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PRELIMINARY HYDROLOGY AND DRAINAGE STUDY
for the
Jacumba Solar Energy Project
Major Use Permit PDS2014-MUP-14-041
Environmental Review Project Number PDS2014-MPA-14-015
Jacumba, San Diego County, California

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1 DECLARATION OF RESPONSIBLE CHARGE

I, hereby declare that I am the Civil Engineer of work for this report, that I have exercised responsible charge over the preparation of this report as defined in section 6703 of the business and professional code, and that the report is consistent with current project concept.

I understand that the check of the report by the County of San Diego is confined to a review only and does not relieve me, as the Civil Engineer of work, of my responsibilities for the report.

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2 INTRODUCTION

Jacumba Solar, LLC is in the process of developing a solar energy facility, named the Jacumba Solar Energy Project (Proposed Project), in the southeastern part of San Diego County (the County). This Preliminary Hydrology and Drainage Study, referred to as the report, was prepared for the Proposed Project as a part of the Draft Environmental Impact Report (EIR) in accordance with the San Diego County Hydrology Manual (SDCHM).

The purpose of this report is to identify hydrologic impacts as a result of the development of the Proposed Project. This report includes quantification of off-site and on-site runoff discharging onto and from the Proposed Project for pre-development and post-development conditions. Additionally, this report identifies and discusses the mitigation measures proposed for mitigating the increase in runoff. Runoff calculations were performed for the 100-year storm event in accordance with the Rational Method as described in the SDCHM by using the Advanced Engineering Software (AES). Analyses of the existing and proposed 100-year flood inundation levels were conducted using the Army Corps of Engineers' Hydrologic Engineering Centers River Analysis System (HEC-RAS) software.

The hydrologic analysis including watershed delineation, results, and mitigation measures presented in this report are preliminary in nature and subject to change should the boundary, site plan, or other components of the Proposed Project change. Plans, specifications, and recommendations found within this report are not approved and are not for construction purposes; contractors shall refer to the final approved construction documents for construction details.

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3 PROJECT DESCRIPTION

3.1 Project Location

The Proposed Project encompasses a total of approximately 304 acres of which approximately 108 acres would be disturbed for the development of the solar energy facility. The disturbed area for the purposes of this report does not include vegetation management areas outside the fence line. The Proposed Project falls within the Mountain Empire Subregional Plan Area in unincorporated San Diego County and is located approximately 2.5 miles to the east of the community of Jacumba Hot Springs, south of Interstate 8 (I-8), and immediately north of the U.S./Mexico International Border. Figure 1 shows the vicinity map for the Proposed Project.

3.2 Project Description

The Proposed Project encompasses a total of approximately 304 acres within the Mountain Empire Subregional Plan Area in unincorporated San Diego County; however, the solar energy facility comprising the Proposed Project would encompass approximately 108 acres. The solar energy facility would use photovoltaic (PV) fixed-tilt rack electric generation system technology to produce solar energy at the utility scale, producing approximately 20 megawatts (MW).

Implementation of the Proposed Project would include installation of individual fixed-tilt-mounted PV modules, which would comprise the majority of the proposed facilities. PV modules generate electricity by safely converting the energy of the sun's photons into direct current (DC) electrons. The PV module arrays (a row of PV modules) would be a fixed-tilt system that would be oriented along an east–west axis. The PV modules, at their highest point, would be approximately 8 feet above the ground surface. The mounting structures are typically mounted on metal pipe pile or beam foundations 4 to 6 inches in diameter. The beams would be driven into the soil using a pile/vibratory/rotary driving technique.

Depending on final engineering, the arrays may be equal in length, creating a uniform rectangular Project footprint, or may vary in length in order to avoid sensitive resources. The east–west arranged fixed-tilt arrays, if used, would be constructed approximately 25 feet apart (centerline to centerline) in a north–south direction, with an east–west array spacing of approximately 12.5 feet. Each PV module array "row" would measure approximately 144 feet in total combined length and approximately 6.5 feet in width. The PV module arrays' final elevations from ground surface would be determined during detailed Project design; however, it is common to maintain as low an elevation profile as possible to reduce potential wind loads on the PV module arrays. All solar panels at maximum tilt would be raised above the 100-year base flood elevation. The Proposed Project would not place housing within a 100-year flood hazard area.

Following this section of the report, the portion of the Proposed Project that would be disturbed for the development of the solar energy facility (approximately 108 acres) is referred to as the Proposed Project. The hydrologic characteristic would only be impacted within the disturbed area that does not include vegetation management areas outside the fence line.

3.3 Project Hydrologic Characteristics

The Proposed Project falls within the Jacumba Valley hydrologic subarea of the Jacumba hydrologic area located within the Anza Borrego hydrologic unit as identified in Table 1, Project Hydrologic Characteristics. The hydrologic unit, hydrologic area, and hydrologic subarea information was obtained from the Water Quality Control Plan for the Colorado River Basin (Region No. 7), prepared by the California Regional Water Quality Control Board (RWQCB) under the State Water Resources Control Board (RWQCB 2005).

Table 1
Project Hydrologic Characteristics

Hydrologic Unit (HU)	Hydrologic Area (HA)	Hydrologic Subarea (HSA)
Anza Borrego (722.00)	Jacumba (722.70)	Jacumba Valley (722.72)

Figure 2 shows the location of the Proposed Project with reference to the Jacumba Valley hydrologic subarea. A comparison of the Proposed Project area with respect to the acreage of the Jacumba Valley hydrologic subarea is presented in Table 2, Project Contribution to Hydrologic Subarea.

Table 2
Project Contribution to Hydrologic Subarea

Hydrologic Subarea (HSA)	Area (Acres)	Approximate Proposed Project Area (Acres)	Estimated Project Contribution (Percent)
Jacumba Valley HSA (722.72)	16,284	108[a]	0.7

[a] The Proposed Project is approximately 304 acres; however, approximately 108 acres of the Proposed Project would be disturbed for the development of the solar energy facility and is considered as the area of the Proposed Project for this report. The disturbed area does not include vegetation management areas outside the fence line.

The Proposed Project area is less than 1% of the area encompassed by the affected Jacumba Valley hydrologic subarea.

3.4 Rainfall

The rainfall isopluvial values for the Proposed Project were obtained from the SDCHM. The rainfall isopluvial values for the 100-year 6-hour and 100-year 24-hour storm events are as follows:

100-year 6-hour Rainfall (P_6) = 3.0 inches

100-year 24-hour Rainfall (P_{24}) = 5.0 inches

P_6 / P_{24} = 60%

Per the SDCHM, P_6 for the selected storm event should be between 45% and 65% of P_{24}. This criterion was met as the P_6 for the Proposed Project falls within the specified range. The P_6 and P_{24} isopluvial maps and the Intensity-Duration Design Chart are presented in Appendix C.

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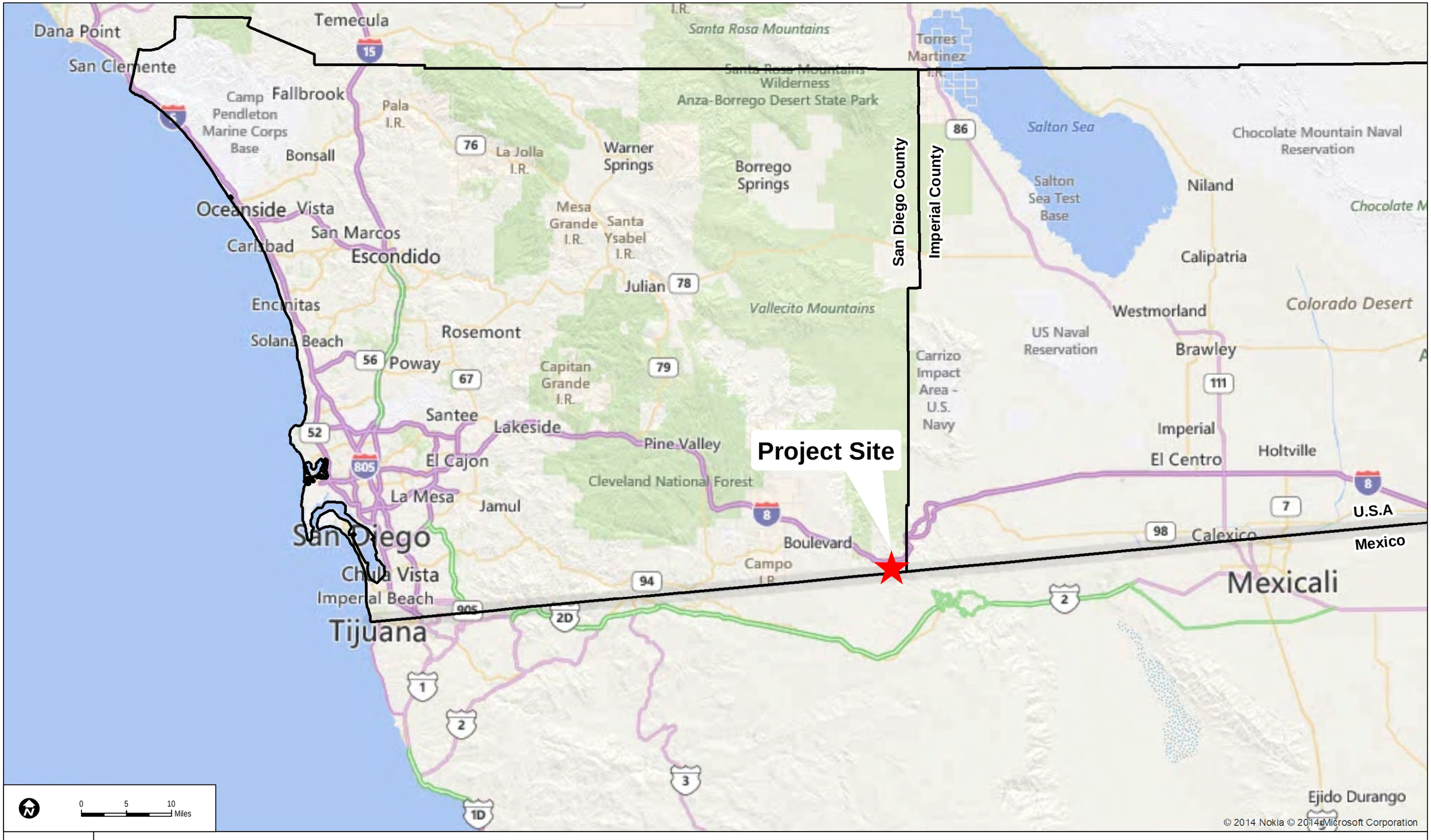

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SOURCE: Bing Maps

FIGURE 1

Vicinity Map

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Jacumba Solar Energy Project - Preliminary Hydrology and Drainage Study

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SOURCE: Bing Maps, SANGIS

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FIGURE 2

Hydrologic Subarea

Jacumba Solar Energy Project - Preliminary Hydrology and Drainage Study

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4 EXISTING DRAINAGE (PRE-DEVELOPMENT CONDITION)

4.1 Existing Topography

The Proposed Project is located within the Mountain Empire Subregional Plan Area in unincorporated San Diego County on vacant and undeveloped land that ranges in elevation from approximately 3,096 to 3,168 feet above mean sea level (amsl). An existing topographic map of the Proposed Project for the pre-development condition is shown on Figure 3.

The watershed contributing runoff to the Proposed Project is designated as undisturbed natural terrain based on its topography and terrain, and in accordance with the Natural Resources Conservation Service (NRCS) land use elements described in the Rational Method of the SDCHM that ranges in elevation from approximately 3,096 to 4,325 feet amsl.

4.2 Existing Hydrologic Soil Groups

Soil properties influence the rainfall–runoff relationship due to their varying rate of infiltration. Soils are classified by the NRCS into four hydrologic soil groups based on the soil's runoff potential. The four hydrologic soil groups are A, B, C, and D. Soil Group A generally has the smallest runoff potential and Soil Group D has the highest. A geographic information system (GIS)-based soils analysis was performed to determine the distribution of soil groups within the watershed contributing runoff to the Proposed Project, as shown in tabular format in Table 3, Hydrologic Soil Groups, and in spatial format on Figure 4. The watershed that contributes runoff to the Proposed Project is approximately 555 acres. Soil Group A is the predominant soil group in the contributing watershed, followed by Soil Groups D and B. Approximately 7% of soils in the contributing watershed are undetermined, according to the SDCHM. These undetermined soils were assumed to be Soil Group D due to its highest runoff potential. Additionally, due to the lack of availability of soil group information in the Imperial County and Mexico, these soil groups were assumed based on aerial photography and adjacent soil groups.

Table 3
Hydrologic Soil Groups

Soil Group	Area (Acres)	Area (Percent)
A	228.54	41.16
B	62.85	11.32
C	—	—
D	223.53	40.25
Undetermined	40.37	7.27
Total	**555.30**[a]	**100.00**

[a] Approximately 555 acres is the area of the watershed that contributes runoff to the Proposed Project.

4.3 Existing Land Use

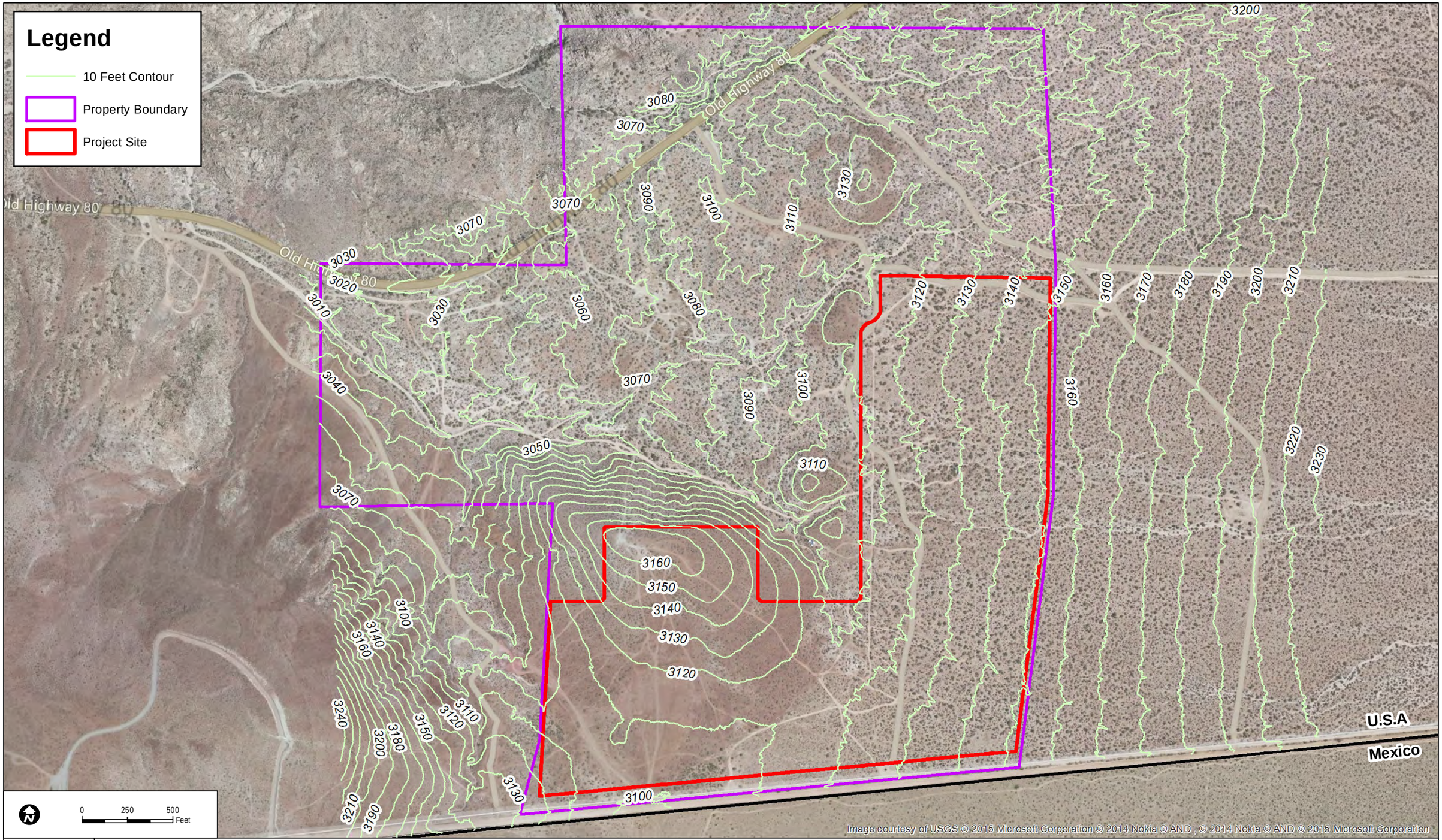
The Proposed Project is in the Mountain Empire Subregional Plan Area on vacant, undeveloped land in unincorporated San Diego County. The Proposed Project and its contributing watershed is generally an arid desert environment that supports a limited range of habitats and biological communities. These habitats and communities include desert scrub and chaparral. Additionally, these habitats and communities may vary depending on the ecoregion, soils and substrate, and topography. Based on the topography and terrain, the Proposed Project as well as its contributing watershed is designated as undisturbed natural terrain in accordance with the NRCS land use elements described in the Rational Method of the SDCHM.

Major land uses surrounding the Proposed Project include the following:

The surrounding Jacumba area, which includes the community of Jacumba Hot Springs, can be characterized as a predominantly rural landscape featuring large-lot ranches and single-family homes with a mixture of small-scale agriculture, recreational opportunities, and vast areas of undeveloped lands. The community also has an old rail line running to the north, with the town characterized by Old Highway 80 as its main street, single-family homes throughout the town, and agricultural uses to the east. Very few single-family homes are scattered amongst the mountainous landscape; however, recent developments have resulted in a variable physical setting that includes both rural and major infrastructure elements, including the East County (ECO) Substation, Kumeyaay Wind Energy Facility, and Sunrise Powerlink.

South of I-8, major infrastructure elements of the landscape include the Sunrise Powerlink, which consists of a 500-kilovolt (kV) electric transmission line supported by 150-foot-tall steel lattice structures and the Southwest Powerlink, which also consists of a 500 kV electric transmission line supported by 150-foot-tall steel lattice structures, as well as several large, vertical, metallic communication towers located at the White Star Communication Facility, and the linear rust-colored U.S./Mexico international border fence located immediately south of the Proposed Project.

In addition, the Golden Acorn Casino and Travel Center is located south of I-8 near the Tecate Divide on reservation lands of the Campo Kumeyaay Nation, and the existing Boulevard Border Protection Station and the adjacent Lux Motel are located south of the interstate near the Ribbonwood Road exit.



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SOURCE: Bing Maps

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FIGURE 3

Existing Topography

Jacumba Solar Energy Project - Preliminary Hydrology and Drainage Study

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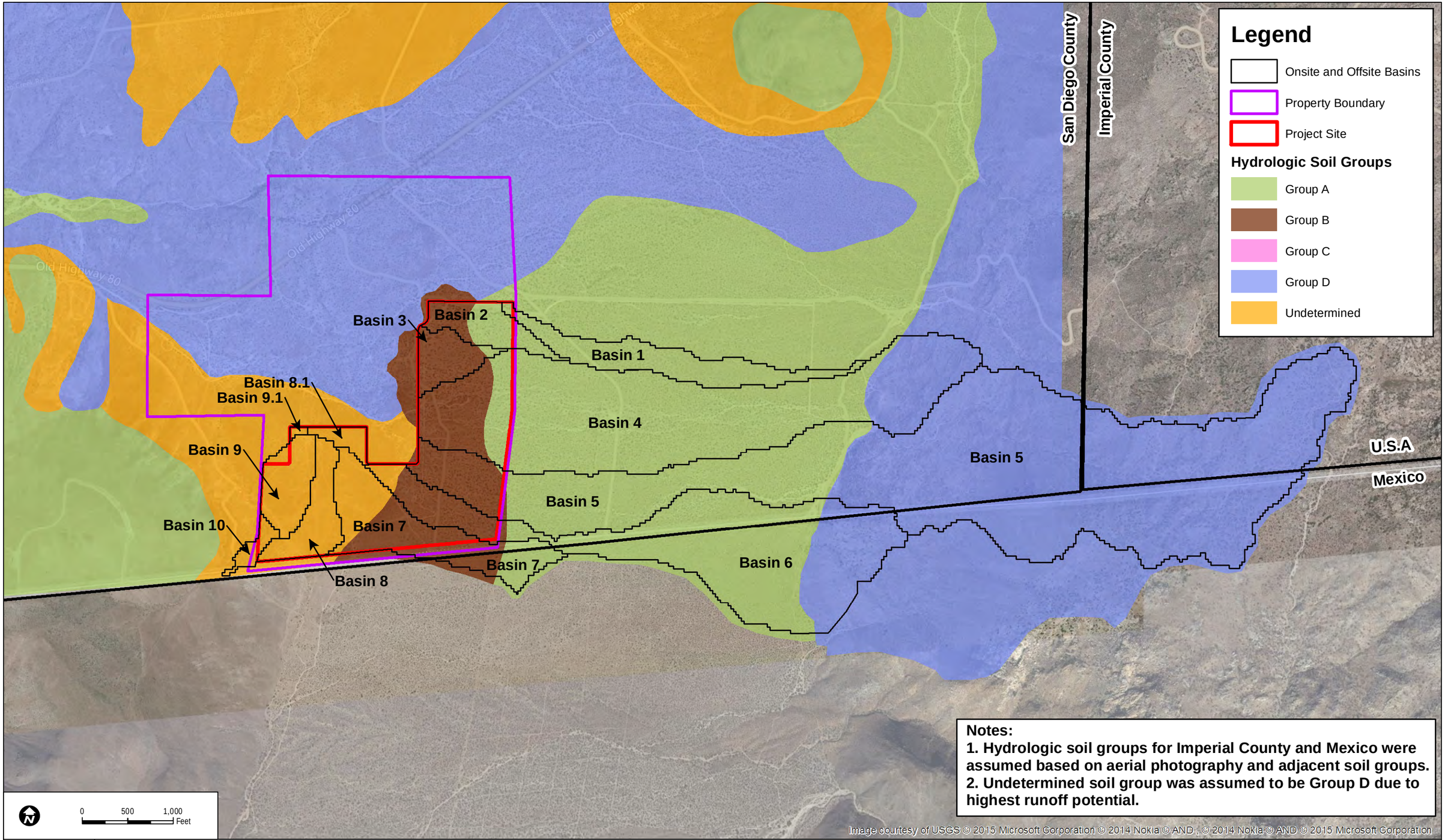

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SOURCE: Bing Maps, SANGIS

FIGURE 4

Hydrologic Soil Groups

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Jacumba Solar Energy Project - Preliminary Hydrology and Drainage Study

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4.4 Existing Runoff

The Proposed Project is located approximately 4,000 feet west of the Sierra Juarez Mountains. Runoff discharging from the Sierra Juarez Mountains generally flows in the westerly direction toward the Proposed Project. A hill located at the western portion of the Proposed Project also flows toward the Proposed Project to the south, west, and east.

For the purpose of quantifying existing runoff discharging onto the Proposed Project for the pre-development condition, the contributing watershed was delineated to determine the extent of the hydrologic unit of land contributing runoff to the Proposed Project. The contributing watershed is approximately 555 acres and was divided into twelve (12) basins, which were further subdivided into smaller sub-basins such that each basin has its own initial subarea followed by subsequent sub-basins. Figure 5 shows the existing drainage for the pre-development condition.

The contributing watershed and its corresponding basins and sub-basins were delineated using the Esri ArcHydro tool in GIS. The ArcHydro tool uses a Digital Elevation Model (DEM) to calculate flow paths between grid cells to generate streams and then subsequently delineates basins and sub-basins within a larger watershed based on the grid cells. The U.S. Geological Survey's National Elevation Dataset with a 1/3 arc second spatial resolution was used as the DEM to delineate the basins and sub-basins within the contributing watershed. Various hydrologic parameters associated with hydrologic modeling, such as area, slope, and length, were also determined as a part of the delineation process.

