other factors that may fall under an agency's jurisdiction. Additionally, the maps depict topography through color and contour lines, which are helpful in determining elevations and latitude and longitude within the project site.

The project site is depicted on the Keller Peak quadrangle of the United States Geological Survey's (USGS) 7.5-minute topographic map series within Sections 28 and 33 of Township 2 North, Range 2 West. According to the topographic map, the project site consists almost entirely of vacant/undeveloped land that supports natural plant communities with campground facilities and other infrastructure scattered throughout.

Elevation on project site ranges from to 6,280 to 6,760 feet above mean sea level and is highly variable, consisting of steep slopes and valleys generally sloping from north to south.

4.4 AERIAL PHOTOGRAPHS

Prior to conducting the field delineation, ELMT reviewed current and historical aerial photographs (1985-2022) of the project as available from Google Earth Pro Imaging. Aerial photographs can be useful during the delineation process, as they often indicate the presence of drainage features and riverine habitat within the boundaries of the project site, if any.

According to the 1995 through 2022 aerial photographs, the project site has supported the majority of existing campground facilities, roads, and infrastructure since 1995. The only major observable changes occurring on-site since 1995 are occasional paving/resurfacing of access roads and parking areas, and the installation of a paved parking are and adjoining facilities structures along the southern limits of the existing campground between 2015 and 2016.

Despite the presence of structures, access roads, and existing land uses associated with campground activities, undeveloped portions of the project site generally support natural plant communities consistent with nearby open spaces. Undeveloped portions of the site support sprawling forests and riparian woodlands are present along perennial waterways. In addition, the site supports two (2) land cover types that would be classified as disturbed and developed. Refer to Appendix B, *Site Photographs*.

4.5 SOILS

Soils within and adjacent to the Project site were researched prior to the field delineation using the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Custom Soil Resource Report for San Bernardino National Forest Area, California. Soil surveys furnish soil maps and

interpretations originally needed in providing technical assistance to farmers and ranchers; in guiding other decisions about soil selection, use, and management; and in planning, research, and disseminating the results of the research. In addition, soil surveys are now heavily utilized in order to obtain soil information with respect to potential wetland environments and jurisdictional areas (i.e., soil characteristics, drainage, and color).

Based on the NRCS USDA Web Soil Survey, the project site is underlain by Cedarpines-Plaskett-Stargazer complex (30 to 50 percent slopes), Cedarpines-Stargazer-Urban land complex (15 to 30 percent slopes), Rock outcrop-Cedarpines-Plaskett complex (15 to 35 percent slopes), Runningsprings-Cedarpines-Plaskett complex (15 to 35 percent slopes), and Urban land. Soils underlying the camp portions of the site have been disturbed and compacted by on-site and surrounding development, infrastructure, and dirt and paved roads.

4.6 HYDRIC SOILS LIST OF CALIFORNIA

ELMT reviewed the USDA NRCS Hydric Soils List of California in an effort to verify whether on-site soils are considered to be hydric[5]. It should be noted that lists of hydric soils along with soil survey maps provide off-site ancillary tools to assist in wetland determinations, but they are not a substitute for field investigations. The presence of hydric soils is initially investigated by comparing the mapped soil series for the site to the County list of hydric soils. According to the hydric soils list, none of the soil types mapped as underlying the project site have been listed as hydric in San Bernardino National Forest, California.