The existing runoff calculations were performed to quantify peak runoff discharging onto the Proposed Project for the pre-development condition based on the Rational Method as described in the SDCHM by using AES (see Appendix A of this report). AES is a computer-aided watershed modeling program that comes pre-loaded with the County Hydrology Method module. Peak runoff was calculated for all discharge points representing each basin within the contributing watershed for the 100-year storm event. The runoff coefficients (C) used to calculate existing runoff were obtained from the SDCHM (see Appendix C of this report) as shown below:

Soil Type: A; C = 0.20

Soil Type: B; C = 0.25

Soil Type: C; C = 0.30

Soil Type: D; C = 0.35

A GIS-based analysis was performed to calculate weighted C for each basin based on the soil groups (see Appendix A of this report).

The results of the existing runoff calculations for the pre-development condition are presented in Table 4, Existing Results for Pre-Development Condition.

Table 4
Existing Results for Pre-Development Condition

Discharge Point	Existing Results per the San Diego County Hydrology Manual (Rational Method) using AES						
	Basin	*Area (Acres)*	*Weighted C*	*Tc (min)*	*I (in/hr)*	*Peak Q_{100} (cfs)*	*V (fps)*
DP 1	1	21.41	0.20	26.48	2.70	11.55	5.17
DP 2	2	11.08	0.22	17.01	3.59	8.63	3.42
DP 3	3	8.94	0.25	14.71	3.94	8.83	2.89
DP 4	4	123.62	0.23	23.44	2.92	82.60	8.89
DP 5/6	5 and 6	330.83	0.30	29.63	2.51	248.60	10.99
DP 7	7	30.02	0.27	26.23	2.71	22.26	3.22
DP 8	8	11.61	0.35	12.98	4.27	17.37	3.89
DP 8.1	8.1	3.14	0.35	11.39	4.65	5.11	4.69
DP 9	9	11.41	0.35	11.36	4.65	18.57	4.56
DP 9.1	9.1	0.43	0.35	9.92	5.08	0.76	3.41
DP 10	10	2.81	0.35	12.85	4.30	4.23	4.11

Source: Appendix A, AES Modeling Results.
Notes: C = Runoff Coefficient; Tc = Time of Concentration; I = Intensity; Q = Runoff; V = Velocity.
min = minutes; in/hr = inch per hour; cfs = cubic feet per second; fps = feet per second.

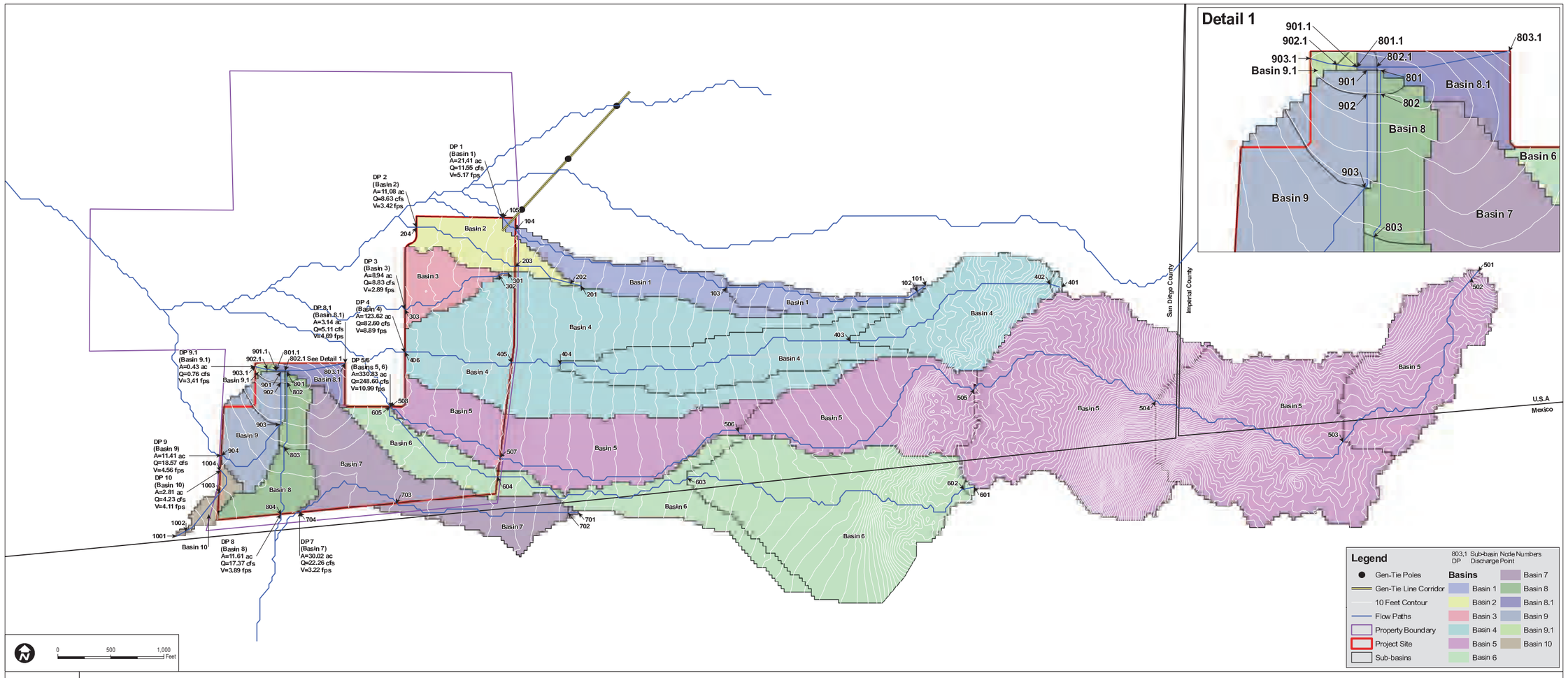

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FIGURE 5

Existing Drainage

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Jacumba Solar Energy Project - Preliminary Hydrology and Drainage Study

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5 PROPOSED DRAINAGE (POST-DEVELOPMENT CONDITION)

5.1 Proposed Topography

Modification to the existing topography is proposed for the post-development condition that would result in on-site topography ranging in elevation from 3,098 to 3,162 feet amsl. A proposed topographic map of the Proposed Project for the post-development condition is shown on Figures 6 and 7. The proposed topography was obtained from the preliminary grading plans prepared by WorleyParsons (see Appendix B of this report).

During the post-development condition, the proposed topography would allow the on-site runoff generated from the Proposed Project to flow generally to the west in the northern portion of the Proposed Project. A hill located at the western portion of the Proposed Project would be graded and flow to the south, west, and east, maintaining drainage patterns similar to the pre-development condition to the maximum extent practical.

5.2 Proposed Hydrologic Soil Groups

The hydrologic soil groups for the post-development condition were assumed to remain the same as the pre-development condition as described in Section 3.2.

5.3 Proposed Land Use

The Proposed Project as well as its contributing watershed is currently vacant and undeveloped, and designated as undisturbed natural terrain in accordance with the NRCS land use elements described in the Rational Method of the SDCHM. The post-development condition would change the existing land use from undisturbed natural terrain to impervious surfaces that would include battery storage area, substation area, and inverter pads. The undisturbed natural terrain includes approximately 555 acres of contributing watershed discharging onto the Proposed Project, of which approximately 1.9 acres (approximately 0.34% of the contributing watershed) would be converted to impervious surfaces comprising battery storage area, substation area, and inverter pads during the post-development condition.

The increase in impervious surfaces due to the development of the Proposed Project would result in a change in imperviousness from approximately 0 acres (0% of the contributing watershed) to approximately 1.9 acres (approximately 0.34% of the contributing watershed). Table 5, Proposed Land Use and Imperviousness for Post-Development Condition, shows the distribution of the proposed land use and percentage of imperviousness after the Proposed Project is developed. The proposed site plan showing the proposed land use for the post-development

condition is shown on Figures 6 and 7. The addition of impervious surfaces is minimal. The Proposed Project would not place housing within a 100-year flood hazard area.

Table 5
Proposed Land Use and Imperviousness for Post-Development Condition

Land Use	Percent Impervious	Proposed Post-Development Condition	
		Area (Acres)	*Area (Percent)*
Natural	0	553.42	99.66
Battery storage area	100	0.50	0.09
Substation area	100	0.54	0.10
Inverter pads	100	0.84	0.15
Total		**555.30**	**100.00**

Additionally, the surroundings of the Proposed Project are experiencing major changes in environmental conditions that are expected to occur before implementation of the Proposed Project. Major projects either approved, in construction, or completed include the San Diego Gas & Electric (SDG&E) ECO Substation project, which includes the rebuilt Boulevard Substation and the 138 kV ECO Transmission Line between the ECO Substation and the rebuilt Boulevard Substation, and the Tule Wind project, which includes 67 wind turbines that would produce up to 186 MW of electricity, a collector substation / operations and maintenance facility on Rough Acres Ranch, and a 3.8-mile-long 138 kV gen-tie (Tule gen-tie) that would connect the on-site collector substation to the rebuilt Boulevard Substation (Department of the Interior 2013).

5.4 Proposed Runoff

Based on the preliminary grading plans prepared by WorleyParsons, proposed runoff would maintain similar drainage patterns as existing runoff to the maximum extent practical. Per the preliminary grading plans, off-site runoff would be collected at the eastern boundary and conveyed across the Proposed Project to the western and northern boundaries via the proposed drainage channels recommended for the post-development condition. Off-site runoff discharging onto the Proposed Project during the post-development condition was anticipated to be similar to the pre-development condition. In other words, for the purpose of this report, no change was anticipated in the off-site runoff discharging onto the Proposed Project for the post-development condition.

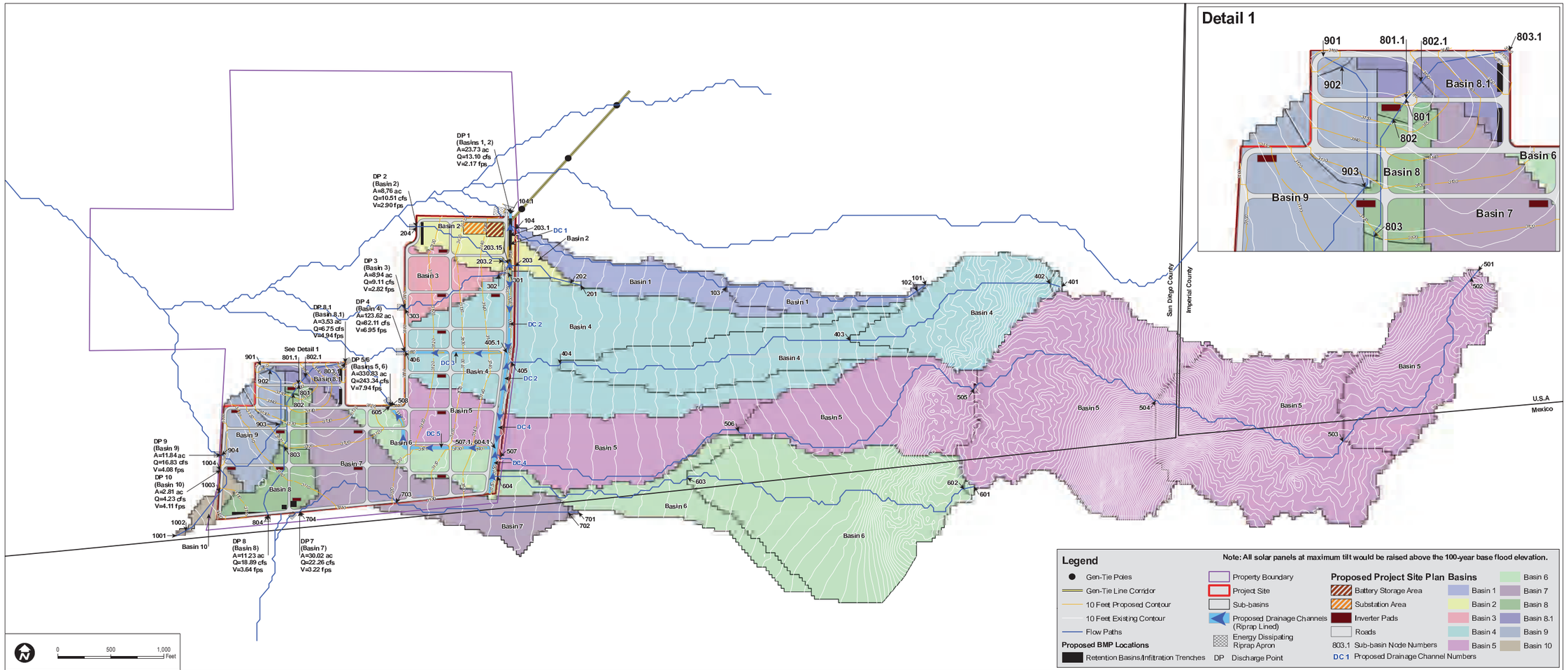

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FIGURE 6

Proposed Drainage

Jacumba Solar Energy Project - Preliminary Hydrology and Drainage Study

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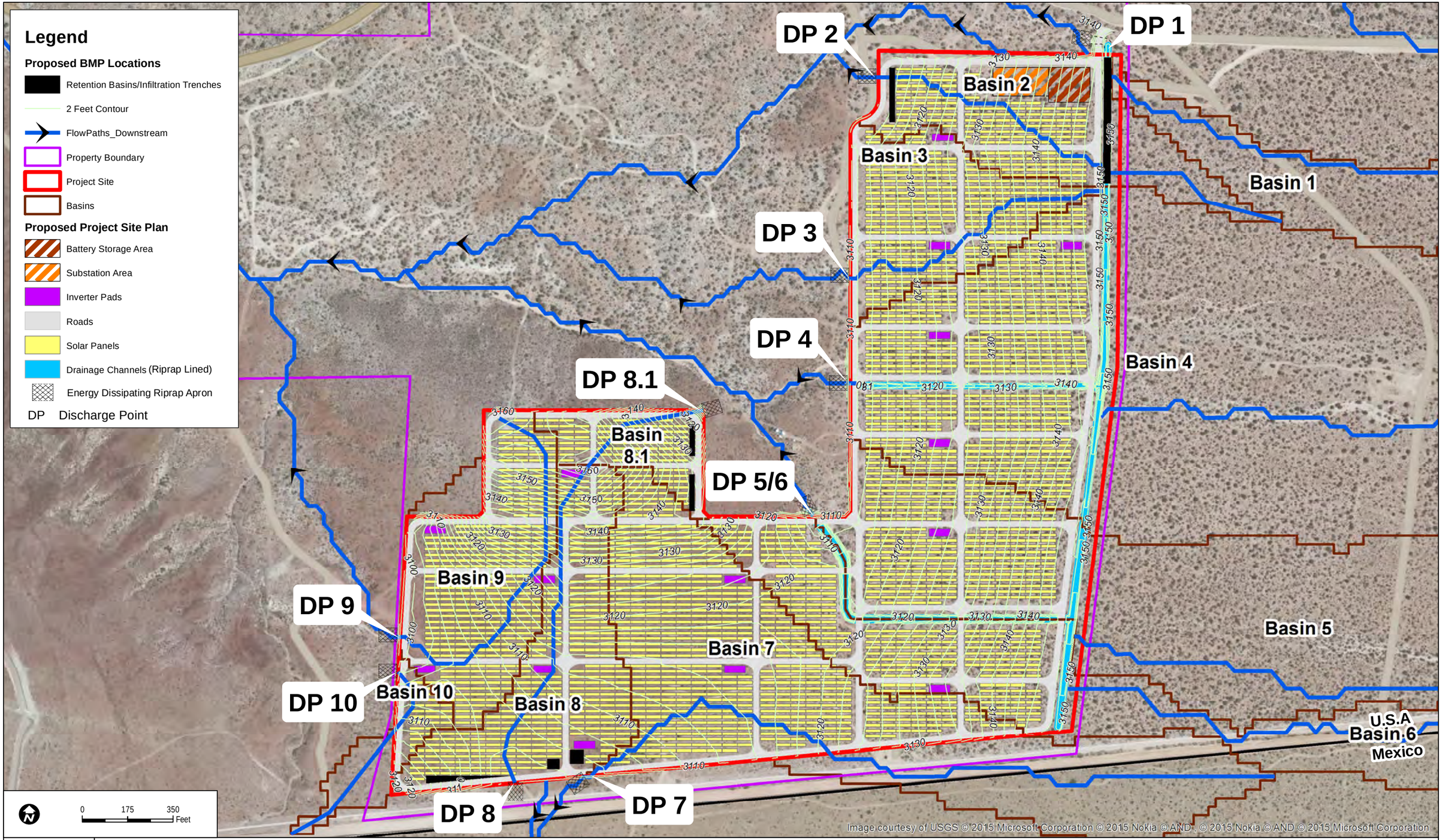

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SOURCE: Bing Maps

FIGURE 7

Proposed Project Site Plan

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Jacumba Solar Energy Project - Preliminary Hydrology and Drainage Study

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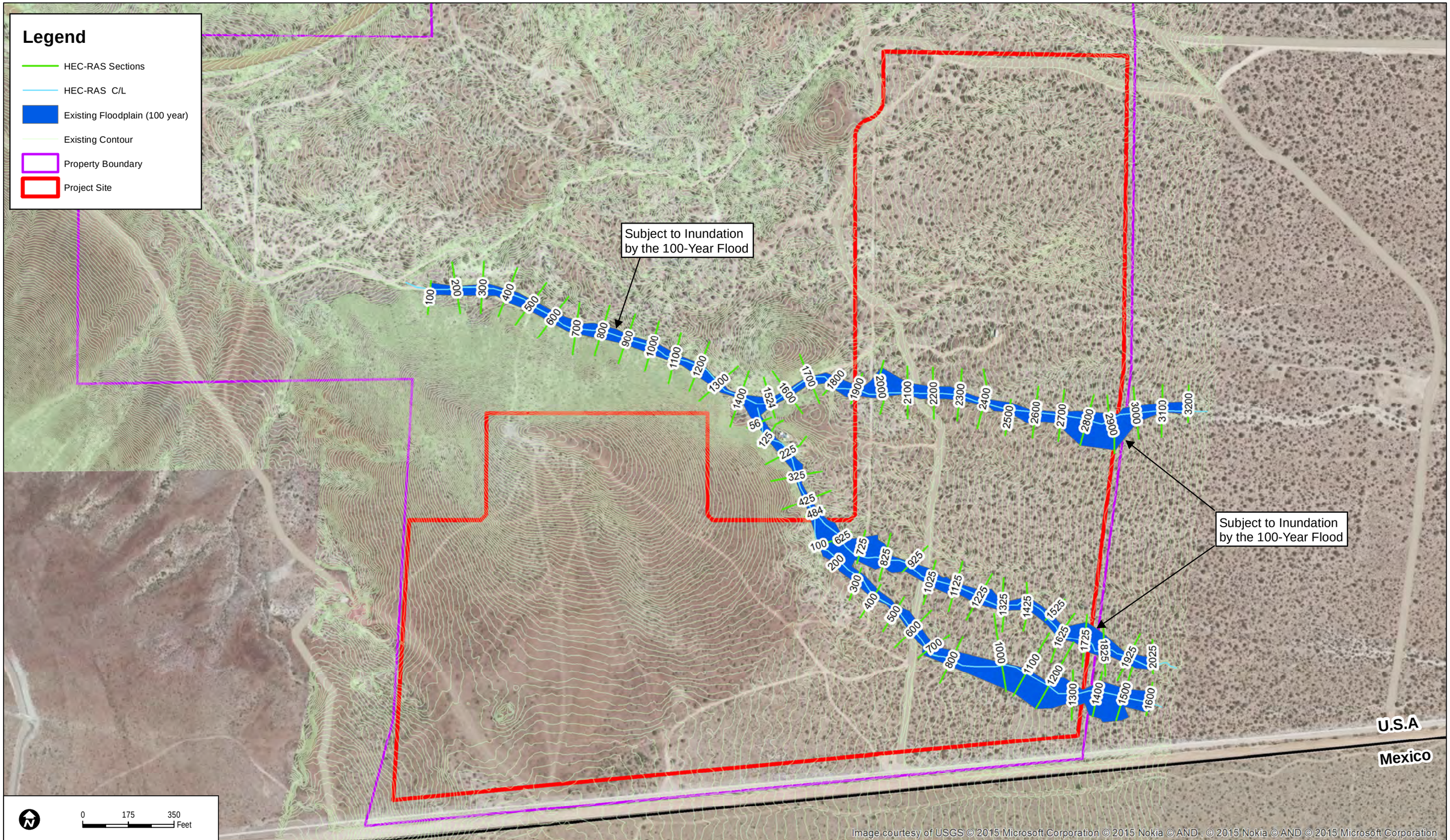

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SOURCE: Bing Maps

FIGURE 8

Existing Condition Inundation Map

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Jacumba Solar Energy Project - Preliminary Hydrology and Drainage Study

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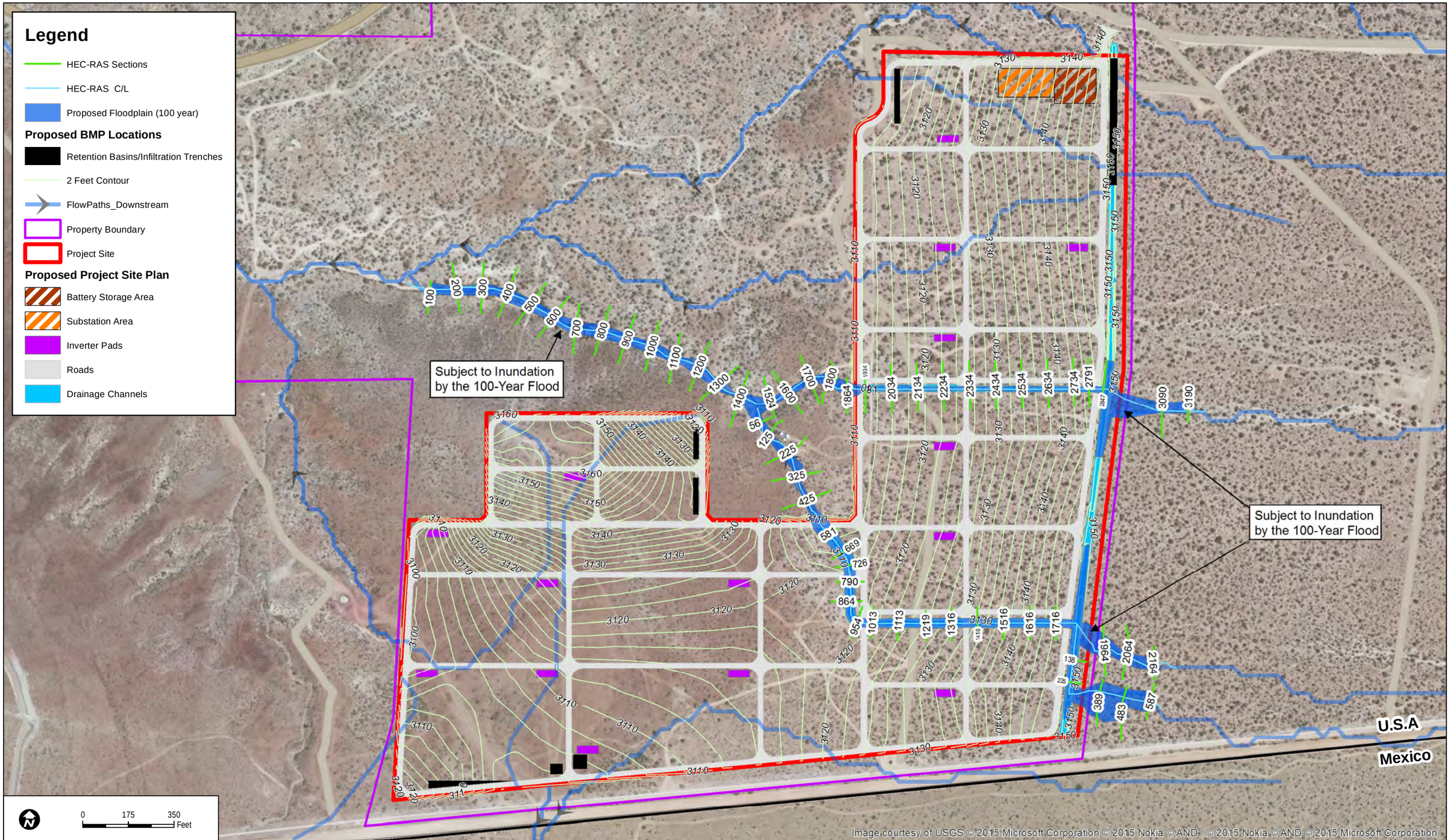

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SOURCE: Bing Maps

FIGURE 9

Proposed Inundation Map

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Jacumba Solar Energy Project - Preliminary Hydrology and Drainage Study

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A brief description of the proposed drainage channels recommended in the preliminary grading plans is as follows:

1. **Proposed Drainage Channel No. 1 –** consists of a drainage channel located along the northeastern boundary of the Proposed Project. This drainage channel would collect the off-site runoff generated from Basins 1 and 2 and would convey it to the north at Drainage Point 1 (DP 1). This drainage channel would also act as a retention basin to mitigate the increase in runoff at DP 1.
2. **Proposed Drainage Channel No. 2 –** consists of a drainage channel located along the eastern boundary of the Proposed Project. This drainage channel would collect the off-site runoff generated from Basin 4 and would convey it toward the Proposed Drainage Channel No. 3 located in the middle of the Proposed Project in the east–west direction.
3. **Proposed Drainage Channel No. 3 –** consists of a drainage channel located in the middle of the Proposed Project in the east–west direction. This drainage channel would collect the off-site runoff discharging from the Proposed Drainage Channel No. 2 located along the eastern boundary and would convey it across the Proposed Project to the western boundary at DP 4 where the off-site runoff would be discharged into Carrizo Creek, which is an existing natural channel.
4. **Proposed Drainage Channel No. 4 –** consists of a drainage channel located along the southeastern boundary of the Proposed Project. This drainage channel would collect the off-site runoff generated from Basins 5 and 6 and would convey it toward the Proposed Drainage Channel No. 5 located in the southern portion of the Proposed Project in the east–west and north–west directions.
5. **Proposed Drainage Channel No. 5 –** consists of a drainage channel located in the southern portion of the Proposed Project in the east–west and north–west directions. This drainage channel would collect the off-site runoff discharging from the Proposed Drainage Channel No. 4 located along the southeastern boundary and would convey it across the Proposed Project to the western boundary at DP 5/6 where the off-site runoff would be discharged into Carrizo Creek, which is an existing natural channel.