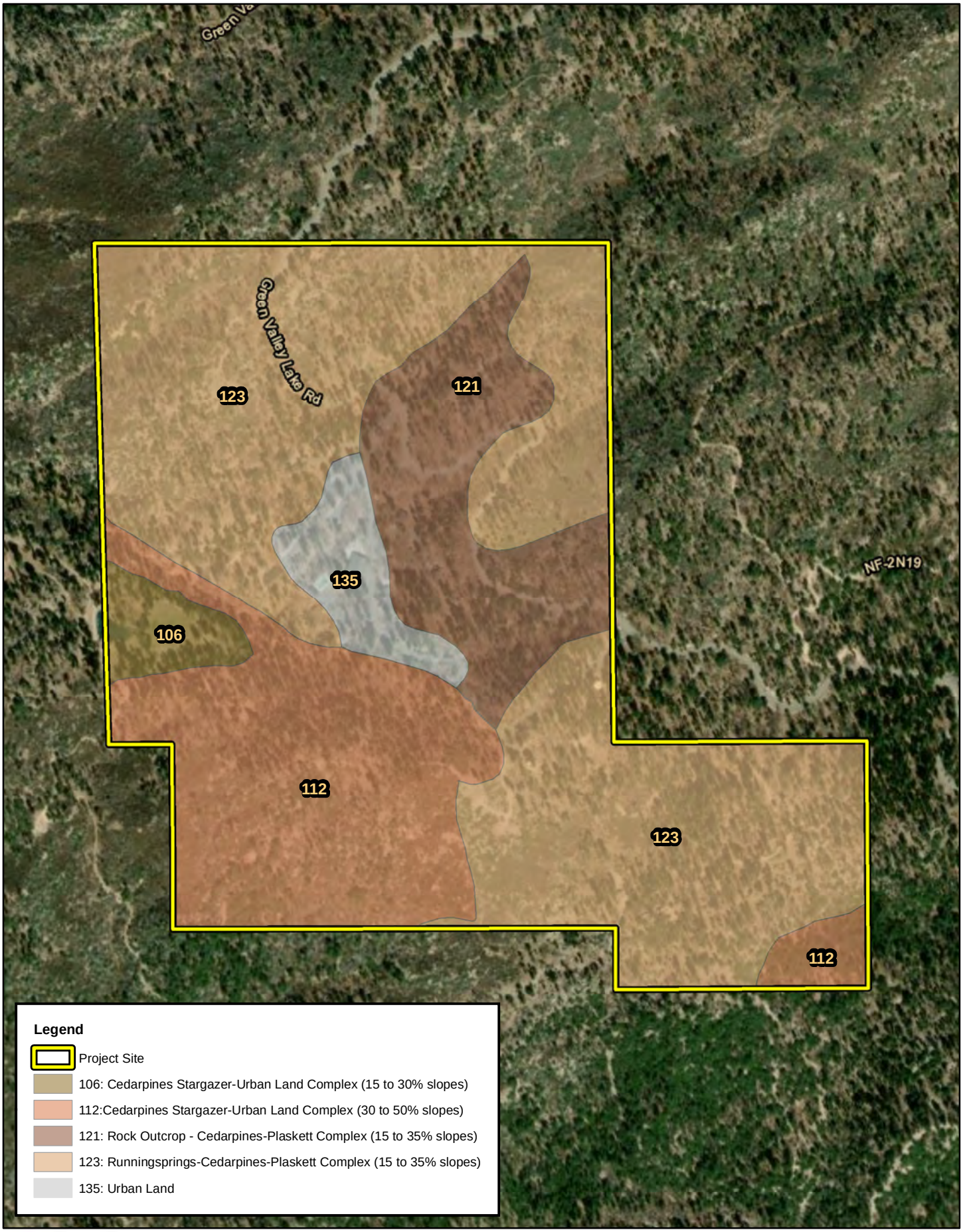
4.7 NATIONAL WETLANDS INVENTORY

ELMT reviewed the U.S. Fish and Wildlife Service's (USFWS) National Wetland Inventory maps. Based on this review, no wetland features have been mapped within the boundaries of the project site. One (1) riverine resource was mapped on-site, entering the northern portion of the eastern boundary and traversing southwest towards the western portion of the site, then veering northwest to exit the northern portion of the western boundary. This feature is mapped in association with a tributary of Deep Creek, the named portion of which flows westward out of the valleys to the east and south of the site before veering north to the west of the site. Refer to Appendix A, *Documentation*.

4.8 FLOOD ZONE

The Federal Emergency Management Act (FEMA) website was searched for flood data for the project site. Based on Flood Insurance Rate Map No. 06071C8000H, the project site is located within Zone D – areas with flood risk due to levees. Refer to Appendix A, *Documentation.*

[5] A hydric soil is a soil that formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part.



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HUME SO CAL CAMPGROUND PROJECT

Soils

Source: ESRI Aerial Imagery, Soil Survey Geographic Database, San Bernardino County

Exhibit 4

Section 5 Site Conditions

ELMT biologists Jacob H. Lloyd Davies, Rachael A. Lyons, and Megan E. Peukert conducted a field delineation on July 31, 2023, and August 2, 2023 to verify existing site conditions and document the extent of potential jurisdictional areas within the boundaries of the project site. ELMT field staff encountered no limitations during the field delineation.

5.1 ON-SITE FEATURES

5.1.1 DRAINAGE FEATURES

Three (3) perennial drainage features and four (4) ephemeral drainage features were observed within the boundaries of the project site during the field delineation (refer to Exhibit 5, *Jurisdictional Areas*). ELMT carefully assessed the site for depressions, inundation, presence of hydrophytic vegetation, staining, cracked soil, ponding, and indicators of active surface flow and corresponding physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris. Suspected jurisdictional areas were checked for the presence of definable channels, soils, and hydrology. The drainage features mapped on-site are numbered from west to east as they occur within the project site.

Drainage 1

Drainage 1 corresponds to the mapped riverine resource documented in the NWI query and is the largest and main drainage supported on the project site. This drainage is a perennial creek and traverses the entire site in an overall westerly direction. This drainage enters the northern portion of the eastern boundary and traverses to the southwest and then northwest until exiting the site near the middle of the western boundary. Flows within Drainage 1 are conveyed for approximately 2,964 linear feet before exiting the site. Surface water was present throughout most of Drainage 1. Further evidence of an OHWM was observed via scour, changes in substrate, shelving, and lack of vegetation. The OHWM of Drainage 1 ranged from approximately 2 to 35 feet. Riparian vegetation is supported along most of the middle and eastern portions of Drainage 1. The channel bottom consists of exposed bedrock, cobble, and silty substrates. After flowing off-site, Drainage 1 is a direct tributary to Deep Creek, which occurs approximately 3,560 linear feet downstream to the east.

Two (2) plant communities occur along Drainage 1: Mixed Conifer Forest and Willow Riparian Woodland. The Mixed Conifer Forest plant community is co-dominated by conifer species such as Jeffrey pine (*Pinus jeffreyi*), sugar pine (*Pinus lambertiana*), and bigcone Douglas-fir (*Pseudotsuga macrocarpa*), and supports lesser dominance of oak species such as California black oak (*Quercus kelloggii*) and canyon live oak (*Quercus chrysolepis*). Understories are variable, with some areas supporting dense understories of shrubs and a dense herbaceous later, and some areas relatively lacking understories. Other common plant species observed in this plant community include bigberry manzanita (*Arctostaphylos glauca*), Sierra lotus (*Acmispon decumbens*), California false indigo (*Amorpha californica*, FAC), coffee berry (*Frangula californica*), diffuse groundsmoke (*Gayophytum diffusum*), California aster (*Corethrogyne filaginifolia*), woollypod milkweed (*Asclepias eriocarpa*), goldenstar (*Bloomeria crocea*), giant red Indian paintbrush

(*Castilleja miniate*, FAC), mountain gooseberry (*Ribes montigenum*), Grinnell's beardtongue (*Penstemon grinnellii*), Bridge's penstemon (*Penstemon rostriflorus*), snowplant (*Sarcodes sanguinea*), western wallflower (*Erysimum capitatum*), giant woollystar (*Eriastrum densifolium*), yarrow (*Achillea millefolium* FACU), common bracken fern (*Pteridium aquilinum*, FACU), woodland strawberry (*Fragaria vesca*, UPL), California fuchsia (*Epilobium canum*), and rainbow iris (*Iris hartwegii*, FACU).