Figure 6 shows the proposed drainage for the post-development condition.

For the purpose of quantifying proposed runoff discharging onto the Proposed Project for the post-development condition, the contributing watershed was divided into eleven (11) basins retaining the drainage patterns similar to the pre-development condition to the maximum extent practical, except Basin 9.1 which was merged with Basin 9 based on the preliminary grading plans. For the post-development condition, there is no DP 9.1 because runoff from

Basin 9.1 flows to Basin 9 based on the preliminary grading plans. Therefore, Basin 9.1 was merged with Basin 9.

The proposed runoff calculations were performed to quantify peak runoff discharging onto the Proposed Project for the post-development condition based on the Rational Method as described in the SDCHM by using AES (see Appendix A of this report). Peak runoff was calculated for all discharge points representing each basin within the contributing watershed for the 100-year storm event. The runoff coefficients (C) used to calculate proposed runoff were obtained from the SDCHM (see Appendix C of this report) as shown below:

Soil Type: A; C = 0.20

Soil Type: B; C = 0.25

Soil Type: C; C = 0.30

Soil Type: D; C = 0.35

Impervious Surface; C = 1.0

A GIS-based analysis was performed to calculate weighted C for each basin based on the soil groups (see Appendix A of this report).

The results of the proposed runoff calculations for the post-development condition are presented in Table 6, Proposed Results for Post-Development Condition.

Table 6
Proposed Results for Post-Development Condition

Discharge Point	Proposed Results per the San Diego County Hydrology Manual (Rational Method) using AES						
	Basin	*Area (Acres)*	*Weighted C*	*Tc (min)*	*I (in/hr)*	*Peak Q_{100} (cfs)*	*V (fps)*
DP 1	1 and 2	23.73	0.20	27.60	2.63	13.10	2.17
DP 2	2	8.76	0.32	15.77	3.77	10.51	2.90
DP 3	3	8.94	0.26	14.88	3.91	9.11	2.82
DP 4	4	123.62	0.23	23.87	2.88	82.11	6.95
DP 5/6	5 and 6	330.83	0.30	30.54	2.46	243.34	7.94
DP 7	7	30.02	0.27	26.23	2.71	22.26	3.22
DP 8	8	11.23	0.36	11.44	4.63	18.89	3.64
DP 8.1	8.1	3.53	0.35	8.84	5.47	6.75	4.94
DP 9	9	11.84	0.36	14.47	3.98	16.83	4.08
DP 10	10	2.81	0.35	12.85	4.30	4.23	4.11

Source: Appendix A, AES Modeling Results.
Notes: C = Runoff Coefficient; Tc = Time of Concentration; I = Intensity; Q = Runoff; V = Velocity.
min = minutes; in/hr = inch per hour; cfs = cubic feet per second; fps = feet per second.

6 HYDROLOGIC IMPACTS AND MITIGATION

As a result of the development of the Proposed Project, approximately 1.9 acres (approximately 0.34% of the contributing watershed) of the approximately 555-acre contributing watershed that discharges onto the Proposed Project would be converted from undisturbed natural terrain to impervious surfaces comprising battery storage area, substation area, and inverter pads during the post-development condition.

The increase in impervious surfaces due to the development of the Proposed Project would result in a change in imperviousness from approximately 0 acres (0% of the contributing watershed) to approximately 1.9 acres (approximately 0.34% of the contributing watershed). The addition of impervious surfaces is minimal. Table 7, Comparison of Land Use and Imperviousness for Proposed Project, shows the difference between the distribution of land use and imperviousness for pre-development and post-development conditions.

Table 7
Comparison of Land Use and Imperviousness for Proposed Project

Land Use	Percent Impervious	Existing Pre-Development Condition		Proposed Post-Development Condition	
		Area (Acres)	*Area (Percent)*	*Area (Acres)*	*Area (Percent)*
Natural	0	555.30	100.00	553.42	99.66
Battery storage area	100	—	—	0.50	0.09
Substation area	100	—	—	0.54	0.10
Inverter pads	100	—	—	0.84	0.15
Total		**555.30**	**100.00**	**555.30**	**100.00**

Following is a description of anticipated hydrologic impacts:

- The Proposed Project would maintain the drainage patterns similar to the pre-development condition by mimicking the natural drainage pathways of the contributing watershed to the maximum extent practical. The Proposed Project would not substantially alter the existing drainage pattern of the site, which would result in substantial erosion.
- The Proposed Project would not substantially increase the rate of runoff in a manner, which would result in on-site or off-site flooding. The Proposed Project would not create or contribute runoff, which would exceed the capacity of the proposed drainage system.
- The Proposed Drainage Channel No. 1 would collect the off-site runoff generated from Basins 1 and 2 at the eastern boundary and would convey it to the north at DP 1. The increase in runoff at DP 1 would be minimal and mitigated prior to discharging. All other

proposed drainage channels would collect the off-site runoff generated from Basins 4, 5, and 6 at the eastern boundary and would convey it across the Proposed Project to the western boundary at DP 4 and 5/6. Other than these modifications, the Proposed Project would not place structures within a 100-year flood hazard area which would impede or redirect flood flows.

- During the pre-development condition, existing runoff is likely to produce erosive velocities at DP 4 and 5/6 (approximately 9 and 11 fps, respectively) for the 100-year storm event. However, during the post-development condition, these erosive velocities are likely to reduce at DP 4 and 5/6 (approximately 7 and 8 fps, respectively) based on the AES modeling. The erosion is proposed to be mitigated by the use of fiber rolls, gravel or sand bags, outlet protection, and energy dissipation. These proposed erosion control mitigation measures would provide mitigation for erosion.
- The development of the Proposed Project and changes in the land use and imperviousness would result in a small increase in runoff from the pre-development condition to the post-development condition for DP 1, 2, 8, and 8.1. The anticipated increase in runoff would be minimal and proposed to be mitigated by the use of retention basins/infiltration trenches. The potential locations of the proposed mitigation measures (retention basins/infiltration trenches) shown in this report are conceptual and subject to change depending on the final design.

A comparison of existing and proposed results for the 100-year storm event is presented in Table 8, Results Comparison. The comparison of results is made at same discharge points.

Table 8
Results Comparison

Discharge Point	Existing Pre-development Condition Results							Proposed Post-development Condition Results						
	Basin	*Area (Acres)*	*Weighted C*	*Tc (min)*	*I (in/hr)*	*Peak Q_{100} (cfs)*	*V (fps)*	*Basin*	*Area (Acres)*	*Weighted C*	*Tc (min)*	*I (in/hr)*	*Peak Q_{100} (cfs)*	*V (fps)*
DP 1	1	21.41	0.20	26.48	2.70	11.55	5.17	1 and 2	23.73	0.20	27.60	2.63	13.10	2.17
DP 2	2	11.08	0.22	17.01	3.59	8.63	3.42	2	8.76	0.32	15.77	3.77	10.51	2.90
DP 3	3	8.94	0.25	14.71	3.94	8.83	2.89	3	8.94	0.26	14.88	3.91	9.11	2.82
DP 4	4	123.62	0.23	23.44	2.92	82.60	8.89	4	123.62	0.23	23.87	2.88	82.11	6.95
DP 5/6	5 and 6	330.83	0.30	29.63	2.51	248.60	10.99	5 and 6	330.83	0.30	30.54	2.46	243.34	7.94
DP 7	7	30.02	0.27	26.23	2.71	22.26	3.22	7	30.02	0.27	26.23	2.71	22.26	3.22
DP 8	8	11.61	0.35	12.98	4.27	17.37	3.89	8	11.23	0.36	11.44	4.63	18.89	3.64
DP 8.1	8.1	3.14	0.35	11.39	4.65	5.11	4.69	8.1	3.53	0.35	8.84	5.47	6.75	4.94
DP 9	9	11.41	0.35	11.36	4.65	18.57	4.56	9	11.84	0.36	14.47	3.98	16.83	4.08
DP 9.1[a]	9.1	0.43	0.35	9.92	5.08	0.76	3.41	9.1	Basin 9.1 is a part of Basin 9 for the post-development condition					
DP 10	10	2.81	0.35	12.85	4.30	4.23	4.11	10	2.81	0.35	12.85	4.30	4.23	4.11

Source: Appendix A, AES Modeling Results.
Notes: C = Runoff Coefficient; Tc = Time of Concentration; I = Intensity; Q = Runoff; V = Velocity.
min = minutes; in/hr = inch per hour; cfs = cubic feet per second; fps = feet per second.
[a] For the post-development condition, there is no DP 9.1 because runoff from Basin 9.1 flows to Basin 9 based on the preliminary grading plans. Therefore, Basin 9.1 was merged with Basin 9.

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7 100-YEAR FLOOD INUNDATION

There were no recorded 100-year floodplain limits available within the Proposed Project per the Federal Emergency Management Agency (FEMA) Fire Insurance Rate Maps (FIRMs) or the County's San Diego Geographic Information Source (SanGIS). Analyses of the existing and proposed 100-year flood inundation levels were conducted using the Army Corps of Engineers' Hydrologic Engineering Centers River Analysis System (HEC-RAS) software.

HEC-RAS analysis
Proposed drainage channels 4 and 5 drain more than 100 acres of watershed and convey 83 cfs and 243 cfs, respectively, during a 100-year storm event. Due to the size of the watershed, flow depths and velocity need to be known for design purposes, as well as analysis of the effect of the project on the upstream and downstream properties.

A HEC-RAS hydraulic model was prepared to analyze the existing and post project off-site and on-site drainage flow paths to delineate the 100-yr floodplain limits, and to characterize the drainage path flow hydraulics in order to evaluate the risk level they present to development of the site. The proposed access road crossings are not incorporated in the HEC-RAS model for inundation mapping at this preliminary phase. The access road crossings will be refined and designed per county standards in the design phase.

The Rational method flow rate has been established for the existing and proposed project conditions. Please refer to Figures 8 and 9 in Appendix E for the pre and post project inundation limits and Tables 9 and 10 below for HEC-RAS summary results. Please refer to Appendix E for the pre project and post project HEC-RAS model runs.

The results of the HEC-RAS analyses are provided to aide in a qualitative evaluation of the site development risks. The HEC-RAS model results were used to map the approximate limits of the off-site floodplain in a 100-yr storm event.

Table 9
Existing Condition HEC-RAS Output Data Table for 100-yr Rational Method Discharge

Reach	River Station	Q Total (cfs)	W.S. Elevation (ft)	Velocity Channel (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Channel
4	3200	74	3164.38	3.91	23.84	67.19	1.14
4	3100	74	3158.71	5.82	12.71	27.29	1.5
4	3000	74	3154.32	3.36	22.01	63.52	1.01
4	2900	83	3148.79	5.53	15.02	40.98	1.61
4	2800	83	3144.11	4.13	20.2	129.81	1.17

Table 9
Existing Condition HEC-RAS Output Data Table for 100-yr Rational Method Discharge

Reach	River Station	Q Total (cfs)	W.S. Elevation (ft)	Velocity Channel (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Channel
4	2700	83	3138.42	4.83	17.18	51.33	1.47
4	2600	83	3134.4	3.43	24.17	66	1
4	2500	83	3129.36	5.79	14.35	32.54	1.54
4	2400	83	3124.69	4.44	18.68	36	1.09
4	2300	83	3120.79	5.03	16.51	30.96	1.21
4	2200	83	3117.37	4.46	18.59	31.25	1.02
4	2100	83	3113.03	5.58	14.88	32.54	1.45
4	2000	83	3109.11	3.11	26.71	83.14	0.97
4	1900	83	3105.33	4.46	18.61	37.87	1.12
4	1800	83	3101.13	6.36	13.04	16.17	1.25
4	1700	83	3096.96	6.42	12.92	16.68	1.29
4	1600	83	3092.86	5.79	14.34	20.99	1.23
4	1524	83	3089.08	7.11	11.68	14.84	1.41
5	2025	193	3161.42	4.94	39.08	52	1
5	1925	193	3156.7	7.38	26.14	44.2	1.69
5	1825	193	3153.01	3.85	50.07	111.91	1.02
5	1725	193	3149.49	6.3	30.77	67.55	1.14
5	1625	193	3144.53	6.85	28.19	56.96	1.71
5	1525	193	3141.98	6.3	30.63	24.62	1
5	1425	193	3138.16	6.68	28.9	53.96	1.61
5	1325	193	3133.69	6.69	28.88	27.12	1.13
5	1225	193	3130.22	6.15	31.39	44.55	1.29
5	1125	193	3126.96	4.92	40.23	139.99	1.02
5	1025	193	3122.74	6.26	30.82	55.78	1.48
5	925	193	3119.07	5.48	36.78	47.74	1.02
5	825	193	3115.36	5.53	34.93	72.79	1.41
5	725	193	3112.08	5.56	39.95	109.66	0.95
5	625	193	3108.98	7.43	33.03	43.19	1.32
6	1600	60	3162.34	3.02	19.86	70.21	1
6	1500	60	3158.07	2.97	20.23	98.84	1.15
6	1400	60	3154.12	2.64	22.7	103.68	1
6	1300	60	3149.67	4.01	14.97	43.6	1.21
6	1200	60	3145.84	2.92	20.52	77.49	1
6	1100	60	3142.32	2.55	23.51	104.79	0.95
6	1000	60	3138.07	2.48	24.19	156.16	1.11
6	800	60	3128.95	3.2	18.74	39.52	0.82
6	700	60	3126.34	2.94	20.39	75	0.99

Table 9
Existing Condition HEC-RAS Output Data Table for 100-yr Rational Method Discharge

Reach	River Station	Q Total (cfs)	W.S. Elevation (ft)	Velocity Channel (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Channel
6	600	60	3122.45	4.04	14.84	36.7	1.12
6	500	60	3119.05	4.08	14.74	26.71	0.95
6	400	60	3116.16	3.45	17.39	48.65	1.02
6	300	60	3112.85	4.27	14.04	31.23	1.12
6	200	60	3109.93	3.78	15.88	37.63	1.02
6	100	60	3106.73	4.13	14.54	28.44	1.02
5-2	484	249	3103.69	4.85	52.17	37.6	0.69
5-2	425	249	3102.47	6.76	36.85	26.47	1.01
5-2	325	249	3100.05	6.92	35.98	28.88	1.08
5-2	225	249	3097.53	5.76	43.24	47.5	1.06
5-2	125	249	3093.72	6.9	36.1	45.89	1.37
5-2	56	249	3091.75	6.25	39.81	33.25	1.01
4-2	1300	320	3083.55	6.38	50.13	40.43	1.01
4-2	1200	320	3081.04	6.21	51.55	52.3	1.1
4-2	1100	320	3077.96	6.98	45.83	39.94	1.15
4-2	1000	320	3075.5	6.1	52.42	45.95	1.01
4-2	900	320	3072.08	7.71	41.5	40.64	1.34
4-2	800	320	3069.55	5.09	62.83	52.23	0.82
4-2	700	320	3067.52	6.28	50.96	42.47	1.01
4-2	600	320	3063.81	8.62	37.1	32.36	1.42
4-2	500	320	3061.28	5.96	53.7	49.62	1.01
4-2	400	320	3057.7	7.35	43.51	51.18	1.41
4-2	300	320	3055.67	6.47	49.45	38.57	1.01
4-2	200	320	3052.04	8.8	36.36	29.86	1.41
4-2	100	320	3049.52	6.68	49	45.13	1.07

Table 10
Proposed Condition HEC-RAS Output Data Table for 100-yr Rational Method Discharge

Reach	Proposed River Station	Existing River Station *	Q Total (cfs)	W.S. Elevation (ft)	Velocity Channel (ft/s)	Flow Area (sq ft)	Top Width	Froude # Channel
4	3190	3200	74	3164.36	3.29	22.5	66.46	1
4	3090	3100	74	3158.67	6.46	11.46	26.21	1.72
4	2847		83	3142.95	7.9	10.5	12.93	1.55
4	2791		83	3141.1	6.68	12.42	13.48	1.23

Table 10
Proposed Condition HEC-RAS Output Data Table for 100-yr Rational Method Discharge

Reach	Proposed River Station	Existing River Station *	Q Total (cfs)	W.S. Elevation (ft)	Velocity Channel (ft/s)	Flow Area (sq ft)	Top Width	Froude # Channel
4	2734		83	3139	7.41	11.19	13.22	1.42
4	2634		83	3135.13	7.49	11.07	12.1	1.38
4	2534		83	3131.25	7.86	10.56	10.93	1.41
4	2434		83	3128.58	5.72	14.52	17.48	1.11
4	2334		83	3124.7	6.64	12.5	25.55	1.67
4	2234		83	3121.18	6.18	13.43	13.72	1.1
4	2134		83	3117	8.85	9.38	11.36	1.72
4	2034		83	3113.39	7.04	11.79	11.26	1.21
4	1934		83	3110.32	7.01	11.83	13.36	1.31
4	1864		83	3104.51	10.16	8.17	22.5	2.97
4	1800	1800	83	3101.22	5.7	14.56	16.93	1.08
4	1700	1700	83	3096.89	7.11	11.68	16.18	1.47
4	1600	1600	83	3092.91	5.33	15.56	21.48	1.1
4	1524	1524	83	3089.02	7.72	10.75	14.3	1.57
5	2164	2025	193	3161.41	4.96	38.94	51.86	1.01
5	2064	1925	193	3156.7	7.35	26.25	44.24	1.68
5	1964	1825	193	3153.03	3.88	52.5	113.9	1
6	587	1600	56	3162.32	2.97	18.89	69.27	1
6	483	1500	56	3158.06	4.51	19.87	98.51	1.2
6	389	1400	56	3154.11	2.78	21.67	102.69	1.28
6	225		56	3147.24	2.14	26.27	23.7	0.35
6	138		56	3146.57	4.21	13.34	24.52	1
5-2	1716		243	3141.6	10.66	22.8	18.3	1.68
5-2	1616		243	3137.5	9.55	25.43	19.99	1.49
5-2	1516		243	3133.33	9.7	25.04	21.44	1.58
5-2	1416		243	3128.98	9.57	25.39	22.08	1.57
5-2	1316		243	3125.51	8.69	27.96	21.53	1.34
5-2	1219		243	3123.57	6.92	35.13	25.48	1.04
5-2	1113		243	3119.23	10.76	22.58	20.78	1.82
5-2	1013		56	3147.24	2.14	26.27	23.7	0.35
5-2	954		56	3146.57	4.21	13.34	24.52	1
5-2	864		243	3141.6	10.66	22.8	18.3	1.68
5-2	790		243	3137.5	9.55	25.43	19.99	1.49
5-2	726		243	3133.33	9.7	25.04	21.44	1.58
5-2	669		243	3128.98	9.57	25.39	22.08	1.57
5-2	581		243	3125.51	8.69	27.96	21.53	1.34
5-2	425	425	243	3123.57	6.92	35.13	25.48	1.04

Table 10
Proposed Condition HEC-RAS Output Data Table for 100-yr Rational Method Discharge

Reach	Proposed River Station	Existing River Station *	Q Total (cfs)	W.S. Elevation (ft)	Velocity Channel (ft/s)	Flow Area (sq ft)	Top Width	Froude # Channel
5-2	325	325	243	3119.23	10.76	22.58	20.78	1.82
5-2	225	225	243	3117.57	6.72	36.18	26.17	1.01
5-2	125	125	243	3115.18	9.61	25.3	23.72	1.64
5-2	56	56	243	3114.36	4.44	54.71	27.88	0.56
4-2	1300	1300	243	3113.4	6.41	37.91	29.9	1
4-2	1200	1200	243	3111.15	8.81	27.59	26.34	1.52
4-2	1100	1100	243	3109.3	8.01	30.34	25.96	1.31
4-2	1000	1000	243	3107.37	6.81	35.67	28.79	1.08
4-2	900	900	243	3102.01	9.49	25.66	21.58	1.48
4-2	800	800	243	3100.11	6.45	37.67	29.57	1.01
4-2	700	700	243	3097.46	6.11	39.76	45.9	1.16
4-2	600	600	243	3093.76	6.47	37.58	46.42	1.26
4-2	500	500	243	3091.69	6.46	37.8	32.5	1.03
4-2	400	400	313	3083.5	6.58	48.33	40	1.02
4-2	300	300	313	3081.03	6.17	50.77	52.22	1.1
4-2	200	200	313	3077.92	7.17	44.35	39.37	1.15
4-2	100	100	313	3075.47	6.13	51.07	45.51	1.02

* Off site Existing condition station at same location as Proposed condition Cross section

HEC-RAS results & recommendations

The floodplain hydraulic analyses indicate that the resultant off-site floodplain limits for the pre and post project condition have similar flooding patterns. For the both existing and proposed condition, the average flow velocity in the wash ranges from 4.5 fps to 9 fps and the average flow depth is less than 2-ft. The flood damage and risk of erosion losses are moderate to significant for both the existing and the proposed conditions. There are no significant differences in flow depths and flow velocities between existing condition and proposed condition. However both existing and proposed flow velocities are in the erosive range for unlined/unarmored creek/channel. The creek/channel would experience erosion in a significant storm event. We recommend that proposed channel be armored to protect against erosion, particularly at downstream discharge locations near property line and access road crossings.

The HEC-RAS results clearly show that the effects of the Project on the upstream and downstream properties are negligible. The average post project difference in water surface elevation and velocity upstream of the Project is 0.02 feet and 0.5 fps, respectively, and

downstream is 0.03 feet and 0.09 fps. There also are no structures within the inundation limits on the adjacent properties that could potentially be affected by a change in water surface elevation or flow velocity. Please refer to Appendix E for a complete comparison of each cross section upstream and downstream of the Project.