The Willow Riparian Woodland plant community is consolidated to riparian areas along much of the middle and eastern portions of Drainage 1, where underlying substrates and immediate topography allows associated species to establish. This plant community is dominated by arroyo willow (*Salix lasiolepis*, FACW), Pacific willow (*Salix lasiandra*, FACW), Scouler willow (*Salix scouleriana*, FAC), and typically supports densely vegetated understories with a varied shrub layer and robust herbaceous layer. Other common species observed in this plant community include yarrow, woodland strawberry, western columbine (*Aquilegia formosa*, FAC), musk monkeyflower (*Erythranthe moschata*, FACW), seep monkeyflower (*Erythranthe guttata*, FAC), cardinal monkeyflower (*Erythranthe cardinalis*, FACW), broadleaf lupine (*Lupinus latifolius*, FACW), mountain pink currant (*Ribes nevadense*, FAC), silver maple (*Acer saccharinum*, FAC), quaking aspen (*Populus tremuloides*, FACU), soft rush (*Juncus effusus*, FACW), willow dock (*Rumex salicifolius*, FACW), watercress (*Nasturtium officinale*, OBL), willow herb (*Epilobium ciliatum*, FACW), perennial pepperweed (*Lepidium latifolium*, FAC), common water weed (*Elodea canadensis*, OBL), and fragile sheathed sedge (*Carex fracta*, FAC).

Drainage 2

Drainage 2 is an ephemeral drainage feature that originates on a south-facing slope in the northwest portion of the project site. This drainage conveys flows south and southwest for approximately 893 linear feet until its confluence with Drainage 1. No surface water was present within Drainage 2. Evidence of an OHWM was observed via scour, changes in substrate, shelving, and lack of vegetation. The OHWM of Drainage 2 ranged from approximately 2 to 20 feet. No riparian vegetation is present within Drainage 2, which only supports upland plant species. This drainage supports a Mixed Conifer Forest and Willow Riparian Woodland plant community similar to that observed in Drainage 1.

Drainage 3

Drainage 3 is an ephemeral drainage feature that originates on a south-facing slope in the northwest portion of the project site. This drainage conveys flows to the southwest for approximately 324 linear feet until its confluence with Drainage 1. No surface water was present within Drainage 2. Evidence of an OHWM was observed via scour, changes in substrate, shelving, and lack of vegetation. The OHWM of Drainage 2 ranged from approximately 2 to 7 feet. No riparian vegetation is present within Drainage 2, which only supports upland plant species. This drainage supports a Mixed Conifer Forest and Willow Riparian Woodland plant community similar to that observed in Drainage 1.

Drainage 4

Drainage 4 is a perennial creek that originates off-site to the north. This drainage enters the eastern portion of the northern boundary of the project site and conveys flows to the southwest until converging with Drainage 1. Flows are conveyed beneath Green Valley Lake Road via a 4-foot-wide culvert into an earthen spillway, which also receives surface flows from Green Valley Lake Road. Flows within Drainage 4 are conveyed for approximately 1,622 linear feet before entering Drainage 1. Surface water was present

throughout Drainage 4. Further evidence of an OHWM was observed via scour, changes in substrate, shelving, and lack of vegetation. The OHWM of Drainage 4 ranged from approximately 2 to 20 feet. Riparian vegetation is supported along the majority of the drainage. The channel bottom consists of exposed bedrock, cobble, and silty substrates. Drainage 4 supports the same Mixed Conifer Forest and Willow Riparian Woodland plant communities observed in Drainage 1.

Drainage 5

Drainage 5 is an ephemeral drainage feature that originates on a south-facing slope in the middle portion of the project site near Green Valley Lake Road. This feature conveys surface flows south and west for approximately 1,504 linear feet until its confluence with Drainage 1. No surface water was present within Drainage 5, although riparian vegetation was present. Evidence of an OHWM was observed via scour, changes in substrate, shelving, and lack of vegetation. The OHWM of Drainage 5 ranged from approximately 2 to 6 feet. This drainage supports a Mixed Conifer Forest and Willow Riparian Woodland plant community similar to that observed in Drainage 1.

Drainage 6

Drainage 6 is an ephemeral drainage feature that originates on a south-facing slope in the middle portion of the project site near Green Valley Lake Road. This feature conveys surface flows southwest for approximately 620 linear feet until its confluence with Drainage 5. No surface water was present within Drainage 5, although riparian vegetation was present. Evidence of an OHWM was observed via scour, changes in substrate, shelving, and lack of vegetation. The OHWM of Drainage 6 ranged from approximately 2 to 4 feet. This drainage supports a Mixed Conifer Forest and Willow Riparian Woodland plant community similar to that observed in Drainage 1.