8 CONCLUSIONS

Following are the conclusions of this Preliminary Hydrology and Drainage Study:

1. The increase in impervious surfaces due to the development of the Proposed Project would result in a change in imperviousness from approximately 0 acres (0% of the contributing watershed) to approximately 1.9 acres (approximately 0.34% of the contributing watershed). The addition of impervious surfaces is minimal.
2. The Proposed Project would maintain the drainage patterns similar to the pre-development condition by mimicking the natural drainage pathways of the contributing watershed to the maximum extent practical. The Proposed Project would not substantially alter the existing drainage pattern of the site which would result in substantial erosion. The Proposed Project would not place housing within a 100-year flood hazard area.
3. The Proposed Project would not substantially increase the rate of runoff in a manner which would result in on-site or off-site flooding. The Proposed Project would not create or contribute runoff which would exceed the capacity of the proposed drainage system.
4. The Proposed Drainage Channel No. 1 would collect the off-site runoff generated from Basins 1 and 2 at the eastern boundary and would convey it to the north at DP 1. The increase in runoff at DP 1 would be minimal and mitigated prior to discharging. The increase in runoff at DP 1 would not result in substantial erosion. All other proposed drainage channels would collect the off-site runoff generated from Basins 4, 5, and 6 at the eastern boundary and would convey it across the Proposed Project to the western boundary at DP 4 and 5/6. Other than these modifications, the Proposed Project would not place structures within a 100-year flood hazard area which would impede or redirect flood flows.
5. During the pre-development condition, existing runoff is likely to produce erosive velocities at DP 4 and 5/6 (approximately 9 and 11 fps, respectively) for the 100-year storm event. However, during the post-development condition, these erosive velocities are likely to reduce at DP 4 and 5/6 (approximately 7 and 8 fps, respectively) based on the AES modeling. The erosion is proposed to be mitigated by the use of fiber rolls, gravel or sand bags, outlet protection, and energy dissipation. These proposed erosion control mitigation measures would provide mitigation for erosion.
6. The development of the Proposed Project and changes in the land use and imperviousness would result in a small increase in runoff from the pre-development condition to the post-development condition for DP 1, 2, 3, 8, and 8.1. The anticipated increase in runoff would be minimal and proposed to be mitigated by the use of retention basins/infiltration

trenches. The potential locations of the proposed mitigation measures (retention basins/infiltration trenches) shown in this report are conceptual and subject to change depending on the final design.

7. The increase in runoff as a result of the Proposed Project will increase the 100-year floodplain stage upstream and downstream the subject property area by 0.02 feet and 0.03 feet, respectively. This small increase in flood stage will not impact any existing features adjacent to the subject property.

9 REFERENCES

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RWQCB (Regional Water Quality Control Board), Region 7. 1994. *Water Quality Control Plan: Colorado River Basin – Region 7*. Adopted November 17, 1993; last amended October 2005.

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APPENDIX A

AES Modeling Results

APPENDIX A
AES Modeling Results

Existing Results for Pre-development Condition

Rainfall Isopluvial Values

P Values	100-Year
P_6	3 inch
P_{24}	5 inch
P_6/P_{24}[a]	60%

Notes: P_6 = Adjusted 6-hour storm rainfall amount in inches, P_{24} = 24-hour storm rainfall amount in inches.

[a] Per the San Diego County Hydrology Manual (Rational Method), P_6 should be between 45% and 65% of P_{24} for the selected frequency of the storm event. This criterion was met.

Existing Basin Node Structure for AES Model for Pre-Development Condition

Basin	Sub-basin	Area (ac)	US Node	DS Node	US Ele (ft)	DS Ele (ft)	Length (ft)	Weighted C
Basin 1	101	0.12	101	102	3,380	3,374	100	0.20
	102	6.83	102	103	3,374	3,252	1,959	0.20
	103	14.07	103	104	3,252	3,148	2,242	0.20
	104	0.39	104	105	3,148	3,141	176	0.20
DP 1 (Basin 1)		**21.41**					**4,477**	**0.20**
Basin 2	201	0.08	201	202	3,183	3,179	100	0.35[a]
	202	2.23	202	203	3,179	3,154	584	0.20
	203	8.77	203	204	3,154	3,112	1,101	0.22
DP 2 (Basin 2)		**11.08**					**1,785**	**0.22**
Basin 3	301	0.08	301	302	3,152	3,148	100	0.35[a]
	302	8.85	302	303	3,148	3,108	1,077	0.25
DP 3 (Basin 3)		**8.94**					**1,177**	**0.25**
Basin 4	401	0.37	401	402	3,601	3,573	100	0.35
	402	26.51	402	403	3,573	3,326	2,191	0.31
	403	26.79	403	404	3,326	3,174	2,995	0.20
	404	49.53	404	405	3,174	3,150	510	0.20
	405	20.42	405	406	3,150	3,104	1,087	0.23
DP 4 (Basin 4)		**123.62**					**6,882**	**0.23**
Basin 5	501	0.14	501	502	4,323	4,277	100	0.35
	502	32.32	502	503	4,277	4,070	2,417	0.35
	503	61.50	503	504	4,070	3,715	2,173	0.35
	504	72.77	504	505	3,715	3,446	2,196	0.35
	505	34.62	505	506	3,446	3,255	2,839	0.26
	506	29.29	506	507	3,255	3,149	2,577	0.20
	507	11.54	507	508	3,149	3,104	1,255	0.25
Basin 5		**242.18**					**13,558**	**0.31**
Basin 6	601	0.23	601	602	3,518	3,502	100	0.35
	602	59.48	602	603	3,502	3,226	3,248	0.26

Existing Basin Node Structure for AES Model for Pre-Development Condition

Basin	Sub-basin	Area (ac)	US Node	DS Node	US Ele (ft)	DS Ele (ft)	Length (ft)	Weighted C
	603	18.04	603	604	3,226	3,151	2,071	0.20
	604	10.91	604	605	3,151	3,103	1,378	0.27
Basin 6		**88.65**					**6,798**	**0.25**
DP 5/6 (Basins 5 and 6)		**330.83**						**0.30**
Basin 7	701	0.14	701	702	3,187	3,183	100	0.20
	702	11.25	702	703	3,183	3,121	1,719	0.23
	703	18.63	703	704	3,121	3,100	1,155	0.30
DP 7 (Basin 7)		**30.02**					**2,975**	**0.27**
Basin 8	801	0.18	801	802	3,166	3,160	100	0.35
	802	3.51	802	803	3,160	3,120	620	0.35
	803	7.93	803	804	3,120	3,100	664	0.35
DP 8 (Basin 8)		**11.61**					**1,384**	**0.35**
Basin 9	901	0.46	901	902	3,168	3,160	100	0.35
	902	2.77	902	903	3,160	3,130	402	0.35
	903	8.17	903	904	3,130	3,096	819	0.35
DP 9 (Basin 9)		**11.41**					**1,321**	**0.35**
Basin 10	1001	0.11	1001	1002	3,140	3,137	100	0.35
	1002	1.43	1002	1003	3,137	3,114	476	0.35
	1003	1.27	1003	1004	3,114	3,100	268	0.35
DP 10 (Basin 10)		**2.81**					**844**	**0.35**
Basin 8.1	801.1	0.15	801.1	802.1	3,168	3,166	85	0.35
	802.1	2.99	802.1	803.1	3,166	3,110	572	0.35
DP 8.1 (Basin 8.1)		**3.14**					**657**	**0.35**
Basin 9.1	901.1	0.12	901.1	902.1	3,168	3,166	85	0.35
	902.1	0.31	902.1	903.1	3,166	3,160	116	0.35
DP 9.1 (Basin 9.1)		**0.43**					**201**	**0.35**
Total		**555.30**						

Notes: ac = acres; US = Upstream; DS = Downstream; Ele = Elevation; ft = feet; C = Runoff Coefficient; DP = Discharge Point.

[a] Runoff coefficient assumed for Soil Group D (C = 0.35) for its highest runoff potential because the area is too small to produce runoff in AES.

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

           RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                        2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2013 Advanced Engineering Software (aes)
             Ver. 20.0 Release Date: 06/01/2013  License ID 1419

           Analysis prepared by: Dudek (Existing Condition Results)



--------------------------------------------------------------------------
  FILE NAME: J100E16.DAT
  TIME/DATE OF STUDY: 13:04 01/16/2015
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.000
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

**************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3380.00
  DOWNSTREAM ELEVATION(FEET) =   3374.00
  ELEVATION DIFFERENCE(FEET) =      6.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.916
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.443
  SUBAREA RUNOFF(CFS) =      0.13
  TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.13

**************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3374.00  DOWNSTREAM(FEET) =   3252.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1959.00   CHANNEL SLOPE =  0.0623
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.13
```

```
  FLOW VELOCITY(FEET/SEC) =   3.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   8.72   Tc(MIN.) =   17.64
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    103.00 =    2059.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.505
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
  SUBAREA AREA(ACRES) =    6.83   SUBAREA RUNOFF(CFS) =    4.79
  TOTAL AREA(ACRES) =        6.9   TOTAL RUNOFF(CFS) =       4.87
  TC(MIN.) =   17.64

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3252.00  DOWNSTREAM(FEET) =   3148.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2242.00   CHANNEL SLOPE =  0.0464
  CHANNEL FLOW THRU SUBAREA(CFS) =       4.87
  FLOW VELOCITY(FEET/SEC) =   4.52 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   8.27   Tc(MIN.) =   25.91
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    104.00 =    4301.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.735
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
  SUBAREA AREA(ACRES) =   14.07   SUBAREA RUNOFF(CFS) =    7.70
  TOTAL AREA(ACRES) =       21.0   TOTAL RUNOFF(CFS) =      11.50
  TC(MIN.) =   25.91

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3148.00  DOWNSTREAM(FEET) =   3141.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   176.00   CHANNEL SLOPE =  0.0398
  CHANNEL FLOW THRU SUBAREA(CFS) =      11.50
  FLOW VELOCITY(FEET/SEC) =   5.17 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.57   Tc(MIN.) =   26.48
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    105.00 =    4477.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.697
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
  SUBAREA AREA(ACRES) =    0.39   SUBAREA RUNOFF(CFS) =    0.21
  TOTAL AREA(ACRES) =       21.4   TOTAL RUNOFF(CFS) =      11.55
  TC(MIN.) =   26.48
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    105.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  4
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   26.48
  RAINFALL INTENSITY(INCH/HR) =   2.70
  TOTAL STREAM AREA(ACRES) =    21.41
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.55

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3183.00
  DOWNSTREAM ELEVATION(FEET) =   3179.00
  ELEVATION DIFFERENCE(FEET) =      4.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.505
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.611
  SUBAREA RUNOFF(CFS) =      0.16
  TOTAL AREA(ACRES) =      0.08   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3179.00  DOWNSTREAM(FEET) =   3154.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   584.00   CHANNEL SLOPE =  0.0428
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.16
  FLOW VELOCITY(FEET/SEC) =   3.10 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.14   Tc(MIN.) =   11.64
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    203.00 =     684.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.583
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2052
  SUBAREA AREA(ACRES) =    2.23   SUBAREA RUNOFF(CFS) =    2.04
  TOTAL AREA(ACRES) =        2.3   TOTAL RUNOFF(CFS) =       2.17
  TC(MIN.) =   11.64

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3154.00  DOWNSTREAM(FEET) =   3112.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1101.00   CHANNEL SLOPE =  0.0381
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.17
  FLOW VELOCITY(FEET/SEC) =   3.42 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.37   Tc(MIN.) =   17.01
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    204.00 =    1785.00 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.589
 *USER SPECIFIED(SUBAREA):
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2200
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.2169
 SUBAREA AREA(ACRES) =    8.77   SUBAREA RUNOFF(CFS) =    6.92
 TOTAL AREA(ACRES) =       11.1   TOTAL RUNOFF(CFS) =       8.63
 TC(MIN.) =   17.01

****************************************************************************
 FLOW PROCESS FROM NODE    201.00 TO NODE    204.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  4
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   17.01
 RAINFALL INTENSITY(INCH/HR) =   3.59
 TOTAL STREAM AREA(ACRES) =    11.08
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.63

****************************************************************************
 FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =   3152.00
 DOWNSTREAM ELEVATION(FEET) =   3148.00
 ELEVATION DIFFERENCE(FEET) =      4.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.505
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.611
 SUBAREA RUNOFF(CFS) =      0.16
 TOTAL AREA(ACRES) =      0.08   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
 FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   3148.00  DOWNSTREAM(FEET) =   3108.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1077.00   CHANNEL SLOPE =  0.0371
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.16
 FLOW VELOCITY(FEET/SEC) =   2.89 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   6.21   Tc(MIN.) =   14.71
 LONGEST FLOWPATH FROM NODE    301.00 TO NODE    303.00 =    1177.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.940
 *USER SPECIFIED(SUBAREA):
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.2509
 SUBAREA AREA(ACRES) =    8.85   SUBAREA RUNOFF(CFS) =    8.72
 TOTAL AREA(ACRES) =        8.9   TOTAL RUNOFF(CFS) =       8.83
 TC(MIN.) =   14.71
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    303.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  4
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.71
  RAINFALL INTENSITY(INCH/HR) =   3.94
  TOTAL STREAM AREA(ACRES) =     8.93
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.83

****************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    402.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3601.00
  DOWNSTREAM ELEVATION(FEET) =   3573.00
  ELEVATION DIFFERENCE(FEET) =     28.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.833
  SUBAREA RUNOFF(CFS) =      0.88
  TOTAL AREA(ACRES) =      0.37   TOTAL RUNOFF(CFS) =      0.88

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    403.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3573.00  DOWNSTREAM(FEET) =   3326.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2191.00   CHANNEL SLOPE =  0.1127
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.88
  FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.70   Tc(MIN.) =   13.97
  LONGEST FLOWPATH FROM NODE    401.00 TO NODE    403.00 =    2291.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    403.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.075
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3100
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3106
  SUBAREA AREA(ACRES) =   26.51   SUBAREA RUNOFF(CFS) =   33.49
  TOTAL AREA(ACRES) =       26.9   TOTAL RUNOFF(CFS) =      34.02
  TC(MIN.) =   13.97

****************************************************************************
  FLOW PROCESS FROM NODE    403.00 TO NODE    404.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3326.00  DOWNSTREAM(FEET) =   3174.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2995.00   CHANNEL SLOPE =  0.0508
  CHANNEL FLOW THRU SUBAREA(CFS) =      34.02
  FLOW VELOCITY(FEET/SEC) =   7.81 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.39   Tc(MIN.) =   20.35
  LONGEST FLOWPATH FROM NODE    401.00 TO NODE    404.00 =    5286.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    403.00 TO NODE    404.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.196
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2554
  SUBAREA AREA(ACRES) =   26.79   SUBAREA RUNOFF(CFS) =   17.12
  TOTAL AREA(ACRES) =       53.7   TOTAL RUNOFF(CFS) =      43.81
  TC(MIN.) =   20.35

****************************************************************************
  FLOW PROCESS FROM NODE    404.00 TO NODE    405.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3174.00  DOWNSTREAM(FEET) =   3150.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   510.00   CHANNEL SLOPE =  0.0471
  CHANNEL FLOW THRU SUBAREA(CFS) =      43.81
  FLOW VELOCITY(FEET/SEC) =   8.08 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.05   Tc(MIN.) =   21.40
  LONGEST FLOWPATH FROM NODE    401.00 TO NODE    405.00 =    5796.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    404.00 TO NODE    405.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.094
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2288
  SUBAREA AREA(ACRES) =   49.53   SUBAREA RUNOFF(CFS) =   30.65
  TOTAL AREA(ACRES) =      103.2   TOTAL RUNOFF(CFS) =      73.05
  TC(MIN.) =   21.40

****************************************************************************
  FLOW PROCESS FROM NODE    405.00 TO NODE    406.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3150.00  DOWNSTREAM(FEET) =   3104.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1087.00   CHANNEL SLOPE =  0.0423
  CHANNEL FLOW THRU SUBAREA(CFS) =      73.05
  FLOW VELOCITY(FEET/SEC) =   8.89 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.04   Tc(MIN.) =   23.44
  LONGEST FLOWPATH FROM NODE    401.00 TO NODE    406.00 =    6883.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    405.00 TO NODE    406.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.918
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2290
  SUBAREA AREA(ACRES) =   20.42   SUBAREA RUNOFF(CFS) =   13.70
  TOTAL AREA(ACRES) =      123.6   TOTAL RUNOFF(CFS) =      82.60
  TC(MIN.) =   23.44

****************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    406.00 IS CODE =   1
```

```
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  4
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  4 ARE:
  TIME OF CONCENTRATION(MIN.) =   23.44
  RAINFALL INTENSITY(INCH/HR) =   2.92
  TOTAL STREAM AREA(ACRES) =   123.62
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     82.60

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       11.55    26.48        2.697         21.41
      2        8.63    17.01        3.589         11.08
      3        8.83    14.71        3.940          8.93
      4       82.60    23.44        2.918        123.62

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  4 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       74.55    14.71       3.940
      2       84.00    17.01       3.589
      3      106.37    23.44       2.918
      4      100.43    26.48       2.697

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     106.37   Tc(MIN.) =   23.44
  TOTAL AREA(ACRES) =      165.0
  LONGEST FLOWPATH FROM NODE    401.00 TO NODE    406.00 =    6883.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    406.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    406.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    501.00 TO NODE    502.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   4323.00
  DOWNSTREAM ELEVATION(FEET) =   4277.00
  ELEVATION DIFFERENCE(FEET) =     46.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.833
  SUBAREA RUNOFF(CFS) =      0.33
  TOTAL AREA(ACRES) =      0.14   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
  FLOW PROCESS FROM NODE    502.00 TO NODE    503.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   4277.00  DOWNSTREAM(FEET) =   4070.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2417.00   CHANNEL SLOPE =  0.0856
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.33
  FLOW VELOCITY(FEET/SEC) =   4.39 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   9.18   Tc(MIN.) =   15.44
  LONGEST FLOWPATH FROM NODE    501.00 TO NODE    503.00 =    2517.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    502.00 TO NODE    503.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.819
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   32.32   SUBAREA RUNOFF(CFS) =   43.20
  TOTAL AREA(ACRES) =       32.5   TOTAL RUNOFF(CFS) =      43.39
  TC(MIN.) =   15.44

****************************************************************************
  FLOW PROCESS FROM NODE    503.00 TO NODE    504.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   4070.00  DOWNSTREAM(FEET) =   3715.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2173.00   CHANNEL SLOPE =  0.1634
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      43.39
  FLOW VELOCITY(FEET/SEC) =  11.75 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.08   Tc(MIN.) =   18.53
  LONGEST FLOWPATH FROM NODE    501.00 TO NODE    504.00 =    4690.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    503.00 TO NODE    504.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.396
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   61.50   SUBAREA RUNOFF(CFS) =   73.10
  TOTAL AREA(ACRES) =       94.0   TOTAL RUNOFF(CFS) =     111.69
  TC(MIN.) =   18.53

****************************************************************************
  FLOW PROCESS FROM NODE    504.00 TO NODE    505.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3715.00  DOWNSTREAM(FEET) =   3446.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2196.00   CHANNEL SLOPE =  0.1225
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =     111.69
  FLOW VELOCITY(FEET/SEC) =  15.52 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.36   Tc(MIN.) =   20.88
  LONGEST FLOWPATH FROM NODE    501.00 TO NODE    505.00 =    6886.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    504.00 TO NODE    505.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.144
  *USER SPECIFIED(SUBAREA):
```

```
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   72.77   SUBAREA RUNOFF(CFS) =   80.06
  TOTAL AREA(ACRES) =      166.7   TOTAL RUNOFF(CFS) =     183.44
  TC(MIN.) =   20.88

****************************************************************************
  FLOW PROCESS FROM NODE    505.00 TO NODE    506.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3446.00  DOWNSTREAM(FEET) =   3255.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2839.00   CHANNEL SLOPE =  0.0673
  CHANNEL FLOW THRU SUBAREA(CFS) =     183.44
  FLOW VELOCITY(FEET/SEC) =  14.81 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.19   Tc(MIN.) =   24.08
  LONGEST FLOWPATH FROM NODE    501.00 TO NODE    506.00 =    9725.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    505.00 TO NODE    506.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.868
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3345
  SUBAREA AREA(ACRES) =   34.62   SUBAREA RUNOFF(CFS) =   25.81
  TOTAL AREA(ACRES) =      201.3   TOTAL RUNOFF(CFS) =     193.16
  TC(MIN.) =   24.08

****************************************************************************
  FLOW PROCESS FROM NODE    506.00 TO NODE    507.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3255.00  DOWNSTREAM(FEET) =   3149.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2577.00   CHANNEL SLOPE =  0.0411
  CHANNEL FLOW THRU SUBAREA(CFS) =     193.16
  FLOW VELOCITY(FEET/SEC) =  11.77 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.65   Tc(MIN.) =   27.73
  LONGEST FLOWPATH FROM NODE    501.00 TO NODE    507.00 =   12302.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    506.00 TO NODE    507.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.618
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3174
  SUBAREA AREA(ACRES) =   29.29   SUBAREA RUNOFF(CFS) =   15.34
  TOTAL AREA(ACRES) =      230.6   TOTAL RUNOFF(CFS) =     193.16
  TC(MIN.) =   27.73
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    507.00 TO NODE    508.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3149.00  DOWNSTREAM(FEET) =   3104.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1255.00   CHANNEL SLOPE =  0.0359
  CHANNEL FLOW THRU SUBAREA(CFS) =     193.16
```

```
  FLOW VELOCITY(FEET/SEC) =  10.99 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.90   Tc(MIN.) =   29.63
  LONGEST FLOWPATH FROM NODE    501.00 TO NODE    508.00 =   13557.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    507.00 TO NODE    508.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.508
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3142
  SUBAREA AREA(ACRES) =   11.54   SUBAREA RUNOFF(CFS) =    7.24
  TOTAL AREA(ACRES) =      242.2   TOTAL RUNOFF(CFS) =     193.16
  TC(MIN.) =   29.63
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    501.00 TO NODE    508.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   29.63
  RAINFALL INTENSITY(INCH/HR) =   2.51
  TOTAL STREAM AREA(ACRES) =   242.18
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    193.16

****************************************************************************
  FLOW PROCESS FROM NODE    601.00 TO NODE    602.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3518.00
  DOWNSTREAM ELEVATION(FEET) =   3502.00
  ELEVATION DIFFERENCE(FEET) =     16.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.833
  SUBAREA RUNOFF(CFS) =      0.55
  TOTAL AREA(ACRES) =      0.23   TOTAL RUNOFF(CFS) =      0.55

****************************************************************************
  FLOW PROCESS FROM NODE    602.00 TO NODE    603.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3502.00  DOWNSTREAM(FEET) =   3226.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  3248.00   CHANNEL SLOPE =  0.0850
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.55
  FLOW VELOCITY(FEET/SEC) =   4.37 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  12.38   Tc(MIN.) =   18.65
  LONGEST FLOWPATH FROM NODE    601.00 TO NODE    603.00 =    3348.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    602.00 TO NODE    603.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.382
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2600
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2603
  SUBAREA AREA(ACRES) =   59.48   SUBAREA RUNOFF(CFS) =   52.30
  TOTAL AREA(ACRES) =       59.7   TOTAL RUNOFF(CFS) =      52.57
  TC(MIN.) =   18.65

****************************************************************************
  FLOW PROCESS FROM NODE    603.00 TO NODE    604.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3226.00  DOWNSTREAM(FEET) =   3151.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2071.00   CHANNEL SLOPE =  0.0362
  CHANNEL FLOW THRU SUBAREA(CFS) =      52.57
  FLOW VELOCITY(FEET/SEC) =   7.47 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.62   Tc(MIN.) =   23.27
  LONGEST FLOWPATH FROM NODE    601.00 TO NODE    604.00 =    5419.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    603.00 TO NODE    604.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.932
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2463
  SUBAREA AREA(ACRES) =   18.04   SUBAREA RUNOFF(CFS) =   10.58
  TOTAL AREA(ACRES) =       77.8   TOTAL RUNOFF(CFS) =      56.16
  TC(MIN.) =   23.27

****************************************************************************
  FLOW PROCESS FROM NODE    604.00 TO NODE    605.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3151.00  DOWNSTREAM(FEET) =   3103.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1378.00   CHANNEL SLOPE =  0.0348
  CHANNEL FLOW THRU SUBAREA(CFS) =      56.16
  FLOW VELOCITY(FEET/SEC) =   7.47 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.07   Tc(MIN.) =   26.34
  LONGEST FLOWPATH FROM NODE    601.00 TO NODE    605.00 =    6797.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    604.00 TO NODE    605.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.706
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2493
  SUBAREA AREA(ACRES) =   10.91   SUBAREA RUNOFF(CFS) =    7.97
  TOTAL AREA(ACRES) =       88.7   TOTAL RUNOFF(CFS) =      59.81
  TC(MIN.) =   26.34

****************************************************************************
  FLOW PROCESS FROM NODE    601.00 TO NODE    605.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   26.34
  RAINFALL INTENSITY(INCH/HR) =   2.71
  TOTAL STREAM AREA(ACRES) =    88.66
```

PEAK FLOW RATE(CFS) AT CONFLUENCE = 59.81

** CONFLUENCE DATA **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)	AREA (ACRE)
1	193.16	29.63	2.508	242.18
2	59.81	26.34	2.706	88.66

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	RUNOFF (CFS)	Tc (MIN.)	INTENSITY (INCH/HOUR)
1	231.51	26.34	2.706
2	248.60	29.63	2.508

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 248.60 Tc(MIN.) = 29.63
TOTAL AREA(ACRES) = 330.8
LONGEST FLOWPATH FROM NODE 501.00 TO NODE 605.00 = 13557.00 FEET.

==========

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 330.8 TC(MIN.) = 29.63
PEAK FLOW RATE(CFS) = 248.60

==========

END OF RATIONAL METHOD ANALYSIS

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

           RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                        2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2013 Advanced Engineering Software (aes)
             Ver. 20.0 Release Date: 06/01/2013  License ID 1419

           Analysis prepared by: Dudek (Existing Condition Results)



--------------------------------------------------------------------------
  FILE NAME: J100E78.DAT
  TIME/DATE OF STUDY: 18:04 01/15/2015
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.000
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

**************************************************************************
  FLOW PROCESS FROM NODE    701.00 TO NODE    702.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3187.00
  DOWNSTREAM ELEVATION(FEET) =   3183.00
  ELEVATION DIFFERENCE(FEET) =      4.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.206
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.989
  SUBAREA RUNOFF(CFS) =      0.14
  TOTAL AREA(ACRES) =      0.14   TOTAL RUNOFF(CFS) =      0.14

**************************************************************************
  FLOW PROCESS FROM NODE    702.00 TO NODE    703.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3183.00  DOWNSTREAM(FEET) =   3121.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1719.00   CHANNEL SLOPE =  0.0361
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.14
```

```
  FLOW VELOCITY(FEET/SEC) =   2.85 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  10.06   Tc(MIN.) =   20.26
  LONGEST FLOWPATH FROM NODE    701.00 TO NODE    703.00 =    1819.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    702.00 TO NODE    703.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.205
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2296
  SUBAREA AREA(ACRES) =   11.25   SUBAREA RUNOFF(CFS) =    8.29
  TOTAL AREA(ACRES) =       11.4   TOTAL RUNOFF(CFS) =       8.38
  TC(MIN.) =   20.26

****************************************************************************
  FLOW PROCESS FROM NODE    703.00 TO NODE    704.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3121.00  DOWNSTREAM(FEET) =   3100.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1155.00   CHANNEL SLOPE =  0.0182
  CHANNEL FLOW THRU SUBAREA(CFS) =       8.38
  FLOW VELOCITY(FEET/SEC) =   3.22 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.97   Tc(MIN.) =   26.23
  LONGEST FLOWPATH FROM NODE    701.00 TO NODE    704.00 =    2974.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    703.00 TO NODE    704.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.713
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2733
  SUBAREA AREA(ACRES) =   18.63   SUBAREA RUNOFF(CFS) =   15.17
  TOTAL AREA(ACRES) =       30.0   TOTAL RUNOFF(CFS) =      22.26
  TC(MIN.) =   26.23

****************************************************************************
  FLOW PROCESS FROM NODE    701.00 TO NODE    704.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   26.23
  RAINFALL INTENSITY(INCH/HR) =   2.71
  TOTAL STREAM AREA(ACRES) =    30.02
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     22.26

****************************************************************************
  FLOW PROCESS FROM NODE    801.00 TO NODE    802.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3166.00
  DOWNSTREAM ELEVATION(FEET) =   3160.00
  ELEVATION DIFFERENCE(FEET) =      6.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.430
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.122
```

```
  SUBAREA RUNOFF(CFS) =      0.39
  TOTAL AREA(ACRES) =      0.18   TOTAL RUNOFF(CFS) =      0.39

****************************************************************************
  FLOW PROCESS FROM NODE    802.00 TO NODE    803.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3160.00  DOWNSTREAM(FEET) =   3120.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   620.00   CHANNEL SLOPE =  0.0645
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.39
  FLOW VELOCITY(FEET/SEC) =   3.81 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.71   Tc(MIN.) =   10.14
  LONGEST FLOWPATH FROM NODE    801.00 TO NODE    803.00 =     720.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    802.00 TO NODE    803.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.009
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    3.51   SUBAREA RUNOFF(CFS) =    6.15
  TOTAL AREA(ACRES) =        3.7   TOTAL RUNOFF(CFS) =       6.47
  TC(MIN.) =   10.14

****************************************************************************
  FLOW PROCESS FROM NODE    803.00 TO NODE    804.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3120.00  DOWNSTREAM(FEET) =   3100.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   664.00   CHANNEL SLOPE =  0.0301
  CHANNEL FLOW THRU SUBAREA(CFS) =       6.47
  FLOW VELOCITY(FEET/SEC) =   3.89 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.84   Tc(MIN.) =   12.98
  LONGEST FLOWPATH FROM NODE    801.00 TO NODE    804.00 =    1384.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    803.00 TO NODE    804.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.271
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    7.93   SUBAREA RUNOFF(CFS) =   11.85
  TOTAL AREA(ACRES) =       11.6   TOTAL RUNOFF(CFS) =      17.37
  TC(MIN.) =   12.98

****************************************************************************
  FLOW PROCESS FROM NODE    801.00 TO NODE    804.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.98
  RAINFALL INTENSITY(INCH/HR) =   4.27
  TOTAL STREAM AREA(ACRES) =    11.62
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     17.37
```

```
 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       22.26    26.23        2.713         30.02
     2       17.37    12.98        4.271         11.62

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       28.39    12.98       4.271
     2       33.30    26.23       2.713

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      33.30   Tc(MIN.) =   26.23
 TOTAL AREA(ACRES) =       41.6
 LONGEST FLOWPATH FROM NODE    701.00 TO NODE    804.00 =    2974.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =       41.6  TC(MIN.) =     26.23
 PEAK FLOW RATE(CFS)   =      33.30
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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

           RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                        2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2013 Advanced Engineering Software (aes)
             Ver. 20.0 Release Date: 06/01/2013  License ID 1419

           Analysis prepared by: Dudek (Existing Condition Results)



--------------------------------------------------------------------------
  FILE NAME: J100E910.DAT
  TIME/DATE OF STUDY: 15:06 01/22/2015
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.000
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

**************************************************************************
  FLOW PROCESS FROM NODE    901.00 TO NODE    902.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3168.00
  DOWNSTREAM ELEVATION(FEET) =   3160.00
  ELEVATION DIFFERENCE(FEET) =      8.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.750
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.513
  SUBAREA RUNOFF(CFS) =      1.05
  TOTAL AREA(ACRES) =      0.46   TOTAL RUNOFF(CFS) =      1.05

**************************************************************************
  FLOW PROCESS FROM NODE    902.00 TO NODE    903.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3160.00  DOWNSTREAM(FEET) =   3130.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   402.00   CHANNEL SLOPE =  0.0746
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.05
  FLOW VELOCITY(FEET/SEC) =   4.13 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
  TRAVEL TIME(MIN.) =   1.62   Tc(MIN.) =    8.37
  LONGEST FLOWPATH FROM NODE    901.00 TO NODE    903.00 =     502.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    902.00 TO NODE    903.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.669
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    2.77   SUBAREA RUNOFF(CFS) =    5.50
  TOTAL AREA(ACRES) =        3.2   TOTAL RUNOFF(CFS) =       6.41
  TC(MIN.) =    8.37

****************************************************************************
  FLOW PROCESS FROM NODE    903.00 TO NODE    904.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3130.00  DOWNSTREAM(FEET) =   3096.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   819.00   CHANNEL SLOPE =  0.0415
  CHANNEL FLOW THRU SUBAREA(CFS) =       6.41
  FLOW VELOCITY(FEET/SEC) =   4.56 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.99   Tc(MIN.) =   11.36
  LONGEST FLOWPATH FROM NODE    901.00 TO NODE    904.00 =    1321.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    903.00 TO NODE    904.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.655
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    8.17   SUBAREA RUNOFF(CFS) =   13.31
  TOTAL AREA(ACRES) =       11.4   TOTAL RUNOFF(CFS) =      18.57
  TC(MIN.) =   11.36

****************************************************************************
  FLOW PROCESS FROM NODE    901.00 TO NODE    904.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.36
  RAINFALL INTENSITY(INCH/HR) =   4.65
  TOTAL STREAM AREA(ACRES) =    11.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     18.57

****************************************************************************
  FLOW PROCESS FROM NODE   1001.00 TO NODE   1002.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3140.00
  DOWNSTREAM ELEVATION(FEET) =   3137.00
  ELEVATION DIFFERENCE(FEET) =      3.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.361
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.275
  SUBAREA RUNOFF(CFS) =      0.20
```

```
  TOTAL AREA(ACRES) =      0.11   TOTAL RUNOFF(CFS) =      0.20

****************************************************************************
  FLOW PROCESS FROM NODE   1002.00 TO NODE   1003.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3137.00  DOWNSTREAM(FEET) =   3114.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   476.00   CHANNEL SLOPE =  0.0483
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.20
  FLOW VELOCITY(FEET/SEC) =   3.30 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.41   Tc(MIN.) =   11.77
  LONGEST FLOWPATH FROM NODE   1001.00 TO NODE   1003.00 =     576.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1002.00 TO NODE   1003.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.551
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    1.43   SUBAREA RUNOFF(CFS) =    2.28
  TOTAL AREA(ACRES) =        1.5   TOTAL RUNOFF(CFS) =       2.45
  TC(MIN.) =   11.77

****************************************************************************
  FLOW PROCESS FROM NODE   1003.00 TO NODE   1004.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3114.00  DOWNSTREAM(FEET) =   3100.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   268.00   CHANNEL SLOPE =  0.0522
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.45
  FLOW VELOCITY(FEET/SEC) =   4.11 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.09   Tc(MIN.) =   12.85
  LONGEST FLOWPATH FROM NODE   1001.00 TO NODE   1004.00 =     844.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1003.00 TO NODE   1004.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.299
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    1.27   SUBAREA RUNOFF(CFS) =    1.91
  TOTAL AREA(ACRES) =        2.8   TOTAL RUNOFF(CFS) =       4.23
  TC(MIN.) =   12.85

****************************************************************************
  FLOW PROCESS FROM NODE   1001.00 TO NODE   1004.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.85
  RAINFALL INTENSITY(INCH/HR) =   4.30
  TOTAL STREAM AREA(ACRES) =     2.81
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.23

  ** CONFLUENCE DATA **
```

```
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       18.57    11.36       4.655         11.40
      2        4.23    12.85       4.299          2.81

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       22.31    11.36       4.655
      2       21.38    12.85       4.299

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      22.31   Tc(MIN.) =   11.36
  TOTAL AREA(ACRES) =       14.2
  LONGEST FLOWPATH FROM NODE    901.00 TO NODE   1004.00 =    1321.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    901.00 TO NODE   1004.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.36
  RAINFALL INTENSITY(INCH/HR) =   4.65
  TOTAL STREAM AREA(ACRES) =    14.21
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     22.31

****************************************************************************
  FLOW PROCESS FROM NODE    801.10 TO NODE    802.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    85.00
  UPSTREAM ELEVATION(FEET) =   3168.00
  DOWNSTREAM ELEVATION(FEET) =   3166.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.358
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.276
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.15   TOTAL RUNOFF(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    802.10 TO NODE    803.10 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3166.00  DOWNSTREAM(FEET) =   3110.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   572.00   CHANNEL SLOPE =  0.0979
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.28
  FLOW VELOCITY(FEET/SEC) =   4.69 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.03   Tc(MIN.) =   11.39
  LONGEST FLOWPATH FROM NODE    801.10 TO NODE    803.10 =     657.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    802.10 TO NODE    803.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.648
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    2.99   SUBAREA RUNOFF(CFS) =    4.86
  TOTAL AREA(ACRES) =        3.1   TOTAL RUNOFF(CFS) =       5.11
  TC(MIN.) =   11.39

****************************************************************************
  FLOW PROCESS FROM NODE    801.10 TO NODE    803.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.39
  RAINFALL INTENSITY(INCH/HR) =   4.65
  TOTAL STREAM AREA(ACRES) =     3.14
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.11

****************************************************************************
  FLOW PROCESS FROM NODE    901.10 TO NODE    902.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    85.00
  UPSTREAM ELEVATION(FEET) =   3168.00
  DOWNSTREAM ELEVATION(FEET) =   3166.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.358
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.276
  SUBAREA RUNOFF(CFS) =      0.22
  TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.22

****************************************************************************
  FLOW PROCESS FROM NODE    902.10 TO NODE    903.10 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3166.00  DOWNSTREAM(FEET) =   3160.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   116.00   CHANNEL SLOPE =  0.0517
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.22
  FLOW VELOCITY(FEET/SEC) =   3.41 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.57   Tc(MIN.) =    9.92
  LONGEST FLOWPATH FROM NODE    901.10 TO NODE    903.10 =     201.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    902.10 TO NODE    903.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.079
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    0.31   SUBAREA RUNOFF(CFS) =    0.55
  TOTAL AREA(ACRES) =        0.4   TOTAL RUNOFF(CFS) =       0.76
  TC(MIN.) =    9.92

****************************************************************************
  FLOW PROCESS FROM NODE    901.10 TO NODE    903.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.92
```

```
 RAINFALL INTENSITY(INCH/HR) =   5.08
 TOTAL STREAM AREA(ACRES) =     0.43
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.76

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       22.31    11.36        4.655         14.21
     2        5.11    11.39        4.648          3.14
     3        0.76     9.92        5.079          0.43

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       25.66     9.92       5.079
     2       28.11    11.36       4.655
     3       28.08    11.39       4.648

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      28.11   Tc(MIN.) =   11.36
 TOTAL AREA(ACRES) =       17.8
 LONGEST FLOWPATH FROM NODE    901.00 TO NODE    903.10 =    1321.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =       17.8  TC(MIN.) =     11.36
 PEAK FLOW RATE(CFS)   =      28.11
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

APPENDIX A
AES Modeling Results

Proposed Results for Post-development Condition

Rainfall Isopluvial Values

P Values	100-Year
P_6	3 inch
P_{24}	5 inch
P_6/P_{24}[a]	60%

Notes: P_6 = Adjusted 6-hour storm rainfall amount in inches, P_{24} = 24-hour storm rainfall amount in inches.

[a] Per the San Diego County Hydrology Manual (Rational Method), P_6 should be between 45% and 65% of P_{24} for the selected frequency of the storm event. This criterion was met.

Proposed Basin Node Structure for AES Model for Post-Development Condition

Basin	Sub-basin	Area (ac)	US Node	DS Node	US Ele (ft)	DS Ele (ft)	Length (ft)	Weighted C
Basin 1	101	0.12	101	102	3,380	3,374	100	0.20
	102	6.83	102	103	3,374	3,252	1,959	0.20
	103	14.07	103	104	3,252	3,148	2,242	0.20
	104.1	0.14	104	104.1	3,148	3,146	220	0.20
Basin 1		**21.16**					**4,521**	**0.20**
Basin 2	201	0.08	201	202	3,183	3,179	100	0.35[a]
	202	2.23	202	203	3,179	3,154	584	0.20
	203.1	0.27	203	203.1	3,154	3,152	338	0.20
Basin 2		**2.58**						**0.20**
DP 1 (Basins 1 and 2)		**23.73**						**0.20**
Basin 2	203.2	0.75	203.15	203.2	3,152	3,148	100	0.20
	203	8.00	203.2	204	3,148	3,112	966	0.33
DP 2 (Basin 2)		**8.76**					**2,088**	**0.32**
Basin 3	301	0.08	301	302	3,152	3,148	100	0.35[a]
	302	8.85	302	303	3,148	3,110	1,077	0.26
DP 3 (Basin 3)		**8.94**					**1,177**	**0.26**
Basin 4	401	0.37	401	402	3,601	3,573	100	0.35
	402	26.51	402	403	3,573	3,326	2,191	0.31
	403	26.79	403	404	3,326	3,174	2,995	0.20
	404	49.53	404	405	3,174	3,150	510	0.20
	405.1	1.12	405	405.1	3,150	3,146	57	0.20
	405	19.30	405.1	406	3,146	3,110	988	0.24
DP 4 (Basin 4)		**123.62**					**6,840**	**0.23**
Basin 5	501	0.14	501	502	4,323	4,277	100	0.35
	502	32.32	502	503	4,277	4,070	2,417	0.35
	503	61.50	503	504	4,070	3,715	2,173	0.35
	504	72.77	504	505	3,715	3,446	2,196	0.35
	505	34.62	505	506	3,446	3,255	2,839	0.26

Proposed Basin Node Structure for AES Model for Post-Development Condition

Basin	Sub-basin	Area (ac)	US Node	DS Node	US Ele (ft)	DS Ele (ft)	Length (ft)	Weighted C