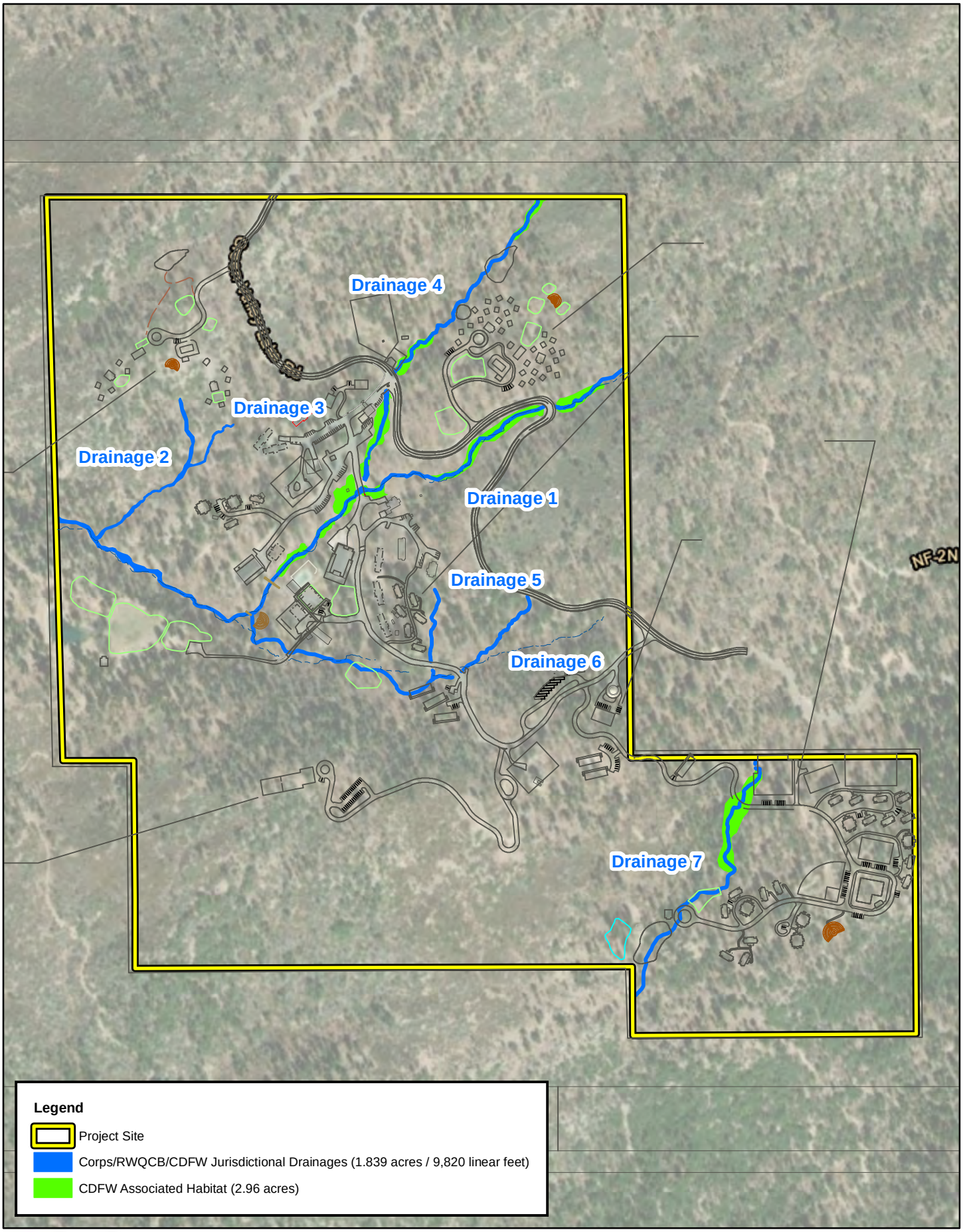
Drainage 7

Drainage 7 includes both ephemeral and perennial drainage features. The upper limits of Drainage 7 are ephemeral in nature and originate off-site near Green Valley Lake Road, just north of the southeast portion of the project site. Flows are collected from Green Valley Lake Road and are conveyed to the southwest towards a culvert beneath an access road. Just beyond this access road, perennial flows enter the drainage via a series of culverts and are conveyed further southwest until exiting site boundaries and continuing southwest along local topography. No surface water was observed upstream of the access road, but is present just downstream of the access road, where riparian vegetation and a narrow patch of wetland is present. Drainage 7 conveys flows for approximately 1,523 linear feet while within site boundaries. Further evidence of an OHWM was observed via scour, changes in substrate, shelving, changes in vegetation, and static water conditions. The OHWM of Drainage 7 ranged from approximately 2 to 16 feet. Riparian vegetation is supported along the majority of the drainage. The channel bottom consists of exposed bedrock, cobble, and silty substrates. Drainage 7 supports the same Mixed Conifer Forest and Willow Riparian Woodland plant communities observed in Drainage 1. After flowing off-site, Drainage 7 is a direct tributary to Deep Creek, which occurs approximately 1,400 linear feet downstream to the south.

5.1.2 WETLAND FEATURES

In order to qualify as a wetland, a feature must exhibit all three wetland parameters (i.e., vegetation, soils, and hydrology) described in the Corps Arid West Regional Supplement. Although evidence of hydrology

(i.e., scour, changes in substrate, shelving) and open water are present, no hydric soils have been mapped as occurring on-site and no anaerobic conditions were observed. While hydrophytic vegetation was observed in portions of Drainages 1, 4, 5, 6, and 7, flows within these drainage features remain sufficiently consistent to prevent the establishment of wetland conditions. Areas with open water tend to be underlain by exposed bedrock with limited, scattered pockets of silty deposits approximately 2 to 6 inches in depth, and surface flows constantly replace existing open water, preventing the development of hydric soil (anaerobic) conditions. As a result, no features on-site meet the Corps' or Regional Board's wetland definition to qualify as jurisdictional wetlands.



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Source: ESRI Aerial Imagery, San Bernardino County

HUME SO CAL CAMPGROUND PROJECT

Jurisdictional Areas

Exhibit 5

Section 6 Findings

This report presents ELMT's best effort at determining the extent of jurisdictional features using the most up-to-date regulations, written policy, and guidance from the regulatory agencies.

6.1 U.S. ARMY CORPS OF ENGINEERS DETERMINATION

6.1.1 WATERS OF THE UNITED STATES DETERMINATION

Prior to leaving the site, surface flows from Drainages 2 through 6 are conveyed to Drainage 1, which exits the western boundary of the site and conveys flows westward to Deep Creek. Drainage 7 also bears a direct connection to Deep Creek, conveying flows off-site to the south. Deep Creek conveys flows along local topography to the northwest until its confluence with Mojave Fork West at Mojave Forks Dam, which consolidates flows from these features and directs them northward within the Mojave River.

All of the onsite drainage features have a surface hydrologic connection to downstream waters of the United States. Approximately 1.839 acres (9,820 linear feet) of waters of the United States occur on-site.

6.1.2 FEDERAL WETLAND DETERMINATION

An area must exhibit all three wetland parameters described in the Corps Arid West Regional Supplement to be considered a jurisdictional wetland. Based on the results of the field delineation, it was determined that no areas within the project site met all three wetland parameters. Therefore, no jurisdictional wetland features exist within the project site.