	506	29.29	506	507	3,255	3,149	2,577	0.20
	507.1	0.43	507	507.1	3,149	3,148	42	0.24
	507	11.43	507.1	508	3,148	3,110	1,309	0.25
Basin 5		**242.49**					**13,653**	**0.31**
Basin 6	601	0.23	601	602	3,518	3,502	100	0.35
	602	59.48	602	603	3,502	3,226	3,248	0.26
	603	18.04	603	604	3,226	3,151	2,071	0.20
	604.1	0.19	604	604.1	3,151	3,150	35	0.25
	604	10.41	604.1	605	3,150	3,110	1,309	0.27
Basin 6		**88.34**					**6,764**	**0.25**
DP 5/6 (Basins 5 and 6)		**330.83**						**0.30**
Basin 7	701	0.14	701	702	3,187	3,183	100	0.20
	702	11.25	702	703	3,183	3,121	1,719	0.23
	703	18.63	703	704	3,121	3,100	1,155	0.30
DP 7 (Basin 7)		**30.02**					**2,975**	**0.27**
Basin 8	801	0.42	801	802	3,160	3,152	100	0.44
	802	2.88	802	803	3,152	3,120	526	0.36
	803	7.93	803	804	3,120	3,102	710	0.36
DP 8 (Basin 8)		**11.23**					**1,335**	**0.36**
Basin 9	901	0.35	901	902	3,162	3,158	100	0.35
	902	3.32	902	903	3,158	3,126	563	0.35
	903	8.17	903	904	3,126	3,098	819	0.36
DP 9 (Basin 9)		**11.84**					**1,483**	**0.36**
Basin 10	1001	0.11	1001	1002	3,140	3,137	100	0.35
	1002	1.43	1002	1003	3,137	3,114	476	0.35
	1003	1.27	1003	1004	3,114	3,100	268	0.35
DP 10 (Basin 10)		**2.81**					**844**	**0.35**
Basin 8.1	801.1	0.58	801.1	802.1	3,160	3,154	100	0.35
	802.1	2.94	802.1	803.1	3,154	3,110	417	0.35
DP 8.1 (Basin 8.1)		**3.53**					**517**	**0.35**
Total		**555.30**						

Notes: ac = acres; US = Upstream; DS = Downstream; Ele = Elevation; ft = feet; C = Runoff Coefficient; DP = Discharge Point.

[a] Runoff coefficient assumed for Soil Group D (C = 0.35) for its highest runoff potential because the area is too small to produce runoff in AES.

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

           RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                        2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2013 Advanced Engineering Software (aes)
             Ver. 20.0 Release Date: 06/01/2013  License ID 1419

           Analysis prepared by: Dudek (Proposed Condition Results)



--------------------------------------------------------------------------
  FILE NAME: J100P16.DAT
  TIME/DATE OF STUDY: 12:54 01/22/2015
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.000
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

**************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3380.00
  DOWNSTREAM ELEVATION(FEET) =   3374.00
  ELEVATION DIFFERENCE(FEET) =      6.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.916
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.443
  SUBAREA RUNOFF(CFS) =      0.13
  TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.13

**************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3374.00  DOWNSTREAM(FEET) =   3252.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1959.00   CHANNEL SLOPE =  0.0623
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.13
```

```
  FLOW VELOCITY(FEET/SEC) =   3.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   8.72   Tc(MIN.) =   17.64
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    103.00 =    2059.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.505
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
  SUBAREA AREA(ACRES) =    6.83   SUBAREA RUNOFF(CFS) =    4.79
  TOTAL AREA(ACRES) =        6.9   TOTAL RUNOFF(CFS) =       4.87
  TC(MIN.) =   17.64

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3252.00  DOWNSTREAM(FEET) =   3148.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2242.00   CHANNEL SLOPE =  0.0464
  CHANNEL FLOW THRU SUBAREA(CFS) =       4.87
  FLOW VELOCITY(FEET/SEC) =   4.52 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   8.27   Tc(MIN.) =   25.91
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    104.00 =    4301.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.735
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2000
  SUBAREA AREA(ACRES) =   14.07   SUBAREA RUNOFF(CFS) =    7.70
  TOTAL AREA(ACRES) =       21.0   TOTAL RUNOFF(CFS) =      11.50
  TC(MIN.) =   25.91

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    104.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   25.91
  RAINFALL INTENSITY(INCH/HR) =   2.74
  TOTAL STREAM AREA(ACRES) =    21.02
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.50

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3183.00
  DOWNSTREAM ELEVATION(FEET) =   3179.00
  ELEVATION DIFFERENCE(FEET) =      4.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.505
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.611
```

```
  SUBAREA RUNOFF(CFS) =      0.16
  TOTAL AREA(ACRES) =      0.08   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3179.00  DOWNSTREAM(FEET) =   3154.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   584.00   CHANNEL SLOPE =  0.0428
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.16
  FLOW VELOCITY(FEET/SEC) =   3.10 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.14   Tc(MIN.) =   11.64
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    203.00 =     684.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.583
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2052
  SUBAREA AREA(ACRES) =    2.23   SUBAREA RUNOFF(CFS) =    2.04
  TOTAL AREA(ACRES) =        2.3   TOTAL RUNOFF(CFS) =       2.17
  TC(MIN.) =   11.64

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    203.10 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3148.00  DOWNSTREAM(FEET) =   3144.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   338.00   CHANNEL SLOPE =  0.0118
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.700
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.27
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.23
  AVERAGE FLOW DEPTH(FEET) =   0.18   TRAVEL TIME(MIN.) =   4.58
  Tc(MIN.) =   16.22
  SUBAREA AREA(ACRES) =     0.27       SUBAREA RUNOFF(CFS) =    0.20
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.205
  TOTAL AREA(ACRES) =        2.6         PEAK FLOW RATE(CFS) =       2.17

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.17   FLOW VELOCITY(FEET/SEC.) =   1.22
  LONGEST FLOWPATH FROM NODE    201.00 TO NODE    203.10 =    1022.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    203.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.22
  RAINFALL INTENSITY(INCH/HR) =   3.70
  TOTAL STREAM AREA(ACRES) =     2.58
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.17

  ** CONFLUENCE DATA **
```

```
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       11.50    25.91        2.735        21.02
      2        2.17    16.22        3.700         2.58

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        9.37    16.22       3.700
      2       13.10    25.91       2.735

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      13.10   Tc(MIN.) =   25.91
  TOTAL AREA(ACRES) =       23.6
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    203.10 =    4301.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    203.10 TO NODE    104.10 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3144.00  DOWNSTREAM(FEET) =   3142.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   220.00   CHANNEL SLOPE =  0.0091
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   3.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.626
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.14
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.18
  AVERAGE FLOW DEPTH(FEET) =   0.54   TRAVEL TIME(MIN.) =   1.68
  Tc(MIN.) =   27.60
  SUBAREA AREA(ACRES) =     0.14       SUBAREA RUNOFF(CFS) =    0.07
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.201
  TOTAL AREA(ACRES) =       23.7         PEAK FLOW RATE(CFS) =      13.10

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.54   FLOW VELOCITY(FEET/SEC.) =   2.17
  LONGEST FLOWPATH FROM NODE    101.00 TO NODE    104.10 =    4521.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    104.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  4
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   27.60
  RAINFALL INTENSITY(INCH/HR) =   2.63
  TOTAL STREAM AREA(ACRES) =    23.74
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     13.10

****************************************************************************
  FLOW PROCESS FROM NODE    203.15 TO NODE    203.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3152.00
  DOWNSTREAM ELEVATION(FEET) =   3148.00
  ELEVATION DIFFERENCE(FEET) =      4.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.206
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.989
```

```
  SUBAREA RUNOFF(CFS) =      0.75
  TOTAL AREA(ACRES) =      0.75   TOTAL RUNOFF(CFS) =      0.75

****************************************************************************
  FLOW PROCESS FROM NODE    203.20 TO NODE    204.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3148.00  DOWNSTREAM(FEET) =   3112.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   966.00   CHANNEL SLOPE =  0.0373
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.75
  FLOW VELOCITY(FEET/SEC) =   2.90 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.56   Tc(MIN.) =   15.77
  LONGEST FLOWPATH FROM NODE    203.15 TO NODE    204.00 =    1066.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    203.20 TO NODE    204.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.768
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3189
  SUBAREA AREA(ACRES) =    8.00   SUBAREA RUNOFF(CFS) =    9.95
  TOTAL AREA(ACRES) =        8.8   TOTAL RUNOFF(CFS) =      10.51
  TC(MIN.) =   15.77

****************************************************************************
  FLOW PROCESS FROM NODE    203.15 TO NODE    204.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  4
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   15.77
  RAINFALL INTENSITY(INCH/HR) =   3.77
  TOTAL STREAM AREA(ACRES) =     8.75
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.51

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3152.00
  DOWNSTREAM ELEVATION(FEET) =   3148.00
  ELEVATION DIFFERENCE(FEET) =      4.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.505
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.611
  SUBAREA RUNOFF(CFS) =      0.16
  TOTAL AREA(ACRES) =      0.08   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3148.00  DOWNSTREAM(FEET) =   3110.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1077.00   CHANNEL SLOPE =  0.0353
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.16
  FLOW VELOCITY(FEET/SEC) =   2.82 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
  TRAVEL TIME(MIN.) =   6.37   Tc(MIN.) =   14.88
  LONGEST FLOWPATH FROM NODE    301.00 TO NODE    303.00 =    1177.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.912
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2608
  SUBAREA AREA(ACRES) =    8.85   SUBAREA RUNOFF(CFS) =    9.00
  TOTAL AREA(ACRES) =        8.9   TOTAL RUNOFF(CFS) =       9.11
  TC(MIN.) =   14.88

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    303.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  4
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.88
  RAINFALL INTENSITY(INCH/HR) =   3.91
  TOTAL STREAM AREA(ACRES) =     8.93
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.11

****************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    402.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3601.00
  DOWNSTREAM ELEVATION(FEET) =   3573.00
  ELEVATION DIFFERENCE(FEET) =     28.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.833
  SUBAREA RUNOFF(CFS) =      0.88
  TOTAL AREA(ACRES) =      0.37   TOTAL RUNOFF(CFS) =      0.88

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    403.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3573.00  DOWNSTREAM(FEET) =   3326.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2191.00   CHANNEL SLOPE =  0.1127
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.88
  FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   7.70   Tc(MIN.) =   13.97
  LONGEST FLOWPATH FROM NODE    401.00 TO NODE    403.00 =    2291.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    403.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.075
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3100
  S.C.S. CURVE NUMBER (AMC II) =   0
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3106
  SUBAREA AREA(ACRES) =   26.51   SUBAREA RUNOFF(CFS) =   33.49
  TOTAL AREA(ACRES) =       26.9   TOTAL RUNOFF(CFS) =      34.02
  TC(MIN.) =   13.97

****************************************************************************
  FLOW PROCESS FROM NODE    403.00 TO NODE    404.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3326.00  DOWNSTREAM(FEET) =   3174.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2995.00   CHANNEL SLOPE =  0.0508
  CHANNEL FLOW THRU SUBAREA(CFS) =      34.02
  FLOW VELOCITY(FEET/SEC) =   7.81 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.39   Tc(MIN.) =   20.35
  LONGEST FLOWPATH FROM NODE    401.00 TO NODE    404.00 =    5286.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    403.00 TO NODE    404.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.196
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2554
  SUBAREA AREA(ACRES) =   26.79   SUBAREA RUNOFF(CFS) =   17.12
  TOTAL AREA(ACRES) =       53.7   TOTAL RUNOFF(CFS) =      43.81
  TC(MIN.) =   20.35

****************************************************************************
  FLOW PROCESS FROM NODE    404.00 TO NODE    405.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3174.00  DOWNSTREAM(FEET) =   3150.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   510.00   CHANNEL SLOPE =  0.0471
  CHANNEL FLOW THRU SUBAREA(CFS) =      43.81
  FLOW VELOCITY(FEET/SEC) =   8.08 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.05   Tc(MIN.) =   21.40
  LONGEST FLOWPATH FROM NODE    401.00 TO NODE    405.00 =    5796.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    404.00 TO NODE    405.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.094
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2288
  SUBAREA AREA(ACRES) =   49.53   SUBAREA RUNOFF(CFS) =   30.65
  TOTAL AREA(ACRES) =      103.2   TOTAL RUNOFF(CFS) =      73.05
  TC(MIN.) =   21.40

****************************************************************************
  FLOW PROCESS FROM NODE    405.00 TO NODE    405.10 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3150.00  DOWNSTREAM(FEET) =   3146.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    57.00   CHANNEL SLOPE =  0.0702
  CHANNEL FLOW THRU SUBAREA(CFS) =      73.05
  FLOW VELOCITY(FEET/SEC) =  11.45 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.08   Tc(MIN.) =   21.49
  LONGEST FLOWPATH FROM NODE    401.00 TO NODE    405.10 =    5853.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    405.00 TO NODE    405.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.086
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2285
  SUBAREA AREA(ACRES) =    1.12   SUBAREA RUNOFF(CFS) =    0.69
  TOTAL AREA(ACRES) =      104.3   TOTAL RUNOFF(CFS) =      73.56
  TC(MIN.) =   21.49

****************************************************************************
  FLOW PROCESS FROM NODE    405.10 TO NODE    406.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3142.00  DOWNSTREAM(FEET) =   3108.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   988.00   CHANNEL SLOPE =  0.0344
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   4.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.884
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2400
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      80.24
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.93
  AVERAGE FLOW DEPTH(FEET) =   1.46   TRAVEL TIME(MIN.) =   2.38
  Tc(MIN.) =   23.87
  SUBAREA AREA(ACRES) =    19.30       SUBAREA RUNOFF(CFS) =   13.36
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.230
  TOTAL AREA(ACRES) =      123.6         PEAK FLOW RATE(CFS) =      82.11

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.48   FLOW VELOCITY(FEET/SEC.) =   6.95
  LONGEST FLOWPATH FROM NODE    401.00 TO NODE    406.00 =    6841.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    406.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  4
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  4 ARE:
  TIME OF CONCENTRATION(MIN.) =   23.87
  RAINFALL INTENSITY(INCH/HR) =   2.88
  TOTAL STREAM AREA(ACRES) =   123.62
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     82.11

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       13.10    27.60        2.626         23.74
      2       10.51    15.77        3.768          8.75
      3        9.11    14.88        3.912          8.93
      4       82.11    23.87        2.884        123.62

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  4 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       79.01    14.88       3.912
      2       82.67    15.77       3.768
      3      108.81    23.87       2.884
```

```
      4      101.31    27.60       2.626

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     108.81   Tc(MIN.) =   23.87
  TOTAL AREA(ACRES) =      165.0
  LONGEST FLOWPATH FROM NODE    401.00 TO NODE    406.00 =    6841.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    406.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    406.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    501.00 TO NODE    502.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   4323.00
  DOWNSTREAM ELEVATION(FEET) =   4277.00
  ELEVATION DIFFERENCE(FEET) =     46.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.833
  SUBAREA RUNOFF(CFS) =      0.33
  TOTAL AREA(ACRES) =      0.14   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
  FLOW PROCESS FROM NODE    502.00 TO NODE    503.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   4277.00  DOWNSTREAM(FEET) =   4070.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2417.00   CHANNEL SLOPE =  0.0856
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.33
  FLOW VELOCITY(FEET/SEC) =   4.39 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   9.18   Tc(MIN.) =   15.44
  LONGEST FLOWPATH FROM NODE    501.00 TO NODE    503.00 =    2517.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    502.00 TO NODE    503.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.819
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   32.32   SUBAREA RUNOFF(CFS) =   43.20
  TOTAL AREA(ACRES) =       32.5   TOTAL RUNOFF(CFS) =      43.39
  TC(MIN.) =   15.44

****************************************************************************
  FLOW PROCESS FROM NODE    503.00 TO NODE    504.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   4070.00  DOWNSTREAM(FEET) =   3715.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2173.00   CHANNEL SLOPE =  0.1634
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      43.39
  FLOW VELOCITY(FEET/SEC) =  11.75 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.08   Tc(MIN.) =   18.53
  LONGEST FLOWPATH FROM NODE    501.00 TO NODE    504.00 =    4690.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    503.00 TO NODE    504.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.396
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   61.50   SUBAREA RUNOFF(CFS) =   73.10
  TOTAL AREA(ACRES) =       94.0   TOTAL RUNOFF(CFS) =     111.69
  TC(MIN.) =   18.53

****************************************************************************
  FLOW PROCESS FROM NODE    504.00 TO NODE    505.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3715.00  DOWNSTREAM(FEET) =   3446.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2196.00   CHANNEL SLOPE =  0.1225
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =     111.69