6.2 REGIONAL WATER QUALITY CONTROL BOARD

6.2.1 WATERS OF THE STATE DETERMINATION

The on-site drainage feature exhibits characteristics consistent with the Regional Board's methodology and would likely be considered jurisdictional waters of the State. Approximately 1.839 acres (9,820 linear feet) of non-wetland waters of the State occur on-site.

6.2.2 STATE WETLAND DETERMINATION

Under the State Water Resources Control Board Sate Wetland Definition, an area is a wetland if, under normal circumstances, (1) the area has continuous or recurrent saturation of the upper substrate caused by groundwater, or shallow surface water, or both; (2) the duration of such saturation is sufficient to cause anaerobic conditions in the upper substrate; and (3) the area's vegetation is dominated by hydrophytes or the area lacks vegetation.

Based on the results of the field delineation, it was determined that no areas within the project site meet the State Wetland Definition. Therefore, no state wetland features exist within the project site.

6.3 CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

The on-site drainage features exhibit characteristics consistent with CDFW's methodology and would be considered CDFW streambed. Approximately 4.8 acres (9,820 linear feet) of CDFW jurisdiction was mapped within boundaries of the Project site.

Section 7 Regulatory Approval Process

The following is a summary of the various permits, certifications, and agreements that may be necessary prior to construction and/or alteration within jurisdictional areas. Ultimately the regulatory agencies make the final determination of jurisdictional boundaries and permitting requirements.

7.1 UNITED STATES ARMY CORPS OF ENGINEERS

The Corps regulates discharges of dredged or fill materials into waters of the United States, including wetlands, pursuant to Section 404 of the CWA. If any impacts occur to the onsite drainage features, it will be necessary for the Applicant to acquire a CWA Section 404 permit prior to impacts occurring within Corps jurisdictional areas. If impacts from the proposed Project will result in the loss of less than 1/2-acre of Corps jurisdiction (non-wetland waters), the proposed Project can be authorized via a Nationwide Permit (NWP). However, if impacts will be greater than 1/2-acre, the proposed Project will need to be processed under a Standard Individual Permit.

Based on the proposed design plan, no impacts to Corps jurisdictional areas are expected to occur from project implementation.

7.2 REGIONAL WATER QUALITY CONTROL BOARD

The Regional Board regulates discharges to surface waters pursuant to Section 401 of the CWA and the California Porter-Cologne Water Quality Control Act. The Regional Board's jurisdiction extends to all waters of the State and U.S., including wetlands. A Section 401 Water Quality Certification from the Regional Board will be required for impacts to the onsite drainage features. The Regional Board also requires a Section 401 Certification Application Fee, which is dependent on the amount and type of impacts (i.e., acreage, linear feet, and project type). It should also be noted that the Regional Board requires that California Environmental Quality Act (CEQA) compliance be obtained prior to issuance of the water quality certification.

Based on the proposed design plan, no impacts to Regional Board jurisdictional areas are expected to occur from project implementation.

7.3 CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

Pursuant to Section 1602 of the California Fish and Game Code, the CDFW regulates any activity that will divert or obstruct the natural flow or alter the bed, channel, or bank (which may include associated biological resources) of a river or stream. Therefore, any impacts to the on-site jurisdictional areas will require a Section 1602 Streambed Alteration Agreement from the CDFW prior to project implementation, if the project will have a substantial adverse impact on an existing fish or wildlife resource. The notification fee is based on the term and cost of a project. The Section 1602 Streambed Alteration Agreement will not be issued until all fees are paid to the CDFW.

Based on the proposed design plan, no impacts to CDFW jurisdictional areas are expected to occur from project implementation.

7.4 RECOMMENDATIONS

It is recommended that this delineation be forwarded to the regulatory agencies for their review and concurrence. The concurrence/receipt would solidify findings noted within this report.

Section 8 References

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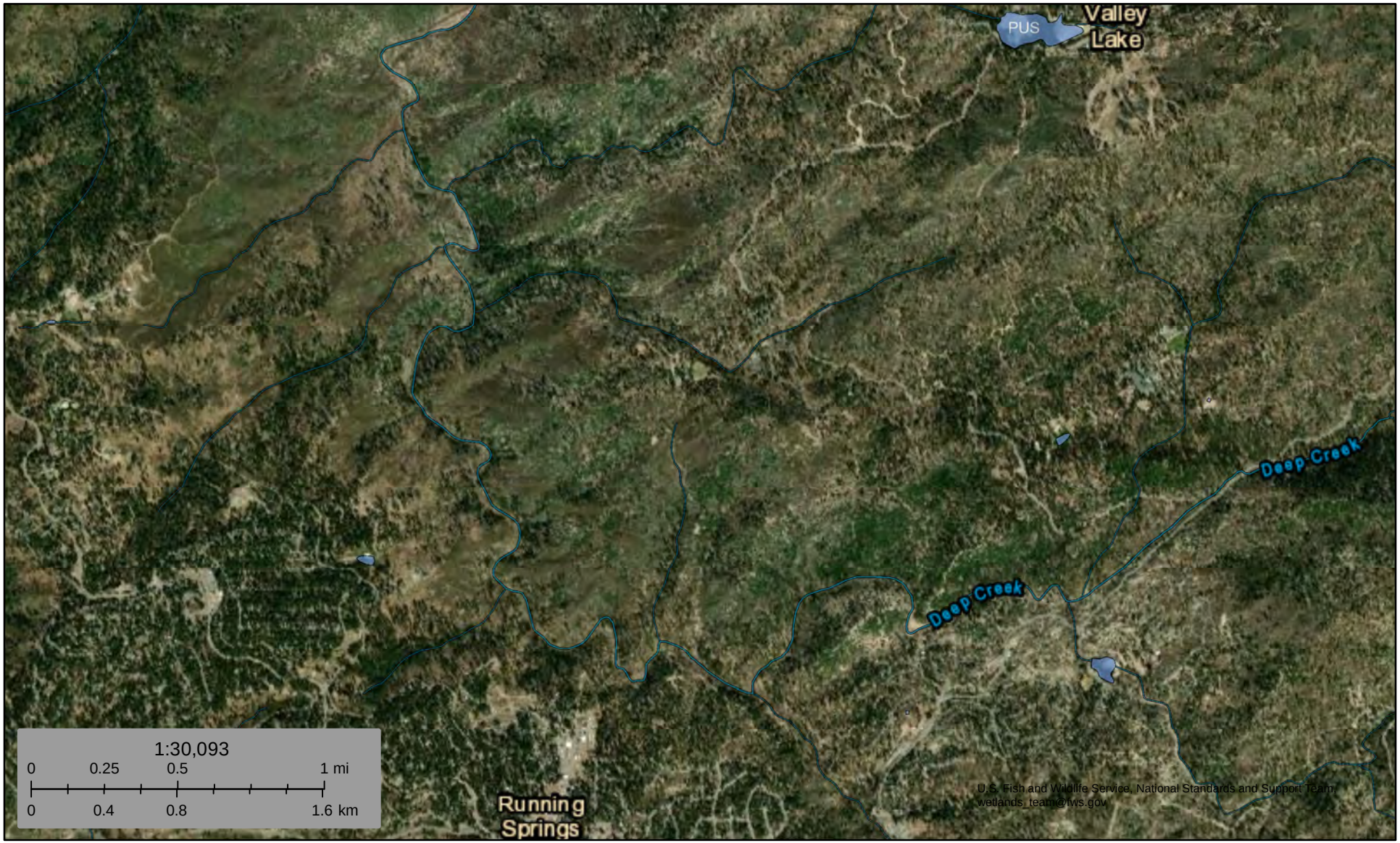
Appendix A Documentation