  FLOW VELOCITY(FEET/SEC) =  15.52 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.36   Tc(MIN.) =   20.88
  LONGEST FLOWPATH FROM NODE    501.00 TO NODE    505.00 =    6886.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    504.00 TO NODE    505.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.144
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   72.77   SUBAREA RUNOFF(CFS) =   80.06
  TOTAL AREA(ACRES) =      166.7   TOTAL RUNOFF(CFS) =     183.44
  TC(MIN.) =   20.88

****************************************************************************
  FLOW PROCESS FROM NODE    505.00 TO NODE    506.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3446.00  DOWNSTREAM(FEET) =   3255.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2839.00   CHANNEL SLOPE =  0.0673
  CHANNEL FLOW THRU SUBAREA(CFS) =     183.44
  FLOW VELOCITY(FEET/SEC) =  14.81 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.19   Tc(MIN.) =   24.08
  LONGEST FLOWPATH FROM NODE    501.00 TO NODE    506.00 =    9725.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    505.00 TO NODE    506.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.868
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2600
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3345
  SUBAREA AREA(ACRES) =   34.62   SUBAREA RUNOFF(CFS) =   25.81
  TOTAL AREA(ACRES) =      201.3   TOTAL RUNOFF(CFS) =     193.16
  TC(MIN.) =   24.08

****************************************************************************
  FLOW PROCESS FROM NODE    506.00 TO NODE    507.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3255.00  DOWNSTREAM(FEET) =   3149.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2577.00   CHANNEL SLOPE =  0.0411
  CHANNEL FLOW THRU SUBAREA(CFS) =     193.16
  FLOW VELOCITY(FEET/SEC) =  11.77 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.65   Tc(MIN.) =   27.73
  LONGEST FLOWPATH FROM NODE    501.00 TO NODE    507.00 =   12302.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    506.00 TO NODE    507.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.618
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3174
  SUBAREA AREA(ACRES) =   29.29   SUBAREA RUNOFF(CFS) =   15.34
  TOTAL AREA(ACRES) =      230.6   TOTAL RUNOFF(CFS) =     193.16
  TC(MIN.) =   27.73
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    507.00 TO NODE    507.10 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3149.00  DOWNSTREAM(FEET) =   3148.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    42.00   CHANNEL SLOPE =  0.0238
  CHANNEL FLOW THRU SUBAREA(CFS) =     193.16
  FLOW VELOCITY(FEET/SEC) =   8.95 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.08   Tc(MIN.) =   27.81
  LONGEST FLOWPATH FROM NODE    501.00 TO NODE    507.10 =   12344.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    507.00 TO NODE    507.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.613
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2400
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3173
  SUBAREA AREA(ACRES) =    0.43   SUBAREA RUNOFF(CFS) =    0.27
  TOTAL AREA(ACRES) =      231.1   TOTAL RUNOFF(CFS) =     193.16
  TC(MIN.) =   27.81
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    501.00 TO NODE    507.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   27.81
  RAINFALL INTENSITY(INCH/HR) =   2.61
```

```
  TOTAL STREAM AREA(ACRES) =   231.07
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    193.16

****************************************************************************
  FLOW PROCESS FROM NODE    601.00 TO NODE    602.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3518.00
  DOWNSTREAM ELEVATION(FEET) =   3502.00
  ELEVATION DIFFERENCE(FEET) =     16.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.833
  SUBAREA RUNOFF(CFS) =      0.55
  TOTAL AREA(ACRES) =      0.23   TOTAL RUNOFF(CFS) =      0.55

****************************************************************************
  FLOW PROCESS FROM NODE    602.00 TO NODE    603.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3502.00  DOWNSTREAM(FEET) =   3226.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  3248.00   CHANNEL SLOPE =  0.0850
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.55
  FLOW VELOCITY(FEET/SEC) =   4.37 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  12.38   Tc(MIN.) =   18.65
  LONGEST FLOWPATH FROM NODE    601.00 TO NODE    603.00 =    3348.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    602.00 TO NODE    603.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.382
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2603
  SUBAREA AREA(ACRES) =   59.48   SUBAREA RUNOFF(CFS) =   52.30
  TOTAL AREA(ACRES) =       59.7   TOTAL RUNOFF(CFS) =      52.57
  TC(MIN.) =   18.65

****************************************************************************
  FLOW PROCESS FROM NODE    603.00 TO NODE    604.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3226.00  DOWNSTREAM(FEET) =   3151.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2071.00   CHANNEL SLOPE =  0.0362
  CHANNEL FLOW THRU SUBAREA(CFS) =      52.57
  FLOW VELOCITY(FEET/SEC) =   7.47 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.62   Tc(MIN.) =   23.27
  LONGEST FLOWPATH FROM NODE    601.00 TO NODE    604.00 =    5419.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    603.00 TO NODE    604.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.932
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2463
  SUBAREA AREA(ACRES) =   18.04   SUBAREA RUNOFF(CFS) =   10.58
  TOTAL AREA(ACRES) =       77.8   TOTAL RUNOFF(CFS) =      56.16
  TC(MIN.) =   23.27

****************************************************************************
  FLOW PROCESS FROM NODE    604.00 TO NODE    604.10 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3151.00  DOWNSTREAM(FEET) =   3150.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    35.00   CHANNEL SLOPE =  0.0286
  CHANNEL FLOW THRU SUBAREA(CFS) =      56.16
  FLOW VELOCITY(FEET/SEC) =   6.77 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.09   Tc(MIN.) =   23.35
  LONGEST FLOWPATH FROM NODE    601.00 TO NODE    604.10 =    5454.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    604.00 TO NODE    604.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.925
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2464
  SUBAREA AREA(ACRES) =    0.19   SUBAREA RUNOFF(CFS) =    0.14
  TOTAL AREA(ACRES) =       77.9   TOTAL RUNOFF(CFS) =      56.16
  TC(MIN.) =   23.35

****************************************************************************
  FLOW PROCESS FROM NODE    601.00 TO NODE    604.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   23.35
  RAINFALL INTENSITY(INCH/HR) =   2.93
  TOTAL STREAM AREA(ACRES) =    77.94
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     56.16

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      193.16    27.81        2.613        231.07
      2       56.16    23.35        2.925         77.94

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      218.38    23.35       2.925
      2      243.34    27.81       2.613

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     243.34   Tc(MIN.) =   27.81
  TOTAL AREA(ACRES) =      309.0
  LONGEST FLOWPATH FROM NODE    501.00 TO NODE    604.10 =   12344.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    507.10 TO NODE    508.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   3144.00  DOWNSTREAM(FEET) =   3106.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1309.00   CHANNEL SLOPE =  0.0290
  CHANNEL BASE(FEET) =   14.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =   4.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.460
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2500
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     246.86
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.98
  AVERAGE FLOW DEPTH(FEET) =   1.77   TRAVEL TIME(MIN.) =   2.73
  Tc(MIN.) =   30.54
  SUBAREA AREA(ACRES) =    11.43       SUBAREA RUNOFF(CFS) =    7.03
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.298
  TOTAL AREA(ACRES) =      320.4         PEAK FLOW RATE(CFS) =     243.34

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.75   FLOW VELOCITY(FEET/SEC.) =   7.94
  LONGEST FLOWPATH FROM NODE    501.00 TO NODE    508.00 =   13653.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    604.10 TO NODE    508.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.460
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2968
  SUBAREA AREA(ACRES) =   10.41   SUBAREA RUNOFF(CFS) =    6.91
  TOTAL AREA(ACRES) =      330.8   TOTAL RUNOFF(CFS) =     243.34
  TC(MIN.) =   30.54
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    501.00 TO NODE    508.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   30.54
  RAINFALL INTENSITY(INCH/HR) =   2.46
  TOTAL STREAM AREA(ACRES) =   330.85
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    243.34
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      330.8  TC(MIN.) =     30.54
  PEAK FLOW RATE(CFS)   =     243.34
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

           RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                        2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2013 Advanced Engineering Software (aes)
             Ver. 20.0 Release Date: 06/01/2013  License ID 1419

           Analysis prepared by: Dudek (Proposed Condition Results)



--------------------------------------------------------------------------
  FILE NAME: J100P78.DAT
  TIME/DATE OF STUDY: 12:26 01/22/2015
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.000
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

**************************************************************************
  FLOW PROCESS FROM NODE    701.00 TO NODE    702.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3187.00
  DOWNSTREAM ELEVATION(FEET) =   3183.00
  ELEVATION DIFFERENCE(FEET) =      4.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.206
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.989
  SUBAREA RUNOFF(CFS) =      0.14
  TOTAL AREA(ACRES) =      0.14   TOTAL RUNOFF(CFS) =      0.14

**************************************************************************
  FLOW PROCESS FROM NODE    702.00 TO NODE    703.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3183.00  DOWNSTREAM(FEET) =   3121.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1719.00   CHANNEL SLOPE =  0.0361
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.14
```

```
  FLOW VELOCITY(FEET/SEC) =   2.85 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  10.06   Tc(MIN.) =   20.26
  LONGEST FLOWPATH FROM NODE    701.00 TO NODE    703.00 =    1819.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    702.00 TO NODE    703.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.205
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .2300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2296
  SUBAREA AREA(ACRES) =   11.25   SUBAREA RUNOFF(CFS) =    8.29
  TOTAL AREA(ACRES) =       11.4   TOTAL RUNOFF(CFS) =       8.38
  TC(MIN.) =   20.26

****************************************************************************
  FLOW PROCESS FROM NODE    703.00 TO NODE    704.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3121.00  DOWNSTREAM(FEET) =   3100.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1155.00   CHANNEL SLOPE =  0.0182
  CHANNEL FLOW THRU SUBAREA(CFS) =       8.38
  FLOW VELOCITY(FEET/SEC) =   3.22 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   5.97   Tc(MIN.) =   26.23
  LONGEST FLOWPATH FROM NODE    701.00 TO NODE    704.00 =    2974.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    703.00 TO NODE    704.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.713
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.2733
  SUBAREA AREA(ACRES) =   18.63   SUBAREA RUNOFF(CFS) =   15.17
  TOTAL AREA(ACRES) =       30.0   TOTAL RUNOFF(CFS) =      22.26
  TC(MIN.) =   26.23

****************************************************************************
  FLOW PROCESS FROM NODE    701.00 TO NODE    704.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   26.23
  RAINFALL INTENSITY(INCH/HR) =   2.71
  TOTAL STREAM AREA(ACRES) =    30.02
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     22.26

****************************************************************************
  FLOW PROCESS FROM NODE    801.00 TO NODE    802.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .4400
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3160.00
  DOWNSTREAM ELEVATION(FEET) =   3152.00
  ELEVATION DIFFERENCE(FEET) =      8.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.940
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.073
```

```
  SUBAREA RUNOFF(CFS) =      1.31
  TOTAL AREA(ACRES) =      0.42   TOTAL RUNOFF(CFS) =      1.31

****************************************************************************
  FLOW PROCESS FROM NODE    802.00 TO NODE    803.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3152.00  DOWNSTREAM(FEET) =   3120.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   526.00   CHANNEL SLOPE =  0.0608
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.31
  FLOW VELOCITY(FEET/SEC) =   3.89 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.25   Tc(MIN.) =    8.19
  LONGEST FLOWPATH FROM NODE    801.00 TO NODE    803.00 =     626.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    802.00 TO NODE    803.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.749
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3702
  SUBAREA AREA(ACRES) =    2.88   SUBAREA RUNOFF(CFS) =    5.96
  TOTAL AREA(ACRES) =        3.3   TOTAL RUNOFF(CFS) =       7.02
  TC(MIN.) =    8.19

****************************************************************************
  FLOW PROCESS FROM NODE    803.00 TO NODE    804.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3120.00  DOWNSTREAM(FEET) =   3102.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   710.00   CHANNEL SLOPE =  0.0254
  CHANNEL FLOW THRU SUBAREA(CFS) =       7.02
  FLOW VELOCITY(FEET/SEC) =   3.64 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.25   Tc(MIN.) =   11.44
  LONGEST FLOWPATH FROM NODE    801.00 TO NODE    804.00 =    1336.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    803.00 TO NODE    804.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.635
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3630
  SUBAREA AREA(ACRES) =    7.93   SUBAREA RUNOFF(CFS) =   13.23
  TOTAL AREA(ACRES) =       11.2   TOTAL RUNOFF(CFS) =      18.89
  TC(MIN.) =   11.44

****************************************************************************
  FLOW PROCESS FROM NODE    801.00 TO NODE    804.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.44
  RAINFALL INTENSITY(INCH/HR) =   4.63
  TOTAL STREAM AREA(ACRES) =    11.23
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     18.89

  ** CONFLUENCE DATA **
```

```
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       22.26    26.23        2.713         30.02
      2       18.89    11.44        4.635         11.23

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       28.60    11.44       4.635
      2       33.32    26.23       2.713

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      33.32   Tc(MIN.) =   26.23
  TOTAL AREA(ACRES) =       41.2
  LONGEST FLOWPATH FROM NODE    701.00 TO NODE    804.00 =    2974.00 FEET.
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       41.2  TC(MIN.) =     26.23
  PEAK FLOW RATE(CFS)   =      33.32
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

           RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                        2003,1985,1981 HYDROLOGY MANUAL
         (c) Copyright 1982-2013 Advanced Engineering Software (aes)
             Ver. 20.0 Release Date: 06/01/2013  License ID 1419

           Analysis prepared by: Dudek (Proposed Condition Results)



--------------------------------------------------------------------------
  FILE NAME: J100P910.DAT
  TIME/DATE OF STUDY: 12:27 01/22/2015
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.000
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

**************************************************************************
  FLOW PROCESS FROM NODE    901.00 TO NODE    902.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3162.00
  DOWNSTREAM ELEVATION(FEET) =   3158.00
  ELEVATION DIFFERENCE(FEET) =      4.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.505
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.611
  SUBAREA RUNOFF(CFS) =      0.69
  TOTAL AREA(ACRES) =      0.35   TOTAL RUNOFF(CFS) =      0.69

**************************************************************************
  FLOW PROCESS FROM NODE    902.00 TO NODE    903.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3158.00  DOWNSTREAM(FEET) =   3126.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   563.00   CHANNEL SLOPE =  0.0568
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.69
```

```
  FLOW VELOCITY(FEET/SEC) =   3.58 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.62   Tc(MIN.) =   11.13
  LONGEST FLOWPATH FROM NODE    901.00 TO NODE    903.00 =     663.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    902.00 TO NODE    903.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.718
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    3.32   SUBAREA RUNOFF(CFS) =    5.48
  TOTAL AREA(ACRES) =        3.7   TOTAL RUNOFF(CFS) =       6.06
  TC(MIN.) =   11.13

****************************************************************************
  FLOW PROCESS FROM NODE    903.00 TO NODE    904.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3126.00  DOWNSTREAM(FEET) =   3098.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   819.00   CHANNEL SLOPE =  0.0342
  CHANNEL FLOW THRU SUBAREA(CFS) =       6.06
  FLOW VELOCITY(FEET/SEC) =   4.08 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.34   Tc(MIN.) =   14.47
  LONGEST FLOWPATH FROM NODE    901.00 TO NODE    904.00 =    1482.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    903.00 TO NODE    904.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.983
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3569
  SUBAREA AREA(ACRES) =    8.17   SUBAREA RUNOFF(CFS) =   11.71
  TOTAL AREA(ACRES) =       11.8   TOTAL RUNOFF(CFS) =      16.83
  TC(MIN.) =   14.47

****************************************************************************
  FLOW PROCESS FROM NODE    901.00 TO NODE    904.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.47
  RAINFALL INTENSITY(INCH/HR) =   3.98
  TOTAL STREAM AREA(ACRES) =    11.84
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     16.83

****************************************************************************
  FLOW PROCESS FROM NODE   1001.00 TO NODE   1002.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3140.00
  DOWNSTREAM ELEVATION(FEET) =   3137.00
  ELEVATION DIFFERENCE(FEET) =      3.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.361
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.275
```

```
  SUBAREA RUNOFF(CFS) =      0.20
  TOTAL AREA(ACRES) =      0.11   TOTAL RUNOFF(CFS) =      0.20

****************************************************************************
  FLOW PROCESS FROM NODE   1002.00 TO NODE   1003.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3137.00  DOWNSTREAM(FEET) =   3114.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   476.00   CHANNEL SLOPE =  0.0483
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.20
  FLOW VELOCITY(FEET/SEC) =   3.30 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.41   Tc(MIN.) =   11.77