U.S. Fish and Wildlife Service
National Wetlands Inventory

Hume SoCal Campground



October 11, 2023

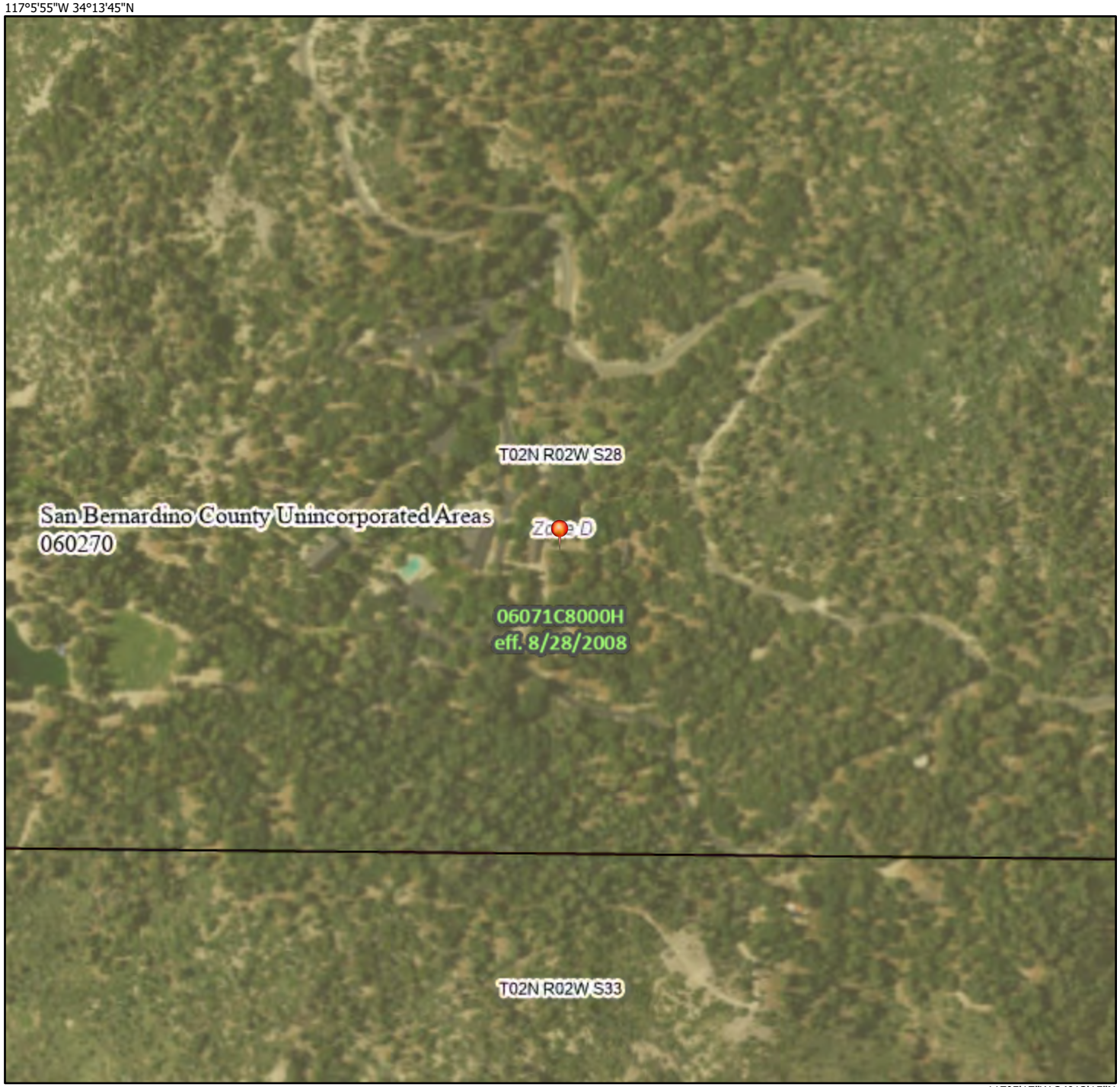
Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

National Flood Hazard Layer FIRMette

FEMA



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

Legend

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

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

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

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

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

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

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

N

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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 10/31/2022 at 6:45 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

Appendix B Site Photographs



Photograph 1: From Green Valley Lake Road looking upstream (northeast) along Drainage 1.



Photograph 2: From Green Valley Lake Road looking south along Drainage 1.



Photograph 3: Looking upstream (north) along Drainage 2. Ephemeral drainages supported on-site are bounded by a Mixed Conifer Forest plant community.



Photograph 4: Looking upstream (northeast) along Drainage 3.



Photograph 5: Looking north along Drainage 4 near the entrance to the Hume SoCal Campground at Green Valley Lake Road. Upper portions of Drainage 4 are visible beyond Green Valley Lake Road.



Photograph 6: The confluence of Drainages 1 and 4 support a robust Willow Riparian Woodland plant community.



Photograph 7: Looking upstream (north) along the upper limits of Drainage 5.



Photograph 8: Looking upstream (north) along the upper limits of Drainage 6.



Photograph 9: Drainages 5 and 6 support narrow swathes of Willow Riparian Woodland immediately south of Smokey Way.



Photograph 10: Lower portions of Drainage 1, downstream of existing campground facilities, bear little to no surface water and are bounded by a Mixed Conifer Woodland plant community.



Photograph 11: Looking downstream (southwest) along the upper limits of Drainage 7, north of the access road.



Photograph 12: Looking downstream (southwest) along the middle portion of Drainage 7, where surface water is no longer present and supported vegetation shifts from a Willow Riparian plant community to Mixed Conifer Forest.

Appendix C Methodology

WATERS OF THE UNITED STATES

In accordance with the Revised Definition of "Waters of the United States"; Conforming (September 8, 2023), "waters of the United Sates" are defined as follows:

(a) ***Waters of the United States*** means:

(1) Waters which are:
(i) Currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
(ii) The territorial seas; or
(iii) Interstate waters;

(2) Impoundments of waters otherwise defined as waters of the United States under this definition, other than impoundments of waters identified under paragraph (a)(5) of this section;

(3) Tributaries of waters identified in paragraph (a)(1) or (2) of this section that are relatively permanent, standing or continuously flowing bodies of water;

(4) Wetlands adjacent to the following waters:
(i) Waters identified in paragraph (a)(1) of this section; or
(ii) Relatively permanent, standing or continuously flowing bodies of water identified in paragraph (a)(2) or (a)(3) of this section and with a continuous surface connection to those waters;

(5) Intrastate lakes and ponds not identified in paragraphs (a)(1) through (4) of this section that are relatively permanent, standing or continuously flowing bodies of water with a continuous surface connection to the waters identified in paragraph (a)(1) or (a)(3) of this section

(b) The following are not "waters of the United States" even where they otherwise meet the terms of paragraphs (a)(2) through (5) of this section:

(1) Waste treatment systems, including treatment ponds or lagoons, designed to meet the requirements of the Clean Water Act;

(2) Prior converted cropland designated by the Secretary of Agriculture. The exclusion would cease upon a change of use, which means that the area is no longer available for the production of agricultural commodities. Notwithstanding the determination of an area's status as prior converted cropland by any other Federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with EPA;

(3) Ditches (including roadside ditches) excavated wholly in and draining only dry land and that do not carry a relatively permanent flow of water;

(4) Artificially irrigated areas that would revert to dry land if the irrigation ceased;

(5) Artificial lakes or ponds created by excavating or diking dry land to collect and retain water and which are used exclusively for such purposes as stock watering, irrigation, settling basins, or rice growing;
(6) Artificial reflecting or swimming pools or other small ornamental bodies of water created by excavating or diking dry land to retain water for primarily aesthetic reasons;

(7) Waterfilled depressions created in dry land incidental to construction activity and pits excavated in dry land for the purpose of obtaining fill, sand, or gravel unless and until the construction or excavation operation is abandoned and the resulting body of water meets the definition of waters of the United States; and

(8) Swales and erosional features (*e.g.*, gullies, small washes) characterized by low volume, infrequent, or short duration flow.

(c) In this section, the following definitions apply:

(1) ***Wetlands*** means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

(2) ***Adjacent*** means having a continuous surface connection

(3) ***High tide line*** means the line of intersection of the land with the water's surface at the maximum height reached by a rising tide. The high tide line may be determined, in the absence of actual data, by a line of oil or scum along shore objects, a more or less continuous deposit of fine shell or debris on the foreshore or berm, other physical markings or characteristics, vegetation lines, tidal gages, or other suitable means that delineate the general height reached by a rising tide. The line encompasses spring high tides and other high tides that occur with periodic frequency but does not include storm surges in which there is a departure from the normal or predicted reach of the tide due to the piling up of water against a coast by strong winds such as those accompanying a hurricane or other intense storm.

(4) ***Ordinary high water mark*** means that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

(5) ***Tidal waters*** means those waters that rise and fall in a predictable and measurable rhythm or cycle due to the gravitational pulls of the moon and sun. Tidal waters end where the rise and fall of the water surface can no longer be practically measured in a predictable rhythm due to masking by hydrologic, wind, or other effects.

WETLANDS

For this project location, Corps jurisdictional wetlands are delineated using the methods outlined in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region, Version 2.0* (Corps 2008). This document is one of a series of Regional Supplements to the Corps Wetland Delineation Manual (Corps 1987). The identification of wetlands is based on a three-parameter approach involving indicators of hydrophytic vegetation, hydric soil, and wetland hydrology. In order to be considered a wetland, an area must exhibit at least minimal characteristics within these three (3) parameters. The Regional Supplement presents wetland indicators, delineation guidance, and other information that is specific to the Arid West Region. In the field, vegetation, soils, and evidence of hydrology are examined using the methodology listed below and documented on Corps wetland data sheets, when applicable. It should be noted that both the Regional Board and the CDFW jurisdictional wetlands encompass those of the Corps.