  LONGEST FLOWPATH FROM NODE   1001.00 TO NODE   1003.00 =     576.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1002.00 TO NODE   1003.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.551
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    1.43   SUBAREA RUNOFF(CFS) =    2.28
  TOTAL AREA(ACRES) =        1.5   TOTAL RUNOFF(CFS) =       2.45
  TC(MIN.) =   11.77

****************************************************************************
  FLOW PROCESS FROM NODE   1003.00 TO NODE   1004.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3114.00  DOWNSTREAM(FEET) =   3100.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   268.00   CHANNEL SLOPE =  0.0522
  CHANNEL FLOW THRU SUBAREA(CFS) =       2.45
  FLOW VELOCITY(FEET/SEC) =   4.11 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.09   Tc(MIN.) =   12.85
  LONGEST FLOWPATH FROM NODE   1001.00 TO NODE   1004.00 =     844.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1003.00 TO NODE   1004.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.299
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    1.27   SUBAREA RUNOFF(CFS) =    1.91
  TOTAL AREA(ACRES) =        2.8   TOTAL RUNOFF(CFS) =       4.23
  TC(MIN.) =   12.85

****************************************************************************
  FLOW PROCESS FROM NODE   1001.00 TO NODE   1004.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   12.85
  RAINFALL INTENSITY(INCH/HR) =   4.30
  TOTAL STREAM AREA(ACRES) =     2.81
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.23
```

```
  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       16.83    14.47        3.983         11.84
      2        4.23    12.85        4.299          2.81

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       19.18    12.85       4.299
      2       20.75    14.47       3.983

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      20.75   Tc(MIN.) =   14.47
  TOTAL AREA(ACRES) =       14.6
  LONGEST FLOWPATH FROM NODE    901.00 TO NODE   1004.00 =    1482.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    901.00 TO NODE   1004.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.47
  RAINFALL INTENSITY(INCH/HR) =   3.98
  TOTAL STREAM AREA(ACRES) =    14.65
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     20.75

****************************************************************************
  FLOW PROCESS FROM NODE    801.10 TO NODE    802.10 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   3160.00
  DOWNSTREAM ELEVATION(FEET) =   3154.00
  ELEVATION DIFFERENCE(FEET) =      6.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.430
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.122
  SUBAREA RUNOFF(CFS) =      1.24
  TOTAL AREA(ACRES) =      0.58   TOTAL RUNOFF(CFS) =      1.24

****************************************************************************
  FLOW PROCESS FROM NODE    802.10 TO NODE    803.10 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   3154.00  DOWNSTREAM(FEET) =   3110.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   417.00   CHANNEL SLOPE =  0.1055
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.24
  FLOW VELOCITY(FEET/SEC) =   4.94 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.41   Tc(MIN.) =    8.84
  LONGEST FLOWPATH FROM NODE    801.10 TO NODE    803.10 =     517.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    802.10 TO NODE    803.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.475
  *USER SPECIFIED(SUBAREA):
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    2.94   SUBAREA RUNOFF(CFS) =    5.63
  TOTAL AREA(ACRES) =        3.5   TOTAL RUNOFF(CFS) =       6.75
  TC(MIN.) =    8.84

****************************************************************************
  FLOW PROCESS FROM NODE    801.10 TO NODE    803.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.84
  RAINFALL INTENSITY(INCH/HR) =   5.47
  TOTAL STREAM AREA(ACRES) =     3.52
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.75

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       20.75    14.47        3.983         14.65
      2        6.75     8.84        5.475          3.52

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       21.84     8.84       5.475
      2       25.65    14.47       3.983

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      25.65   Tc(MIN.) =   14.47
  TOTAL AREA(ACRES) =       18.2
  LONGEST FLOWPATH FROM NODE    901.00 TO NODE    803.10 =    1482.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       18.2  TC(MIN.) =     14.47
  PEAK FLOW RATE(CFS)   =      25.65
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

APPENDIX B

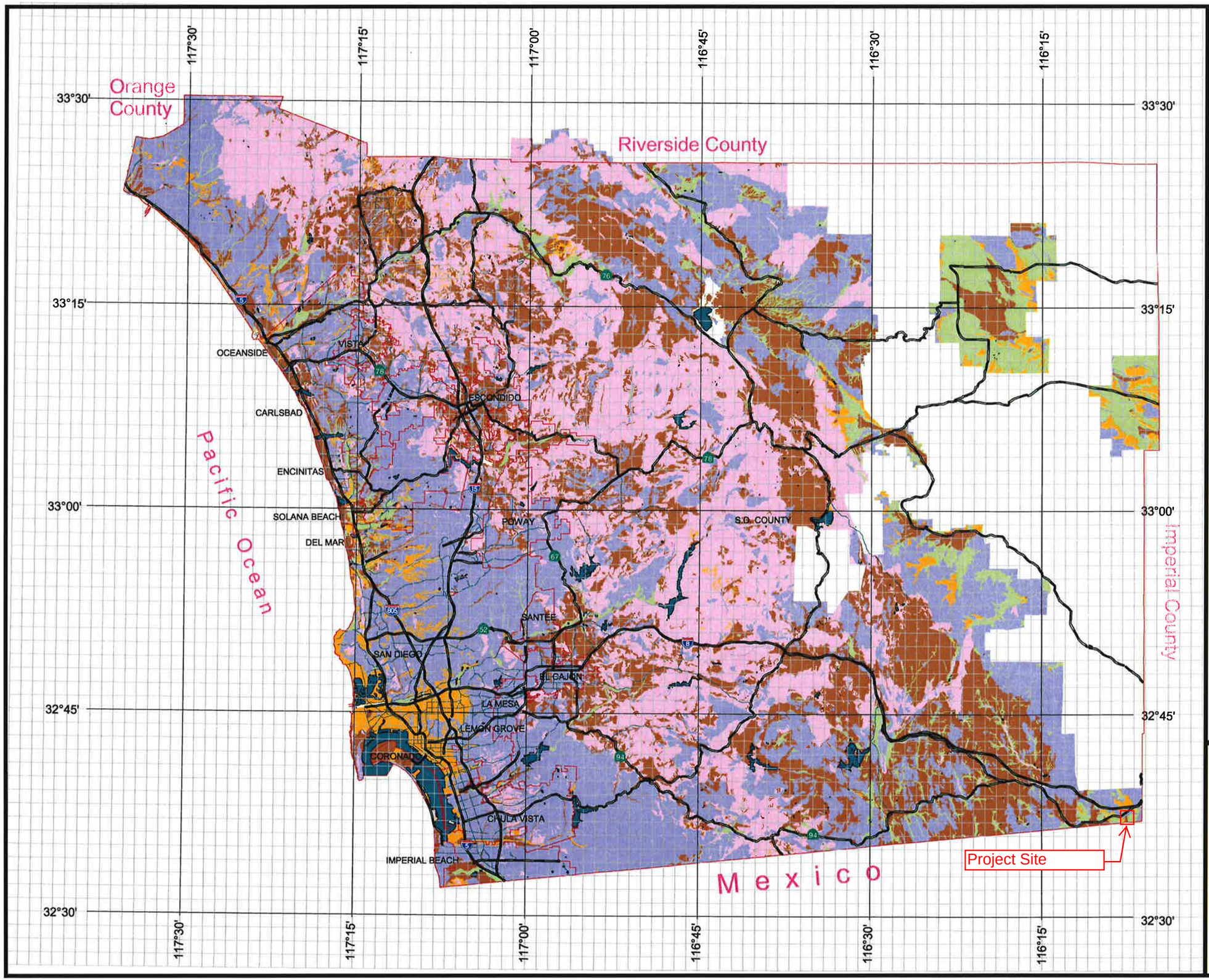
Preliminary Grading Plans (See Attached CD)

APPENDIX C

San Diego County Hydrology Manual Parameters

County of San Diego Hydrology Manual

Soil Hydrologic Groups



Legend

Soil Groups

- Group A
- Group B
- Group C
- Group D
- Undetermined
- Data Unavailable

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County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

Orange County

Riverside County

Imperial County

Pacific Ocean

Mexico

OCEANSIDE
VISTA
CARLSBAD
ESCONDIDO
ENCINITAS
SOLANA BEACH
DEL MAR
POWAY
S.D. COUNTY
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
CHULA VISTA
IMPERIAL BEACH
SD

Project Site
P6 = 3.0 inches

117°30' 117°15' 117°00' 116°45' 116°30' 116°15'
33°30' 33°15' 33°00' 32°45' 32°30'

DPW GIS
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County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

Isopluvial (inches)

Orange County

Riverside County

Imperial County

Pacific Ocean

Mexico

OCEANSIDE
VISTA
CARLSBAD
ESCONDIDO
ENCINITAS
SOLANA BEACH
DEL MAR
POWAY
S.D. COUNTY
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
SD
CHULA VISTA
IMPERIAL BEACH

Project Site
P24 = 5.0 inches

117°30' 117°15' 117°00' 116°45' 116°30' 116°15'
33°30' 33°15' 33°00' 32°45' 32°30'

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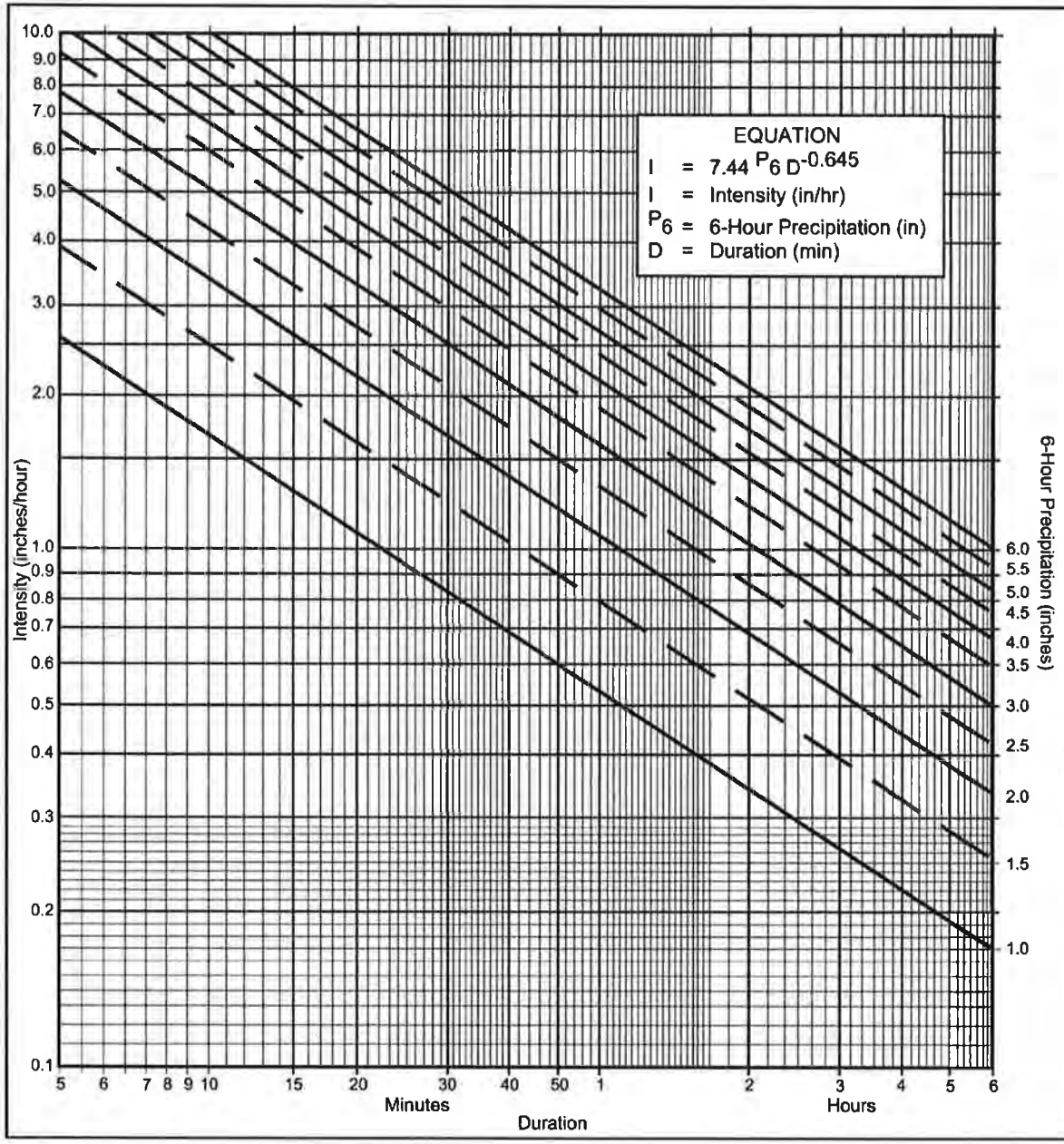
3 0 3 Miles



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 100 year

(b) P_6 = 3.0 in., P_{24} = 5.0, $\frac{P_6}{P_{24}}$ = 60 %(2)

(c) Adjusted $P_6^{(2)}$ = _____ in.

(d) t_x = _____ min.

(e) I = _____ in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6 / Duration	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
	I	I	I	I	I	I	I	I	I	I	I
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE 3-1

Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

Land Use		Runoff Coefficient "C"				
			Soil Type			
NRCS Elements	County Elements	% IMPER.	A	B	C	D
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35
Low Density Residential (LDR)	Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Low Density Residential (LDR)	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low Density Residential (LDR)	Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Medium Density Residential (MDR)	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential (MDR)	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential (MDR)	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential (HDR)	Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
High Density Residential (HDR)	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial (N. Com)	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
Commercial/Industrial (G. Com)	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial (O.P. Com)	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (Limited I.)	Limited Industrial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (General I.)	General Industrial	95	0.87	0.87	0.87	0.87

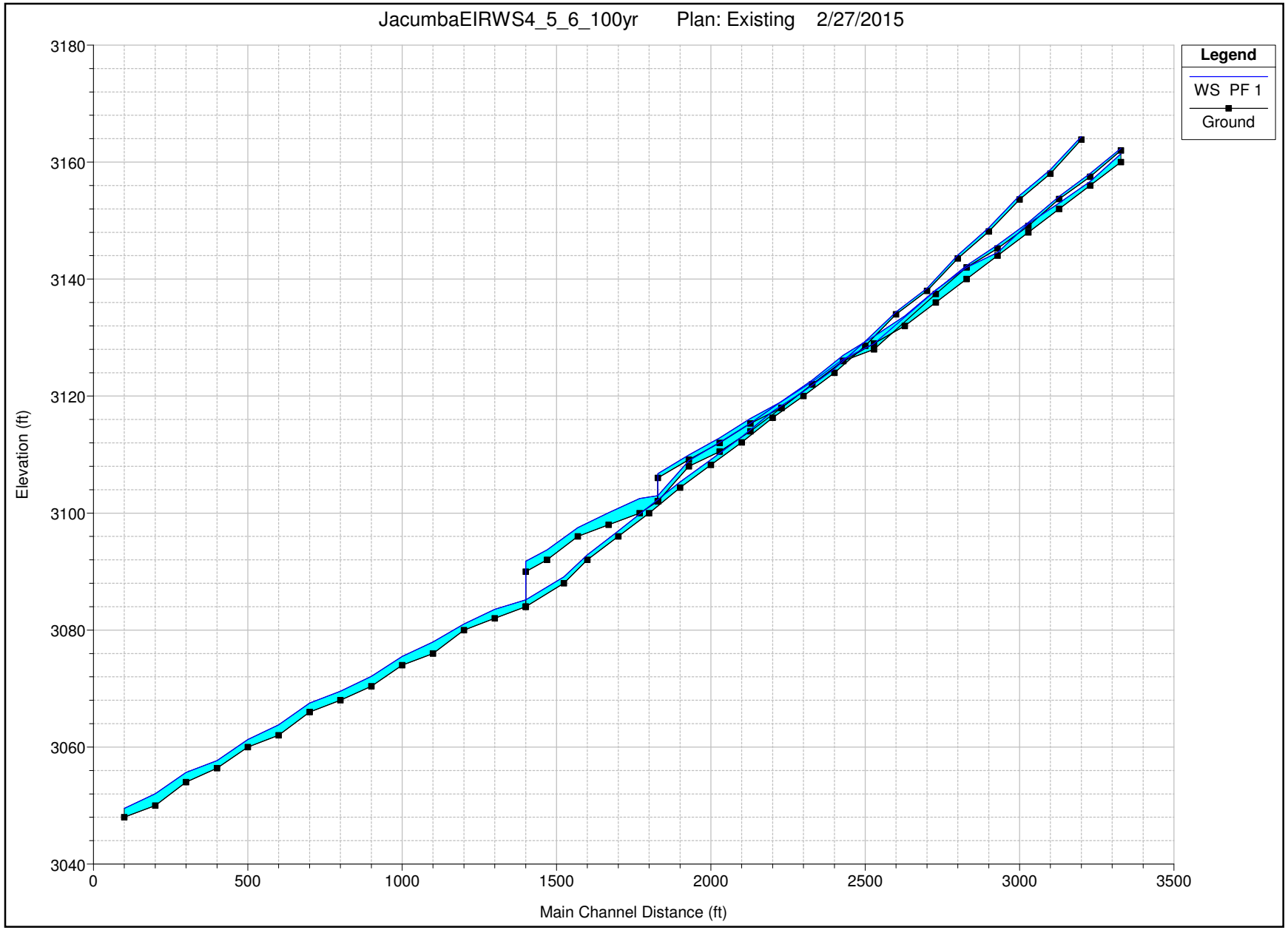
*The values associated with 0% impervious may be used for direct calculation of the runoff coefficient as described in Section 3.1.2 (representing the pervious runoff coefficient, Cp, for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area will remain natural forever (e.g., the area is located in Cleveland National Forest).
DU/A = dwelling units per acre
NRCS = National Resources Conservation Service

APPENDIX D

Figures 5 and 6 (See Attached CD)

APPENDIX E

HEC-RAS Results

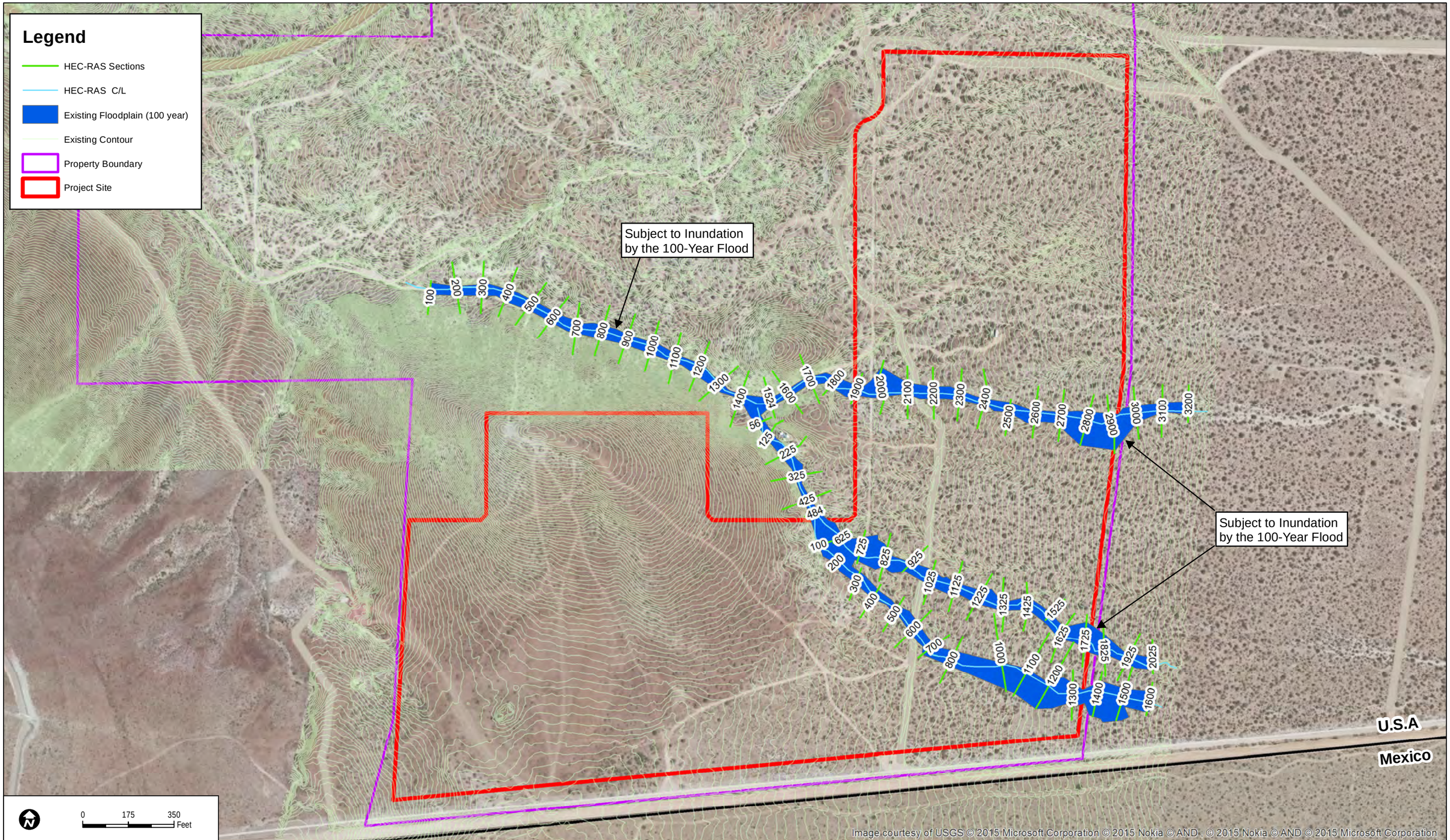

JacumbaEIRWS4_5_6_100yr Plan: Existing 2/27/2015
Legend
WS PF 1
Ground
Elevation (ft)
3180
3160
3140
3120
3100
3080
3060
3040
0
500
1000
1500
2000
2500
3000
3500
Main Channel Distance (ft)

HEC-RAS Plan: ExistingCond Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
4	3200	PF 1	74.00	3163.85	3164.38	3164.38	3164.56	0.042060	3.91	23.84	67.19	1.14
4	3100	PF 1	74.00	3158.02	3158.71	3158.87	3159.24	0.068255	5.82	12.71	27.29	1.50
4	3000	PF 1	74.00	3153.60	3154.32	3154.32	3154.49	0.033672	3.36	22.01	63.52	1.01
4	2900	PF 1	83.00	3148.15	3148.79	3148.93	3149.26	0.084457	5.53	15.02	40.98	1.61
4	2800	PF 1	83.00	3143.54	3144.11	3144.15	3144.37	0.044017	4.13	20.20	129.81	1.17
4	2700	PF 1	83.00	3138.00	3138.42	3138.53	3138.79	0.072873	4.83	17.18	51.33	1.47
4	2600	PF 1	83.00	3134.00	3134.40	3134.40	3134.58	0.032643	3.43	24.17	66.00	1.00
4	2500	PF 1	83.00	3128.61	3129.36	3129.51	3129.88	0.072413	5.79	14.35	32.54	1.54
4	2400	PF 1	83.00	3124.00	3124.69	3124.72	3124.99	0.034366	4.44	18.68	36.00	1.09
4	2300	PF 1	83.00	3120.00	3120.79	3120.86	3121.18	0.042459	5.03	16.51	30.96	1.21
4	2200	PF 1	83.00	3116.29	3117.37	3117.37	3117.68	0.028988	4.46	18.59	31.25	1.02
4	2100	PF 1	83.00	3112.07	3113.03	3113.18	3113.51	0.064238	5.58	14.88	32.54	1.45
4	2000	PF 1	83.00	3108.24	3109.11	3109.10	3109.26	0.031839	3.11	26.71	83.14	0.97
4	1900	PF 1	83.00	3104.34	3105.33	3105.37	3105.64	0.037236	4.46	18.61	37.87	1.12
4	1800	PF 1	83.00	3100.00	3101.13	3101.26	3101.75	0.040078	6.36	13.04	16.17	1.25
4	1700	PF 1	83.00	3096.00	3096.96	3097.11	3097.60	0.043014	6.42	12.92	16.68	1.29
4	1600	PF 1	83.00	3092.00	3092.86	3092.97	3093.38	0.040809	5.79	14.34	20.99	1.23
4	1524	PF 1	83.00	3088.00	3089.08	3089.31	3089.87	0.051820	7.11	11.68	14.84	1.41
5	2025	PF 1	193.00	3160.00	3161.42	3161.42	3161.80	0.025930	4.94	39.08	52.00	1.00
5	1925	PF 1	193.00	3156.00	3156.70	3156.95	3157.54	0.079782	7.38	26.14	44.20	1.69
5	1825	PF 1	193.00	3152.00	3153.01	3153.01	3153.24	0.031490	3.85	50.07	111.91	1.02
5	1725	PF 1	193.00	3148.00	3149.49	3149.59	3150.11	0.030768	6.30	30.77	67.55	1.14
5	1625	PF 1	193.00	3144.00	3144.53	3144.74	3145.26	0.086941	6.85	28.19	56.96	1.71
5	1525	PF 1	193.00	3140.00	3141.98	3141.98	3142.60	0.022230	6.30	30.63	24.62	1.00
5	1425	PF 1	193.00	3136.00	3138.16	3138.36	3138.85	0.076130	6.68	28.90	53.96	1.61
5	1325	PF 1	193.00	3132.00	3133.69	3133.78	3134.39	0.029294	6.69	28.88	27.12	1.13
5	1225	PF 1	193.00	3128.99	3130.22	3130.37	3130.81	0.043850	6.15	31.39	44.55	1.29
5	1125	PF 1	193.00	3126.00	3126.96	3126.99	3127.34	0.027227	4.92	40.23	139.99	1.02
5	1025	PF 1	193.00	3122.00	3122.74	3122.92	3123.35	0.062730	6.26	30.82	55.78	1.48
5	925	PF 1	193.00	3118.00	3119.07	3119.10	3119.53	0.025293	5.48	36.78	47.74	1.02
5	825	PF 1	193.00	3114.00	3115.36	3115.48	3115.83	0.059013	5.53	34.93	72.79	1.41
5	725	PF 1	193.00	3110.50	3112.08	3112.20	3112.55	0.020878	5.56	39.95	109.66	0.95
5	625	PF 1	193.00	3108.00	3108.98	3109.15	3109.67	0.041228	7.43	33.03	43.19	1.32
6	1600	PF 1	60.00	3162.00	3162.34	3162.34	3162.48	0.035654	3.02	19.86	70.21	1.00
6	1500	PF 1	60.00	3157.50	3158.07	3158.09	3158.20	0.052296	2.97	20.23	98.84	1.15
6	1400	PF 1	60.00	3153.69	3154.12	3154.12	3154.23	0.038349	2.64	22.70	103.68	1.00
6	1300	PF 1	60.00	3149.08	3149.67	3149.72	3149.92	0.048489	4.01	14.97	43.60	1.21
6	1200	PF 1	60.00	3145.22	3145.84	3145.84	3145.98	0.036443	2.92	20.52	77.49	1.00

HEC-RAS Plan: ExistingCond Profile: PF 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
6	1100	PF 1	60.00	3142.00	3142.32	3142.32	3142.42	0.034642	2.55	23.51	104.79	0.95
6	1000	PF 1	60.00	3137.47	3138.07	3138.08	3138.16	0.053627	2.48	24.19	156.16	1.11
6	800	PF 1	60.00	3128.00	3128.95	3128.88	3129.11	0.020176	3.20	18.74	39.52	0.82
6	700	PF 1	60.00	3126.00	3126.34	3126.34	3126.48	0.035643	2.94	20.39	75.00	0.99
6	600	PF 1	60.00	3122.00	3122.45	3122.48	3122.71	0.039652	4.04	14.84	36.70	1.12
6	500	PF 1	60.00	3118.00	3119.05	3119.02	3119.31	0.025759	4.08	14.74	26.71	0.95
6	400	PF 1	60.00	3115.32	3116.16	3116.16	3116.34	0.034029	3.45	17.39	48.65	1.02
6	300	PF 1	60.00	3112.00	3112.85	3112.89	3113.13	0.038476	4.27	14.04	31.23	1.12
6	200	PF 1	60.00	3109.15	3109.93	3109.93	3110.15	0.032836	3.78	15.88	37.63	1.02
6	100	PF 1	60.00	3106.00	3106.73	3106.73	3106.99	0.030338	4.13	14.54	28.44	1.02
5-2	484	PF 1	249.00	3102.00	3103.00	3103.36	3104.21	0.068623	8.86	28.11	32.13	1.67
5-2	425	PF 1	249.00	3100.00	3102.47	3102.47	3103.18	0.021913	6.76	36.85	26.47	1.01
5-2	325	PF 1	249.00	3098.00	3100.05	3100.11	3100.79	0.026150	6.92	35.98	28.88	1.08
5-2	225	PF 1	249.00	3096.00	3097.53	3097.57	3098.05	0.027452	5.76	43.25	47.51	1.06
5-2	125	PF 1	249.00	3092.00	3093.72	3093.90	3094.46	0.047933	6.90	36.09	45.89	1.37
5-2	56	PF 1	249.00	3090.00	3091.75	3091.75	3092.35	0.022579	6.25	39.81	33.25	1.01
4-2	1400	PF 1	320.00	3084.00	3085.18	3086.47	3091.76	0.379163	20.58	15.55	17.92	3.89
4-2	1300	PF 1	320.00	3082.00	3083.55	3083.55	3084.18	0.022401	6.38	50.13	40.43	1.01
4-2	1200	PF 1	320.00	3080.00	3081.04	3081.11	3081.64	0.028732	6.21	51.55	52.30	1.10
4-2	1100	PF 1	320.00	3076.00	3077.96	3078.09	3078.72	0.029650	6.98	45.83	39.94	1.15
4-2	1000	PF 1	320.00	3074.00	3075.50	3075.50	3076.08	0.022872	6.10	52.42	45.95	1.01
4-2	900	PF 1	320.00	3070.39	3072.08	3072.31	3073.01	0.042133	7.71	41.50	40.64	1.34
4-2	800	PF 1	320.00	3068.00	3069.55	3069.37	3069.95	0.014818	5.10	62.80	52.23	0.82
4-2	700	PF 1	320.00	3066.00	3067.52	3067.52	3068.13	0.022682	6.28	50.97	42.48	1.01
4-2	600	PF 1	320.00	3062.00	3063.81	3064.14	3064.97	0.045415	8.62	37.10	32.36	1.42
4-2	500	PF 1	320.00	3060.00	3061.28	3061.28	3061.83	0.023298	5.96	53.70	49.62	1.01
4-2	400	PF 1	320.00	3056.41	3057.70	3057.94	3058.54	0.048774	7.35	43.51	51.18	1.41
4-2	300	PF 1	320.00	3054.00	3055.67	3055.67	3056.32	0.022088	6.47	49.45	38.57	1.01
4-2	200	PF 1	320.00	3050.00	3052.04	3052.40	3053.24	0.043899	8.80	36.36	29.86	1.41
4-2	100	PF 1	320.00	3048.00	3049.52	3049.59	3050.20	0.025453	6.68	49.00	45.13	1.07



DUDEK

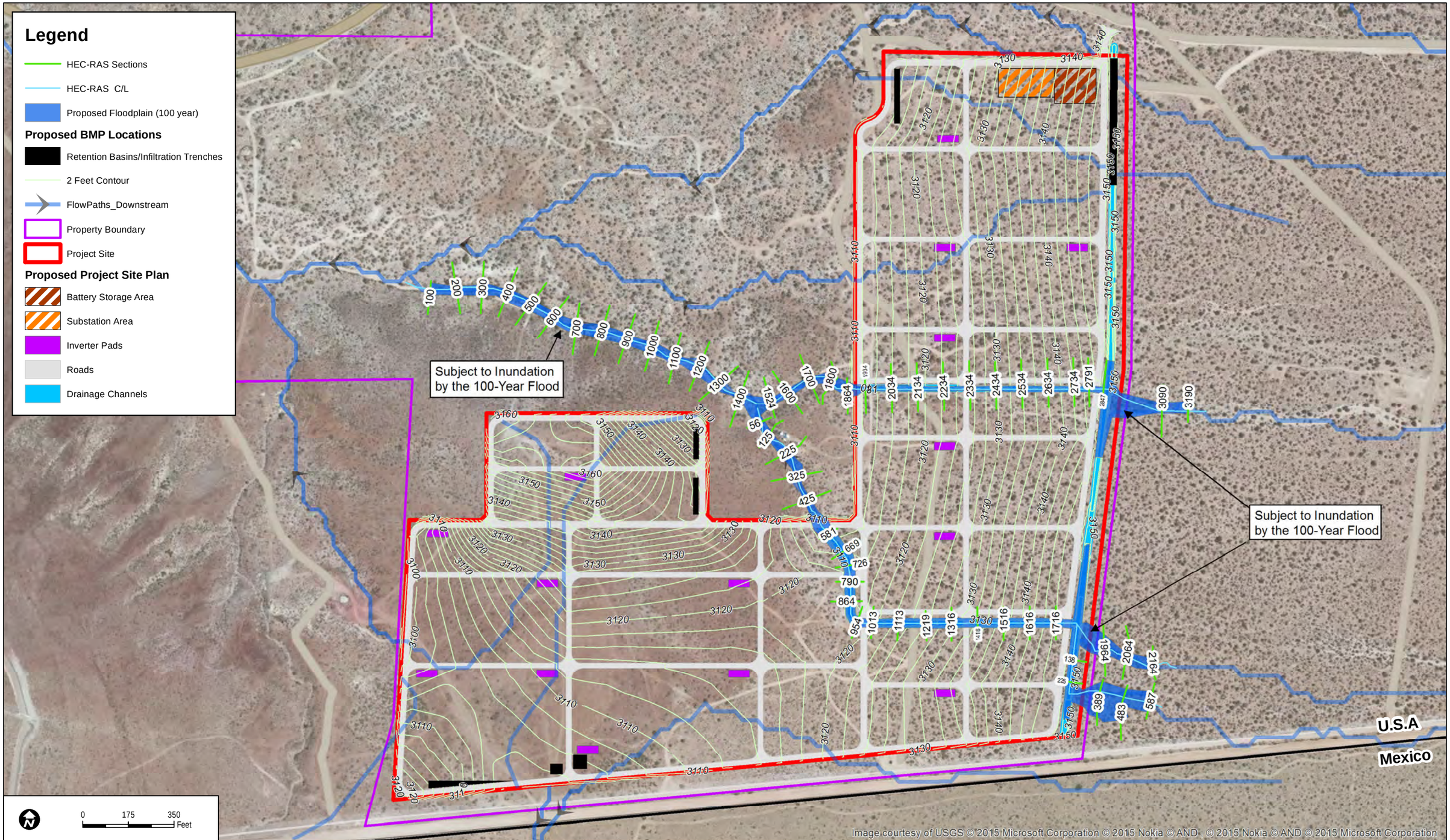
SOURCE: Bing Maps

FIGURE 8

Existing Condition Inundation Map

8477

Jacumba Solar Energy Project - Preliminary Hydrology and Drainage Study



DUDEK

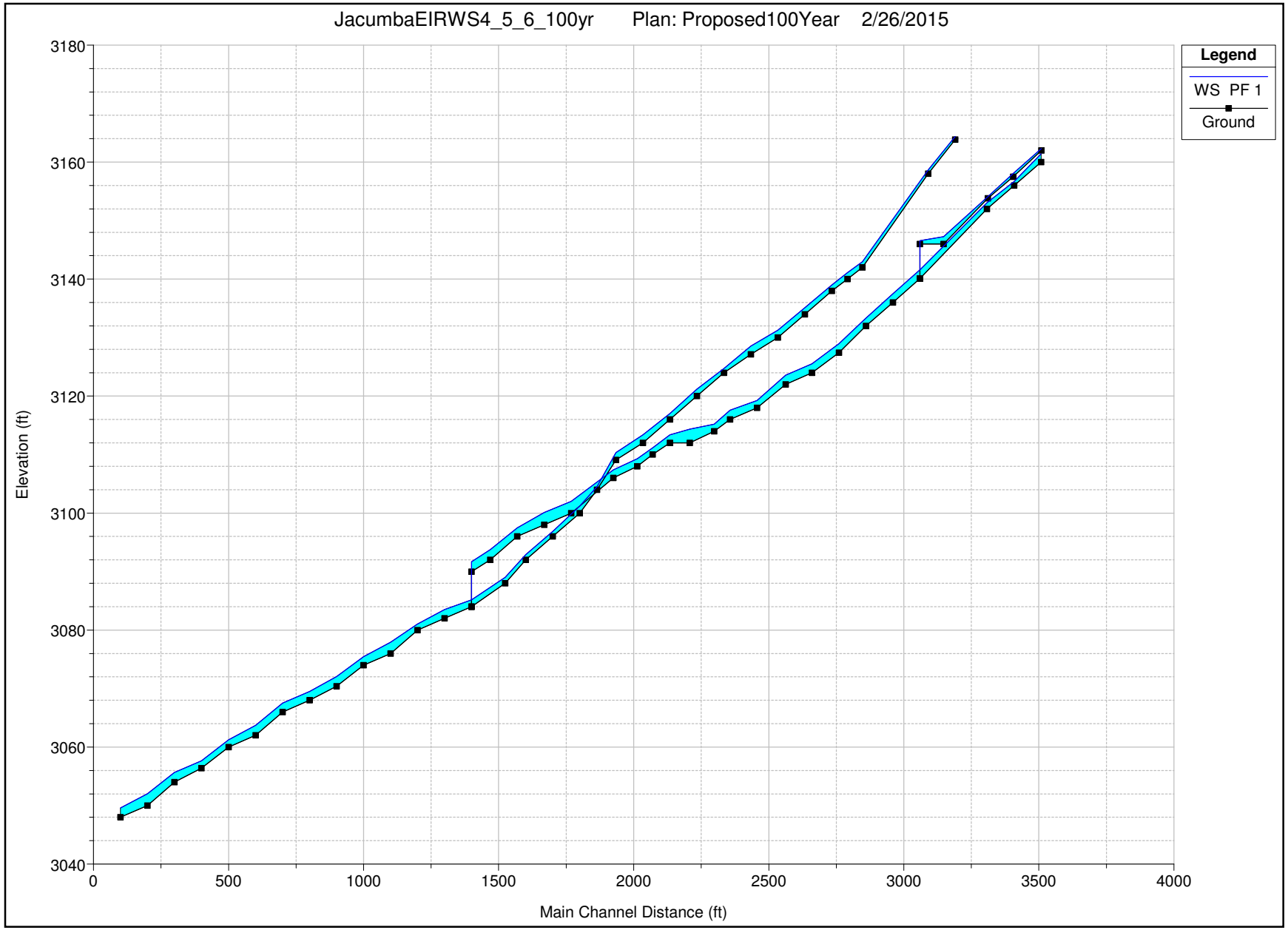
SOURCE: Bing Maps

FIGURE 9

Proposed Inundation Map

8477

Jacumba Solar Energy Project - Preliminary Hydrology and Drainage Study


JacumbaElRWS4_5_6_100yr Plan: Proposed100Year 2/26/2015
Legend
WS PF 1
Ground
Elevation (ft)
3180
3160
3140
3120
3100
3080
3060
3040
0
500
1000
1500
2000
2500
3000
3500
4000
Main Channel Distance (ft)

HEC-RAS Plan: PropCond. Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
4	3190 3200	PF 1	74.00	3163.85	3164.36	3164.36	3164.53	0.033222	3.29	22.50	66.46	1.00
4	3090 3100	PF 1	74.00	3158.02	3158.67	3158.87	3159.31	0.091247	6.46	11.46	26.21	1.72
4	2847	PF 1	83.00	3142.00	3142.95	3143.24	3143.92	0.047827	7.90	10.50	12.93	1.55
4	2791	PF 1	83.00	3140.00	3141.10	3141.24	3141.79	0.029053	6.68	12.42	13.48	1.23
4	2734	PF 1	83.00	3138.00	3139.00	3139.23	3139.85	0.039893	7.41	11.19	13.22	1.42
4	2634	PF 1	83.00	3134.00	3135.13	3135.36	3136.00	0.037114	7.49	11.07	12.10	1.38
4	2534	PF 1	83.00	3130.00	3131.25	3131.52	3132.21	0.038474	7.86	10.56	10.93	1.41
4	2434	PF 1	83.00	3127.13	3128.58	3128.64	3129.08	0.023927	5.72	14.52	17.48	1.11
4	2334	PF 1	83.00	3124.00	3124.70	3124.92	3125.39	0.063705	6.64	12.50	25.55	1.67
4	2234	PF 1	83.00	3120.00	3121.18	3121.25	3121.78	0.023011	6.18	13.43	13.72	1.10
4	2134	PF 1	83.00	3116.00	3117.00	3117.38	3118.22	0.059221	8.85	9.38	11.36	1.72
4	2034	PF 1	83.00	3112.00	3113.39	3113.55	3114.16	0.027907	7.04	11.79	11.26	1.21
4	1934	PF 1	83.00	3109.08	3110.32	3110.51	3111.09	0.033712	7.01	11.83	13.36	1.31
4	1864	PF 1	83.00	3104.00	3104.51	3104.90	3106.11	0.221507	10.16	8.17	22.50	2.97
4	1800 1800	PF 1	83.00	3100.00	3101.22	3101.27	3101.72	0.029567	5.70	14.56	16.93	1.08
4	1700 1700	PF 1	83.00	3096.00	3096.89	3097.11	3097.67	0.057729	7.11	11.68	16.18	1.47
4	1600 1600	PF 1	83.00	3092.00	3092.91	3092.97	3093.36	0.032081	5.33	15.56	21.48	1.10
4	1524 1524	PF 1	83.00	3088.00	3089.02	3089.31	3089.94	0.065019	7.72	10.75	14.30	1.57
5	2164 2025	PF 1	193.00	3160.00	3161.41	3161.41	3161.80	0.026143	4.96	38.94	51.86	1.01
5	2064 1925	PF 1	193.00	3156.00	3156.70	3156.96	3157.54	0.078803	7.35	26.25	44.24	1.68
5	1964 1825	PF 1	193.00	3152.00	3153.03	3153.03	3153.25	0.030264	3.88	52.50	113.90	1.00
6	587 1600	PF 1	56.00	3162.00	3162.32	3162.32	3162.46	0.036047	2.97	18.89	69.27	1.00
6	483 1500	PF 1	56.00	3157.50	3158.06	3158.13	3158.30	0.044636	4.51	19.87	98.51	1.20
6	389 1400	PF 1	56.00	3153.82	3154.11	3154.11	3154.22	0.071816	2.78	21.67	102.69	1.28
6	225	PF 1	56.00	3146.00	3147.24	3146.64	3147.31	0.002204	2.14	26.27	23.70	0.35
6	138	PF 1	56.00	3146.00	3146.57	3146.57	3146.85	0.022011	4.21	13.34	24.52	1.00
5-2	1716	PF 1	243.00	3140.08	3141.60	3142.14	3143.36	0.049456	10.66	22.80	18.30	1.68
5-2	1616	PF 1	243.00	3136.00	3137.50	3137.91	3138.91	0.038466	9.55	25.43	19.99	1.49
5-2	1516	PF 1	243.00	3132.00	3133.33	3133.77	3134.80	0.044149	9.70	25.04	21.44	1.58
5-2	1416	PF 1	243.00	3127.44	3128.98	3129.40	3130.40	0.043720	9.57	25.39	22.08	1.57
5-2	1316	PF 1	243.00	3124.00	3125.51	3125.81	3126.68	0.030891	8.69	27.96	21.53	1.34
5-2	1219	PF 1	243.00	3122.00	3123.57	3123.61	3124.32	0.017971	6.92	35.13	25.48	1.04
5-2	1113	PF 1	243.00	3118.00	3119.23	3119.79	3121.03	0.059705	10.76	22.58	20.78	1.82
5-2	1013	PF 1	243.00	3116.00	3117.57	3117.57	3118.27	0.016868	6.72	36.18	26.17	1.01
5-2	954	PF 1	243.00	3114.00	3115.18	3115.62	3116.62	0.048470	9.61	25.30	23.72	1.64
5-2	864	PF 1	243.00	3112.00	3114.36	3113.64	3114.67	0.004693	4.44	54.71	27.88	0.56
5-2	790	PF 1	243.00	3112.00	3113.40	3113.40	3114.04	0.017099	6.41	37.91	29.90	1.00
5-2	726	PF 1	243.00	3110.00	3111.15	3111.49	3112.35	0.041566	8.81	27.59	26.34	1.52
5-2	669	PF 1	243.00	3108.00	3109.30	3109.53	3110.30	0.029806	8.01	30.34	25.96	1.31
5-2	581	PF 1	243.00	3106.00	3107.37	3107.43	3108.09	0.019927	6.81	35.67	28.79	1.08
5-2	425	PF 1	243.00	3100.00	3102.01	3102.42	3103.41	0.048427	9.49	25.66	21.58	1.48
5-2	325	PF 1	243.00	3098.00	3100.11	3100.11	3100.75	0.022480	6.45	37.67	29.57	1.01

HEC-RAS Plan: PropCond. Profile: PF 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
5-2	225	PF 1	243.00	3096.00	3097.46	3097.55	3098.04	0.032902	6.11	39.76	45.90	1.16
5-2	125	PF 1	243.00	3092.00	3093.76	3093.89	3094.41	0.040134	6.47	37.58	46.42	1.26
5-2	56	PF 1	243.00	3090.00	3091.69	3091.71	3092.33	0.023413	6.46	37.80	32.50	1.03
4-2	1400	PF 1	313.00	3084.00	3085.16	3086.45	3091.74	0.384674	20.58	15.21	17.72	3.91
4-2	1300	PF 1	313.00	3082.00	3083.50	3083.52	3084.17	0.022321	6.58	48.33	40.00	1.02
4-2	1200	PF 1	313.00	3080.00	3081.03	3081.09	3081.62	0.028694	6.17	50.77	52.22	1.10
4-2	1100	PF 1	313.00	3076.00	3077.92	3078.08	3078.72	0.028992	7.17	44.35	39.37	1.15
4-2	1000	PF 1	313.00	3074.00	3075.47	3075.48	3076.05	0.023570	6.13	51.07	45.51	1.02
4-2	900	PF 1	313.00	3070.39	3072.06	3072.28	3073.00	0.039994	7.76	40.60	40.46	1.32
4-2	800	PF 1	313.00	3068.00	3069.52	3069.36	3069.93	0.015402	5.13	61.00	51.68	0.83
4-2	700	PF 1	313.00	3066.00	3067.51	3067.51	3068.15	0.020251	6.48	50.58	42.36	0.98
4-2	600	PF 1	313.00	3062.00	3063.73	3064.10	3065.04	0.050459	9.20	34.45	31.36	1.50
4-2	500	PF 1	313.00	3060.00	3061.26	3061.26	3061.83	0.021308	6.08	52.89	49.48	0.98
4-2	400	PF 1	313.00	3056.41	3057.66	3057.92	3058.56	0.055019	7.62	41.08	50.14	1.48
4-2	300	PF 1	313.00	3054.00	3055.65	3055.65	3056.29	0.022310	6.45	48.51	38.29	1.01
4-2	200	PF 1	313.00	3050.00	3052.01	3052.34	3053.22	0.043295	8.83	35.46	29.39	1.40
4-2	100	PF 1	313.00	3048.00	3049.57	3049.58	3050.14	0.022991	6.06	51.67	46.13	1.01