Vegetation

Nearly 5,000 plant types in the United States may occur in wetlands. These plants, often referred to as hydrophytic vegetation, are listed in regional publications by the U.S. Fish and Wildlife Service (USFWS). In general, hydrophytic vegetation is present when the plant community is dominated by species that can tolerate prolonged inundation or soil saturation during growing season. Hydrophytic vegetation decisions are based on the assemblage of plant species growing on a site, rather than the presence or absence of particular indicator species. Vegetation strata are sampled separately when evaluating indicators of hydrophytic vegetation. A stratum for sampling purposes is defined as having 5 percent or more total plant cover. The following vegetation strata are recommended for use across the Arid West:

- *Tree Stratum:* Consists of woody plants 3 inches or more in diameter at breast height (DBH), regardless of height;
- *Sapling/shrub stratum:* Consists of woody plants less than 3 inches DBH, regardless of height;
- *Herb stratum:* Consists of all herbaceous (non-woody) plants, including herbaceous vines, regardless of size; and,
- *Woody vines:* Consists of all woody vines, regardless of size.

The following indicator is applied per the test method below.[1] Hydrophytic vegetation is present if any of the indicators are satisfied.

[1] Although the Dominance Test is utilized in the majority of wetland delineations, other indicator tests may be employed. If one indicator of hydric soil and one primary or two secondary indicators of wetland hydrology are present, then the Prevalence Test (Indicator 2) may be performed. If the plant community satisfies the Prevalence Test, then the vegetation is hydric. If the Prevalence Test fails, then the Morphological Adaptation Test may be performed, where the delineator analyzes the vegetation for potential morphological features.

Indicator 1 – Dominance Test

Cover of vegetation is estimated and is ranked according to their dominance. Species that contribute to a cumulative total of 50% of the total dominant coverage, plus any species that comprise at least 20% (also known as the "50/20 rule") of the total dominant coverage, are recorded on a wetland data sheet. Wetland indicator status in California (Region 0) is assigned to each species using the *National Wetland Plant List, version 2.4.0* (Corps 2012). If greater than 50% of the dominant species from all strata were Obligate, Facultative-wetland, or Facultative species, the criteria for wetland vegetation is considered to be met. Plant indicator status categories are described below:

- *Obligate Wetland (OBL):* Plants that almost always occur in wetlands;
- *Facultative Wetland (FACW):* Plants that usually occur in wetlands, but may occur in non-wetlands;
- *Facultative (FAC):* Plants that occur in wetlands and non-wetlands;
- *Facultative Upland (FACU):* Plants that usually occur in non-wetlands, but may occur in wetlands; and,
- *Obligate Upland (UPL):* Plants that almost never occur in wetlands.

Hydrology

Wetland hydrology indicators are presented in four (4) groups, which include:

Group A – Observation of Surface Water or Saturated Soils

Group A is based on the direct observation of surface water or groundwater during the site visit.

Group B – Evidence of Recent Inundation

Group B consists of evidence that the site is subject to flooding or ponding, although it may not be inundated currently. These indicators include water marks, drift deposits, sediment deposits, and similar features.

Group C – Evidence of Recent Soil Saturation

Group C consists of indirect evidence that the soil was saturated recently. Some of these indicators, such as oxidized rhizospheres surrounding living roots and the presence of reduced iron or sulfur in the soil profile, indicate that the soil has been saturated for an extended period.

Group D – Evidence from Other Site Conditions or Data

Group D consists of vegetation and soil features that indicate contemporary rather than historical wet conditions, and include shallow aquitard and the FAC-neutral test.

If wetland vegetation criteria is met, the presence of wetland hydrology is evaluated at each transect by recording the extent of observed surface flows, depth of inundation, depth to saturated soils, and depth to free water in the soil test pits. The lateral extent of the hydrology indicators are used as a guide for locating soil pits for evaluation of hydric soils and jurisdictional areas. In portions of the stream where the flow is divided by multiple channels with intermediate sand bars, the entire area between the channels is considered within the OHWM and the wetland hydrology indicator is considered met for the entire area.

Soils

A hydric soil is a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper 16-20 inches.[2] The concept of hydric soils includes soils developed under sufficiently wet conditions to support the growth and regeneration of hydrophytic vegetation. Soils that are sufficiently wet because of artificial measures are included in the concept of hydric soils. It should also be noted that the limits of wetland hydrology indicators are used as a guide for locating soil pits. If any hydric soil features are located, progressive pits are dug moving laterally away from the active channel until hydric features are no longer present within the top 20 inches of the soil profile.

Once in the field, soil characteristics are verified by digging soil pits along each transect to an excavation depth of 20 inches; in areas of high sediment deposition, soil pit depth may be increased. Soil pit locations are usually placed within the drainage invert or within adjoining vegetation. At each soil pit, the soil texture and color are recorded by comparison with standard plates within a *Munsell Soil Chart* (2009). Munsell Soil Charts aid in designating color labels to soils, based by degrees of three simple variables – hue, value, and chroma. Any indicators of hydric soils, such as organic accumulation, iron reduction, translocation, and accumulation, and sulfate reduction, are also recorded.

Hydric soil indicators are present in three groups, which include:

<u>All Soils</u>

"All soils" refers to soils with any United States Department of Agriculture (USDA) soil texture. Hydric soil indicators within this group include histosol, histic epipedon, black histic, hydrogen sulfide, stratified layers, 1 cm muck, depleted below dark surface, and thick dark surface.

<u>Sandy Soils</u>

"Sandy soils" refers to soil materials with a USDA soil texture of loamy fine sand and coarser. Hydric soil indicators within this group include sandy mucky mineral, sandy gleyed matrix, sandy redox, and stripped matrix.

[2] According to the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region, Version 2.0 (Corps 2008), growing season dates are determined through on-site observations of the following indicators of biological activity in a given year: (1) above-ground growth and development of vascular plants, and/or (2) soil temperature.

Loamy and Clayey Soils

"Loamy and clayey soils" refers to soil materials with a USDA soil texture of loamy very fine sand and finer. Hydric soil indicators within this group include loamy mucky mineral, loamy gleyed matrix, depleted matrix, redox dark surface, depleted dark surface, redox depressions, and vernal pools.

SWANCC WATERS

The term "isolated waters" is generally applied to waters/wetlands that are not connected by surface water to a river, lake, ocean, or other body of water. In the presence of isolated conditions, the Regional Board and CDFW take jurisdiction through the application of the OHWM/streambed and/or the 3 parameter wetland methodology utilized by the Corps.