Preliminary Hydrology Report

for

General Atomics: CGCS and Hangar Facility

DRNSTY-2024-00051

APN(s): 045-704-102, 045-704-103, 045-704-104

73 El Mirage Airport Rd. Adelanto, CA, 92301

APRIL 2025

PREPARED FOR:

General Atomics & Affiliated Co.
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Adelanto, CA 92301

PREPARED BY:

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KHA Project # 194065002

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Certification by Engineer



_____ _____04/14/2025_____

Prasad Kasturi, PE Date

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Hydrology Manual. San Berardino County, April 1986.

INTRODUCTION

Kimley-Horn and Associates has been retained to prepare a Preliminary Hydrology Report for the proposed El Mirage Airport Expansion. The purpose of this report is to demonstrate preliminary analysis of the hydrologic and hydraulic conditions associated with the development of the project site. To do so, the following is the scope of this report:

- Discuss the pre-development discharge patterns and points
- Discuss the post-development discharge patterns and points
- Determine the pre-development onsite flow rates for the 100-year event
- Determine the post-development un-mitigated flow rates for the 100-year event
- Determine required post-development onsite mitigation for the 100-year event

Even though this report discusses stormwater, this report is not a Stormwater Pollution Prevention Plan (SWPPP), a Groundwater Study, a Geotechnical Report, nor a Water Quality Management Plan (WQMP). Each of these separate reports discusses separate aspects of stormwater. Portions of the Geotechnical Report are utilized and referenced for the purpose of this report.

PROJECT DESCRIPTION

The El Mirage Airport Expansion includes two vacant areas that will be developed into (8) eight new CGCS modular buildings, (3) three new aircraft launch spots, a proposed 98,950 sf Hangar facility, a 19,500 sf Ground Control facility, additional structures, and an additional parking lot. Site improvements will include compacted earth, concrete hardscape, and asphalt paving. The project onsite drainage analysis area is approximately 14.47 AC and the APN(s) for the project site area are: 045-704-102, 045-704-103, 045-704-104. Additionally, approximately 27.05 AC of offsite area has also been analyzed to examine onsite run on. Appendix A contains an aerial photograph that depicts the project location.

LOCATION

The site located at 73 El Mirage Airport Rd, in the unincorporated area of Adelanto in the County of San Bernardino, California. The project area(s) are bounded by El Mirage Airport runway to the north, an existing Hanger facility to east, vacant land to the south, and existing drainage basin/channels to the west. Refer to Figure 1 below for the project's Location Map.

FIGURE 1: LOCATION MAP



METHODOLOGY

The hydrologic and hydraulic analyses were completed following the methods outlined in San Bernardino County Hydrology Manual. Hydrologic calculations, rational method and synthetic unit hydrographs, were performed using the Advanced Engineering Software (AES). The rational method was used to estimate time of concentrations and peak flow rates generated from the existing and proposed 100-year storm event. The synthetic unit hydrograph method was used to determine the onsite existing and proposed hydrographs for the 24-hour duration of the 100-year storm event. The results of the rational method analyses are included in Appendix E and the results of the synthetic unit hydrograph analyses are included in Appendix F. Complete onsite and offsite drainage system analyses will be provided in the Final Hydrology Report.

The rainfall data used were gathered from the NOAA Atlas 14 precipitation frequency tables for the project site location, see Appendix C. In addition, antecedent moisture condition (AMC) III was used to calculate the 100-year peak flows based on the hydrology manual. Lastly, the type of soil inputted into Civil D is based on the Natural Resources Conservation Service (NRCS) which has classified the onsite soil as soil type A. Group A soils typically have low runoff potential with high infiltration rates when thoroughly wetted and consist chiefly of deep, well drained sands or gravels. See Appendix C for soil type classifications.

For rational method inputs land use options “Apartments” and “5-7 Dwelling/Acre” options were selected in the AES software since the pervious/impervious outputs were better represented. Refer to Appendix E for the rational method calculations.

DRAINAGE CHARACTERISTICS

PRE-DEVELOPMENT CONDITION

The existing project area(s) are currently vacant and drain in a northeast direction. Existing earthen channels and basins collect stormwater from nearby areas that ultimately outfall to El Mirage Dry Lake; located north of the site. Site run on is anticipated and offsite results are included hereon.

Existing earthen channels, which are connected by existing culverts, collect and divert runoff into existing basins located within the El Mirage Airport limits. The project currently discharges and proposes to discharge to the existing channel/basin located northwest of the CGCS improvements. Based on the previously approved report prepared by Kimley-Horn and Associates Inc. (Kimley-Horn) on December 3rd, 2018, the existing "Channel and basin system is oversized by a volume of 1.38 acre-ft" (Kimley-Horn, 2018). Considering the 0.22 acre-ft of volume generated/required for the disturbed area in the 2018 improvements, the remaining channel/basin capacity is 1.16 acre-ft. Basin capacity results are outlined in the "Basin Capacity Analysis" section, but it is important to note that the project extents were previously analyzed, and the existing channel/basin was sized to account for future developments.

Table 1 shows a summary of the pre-development flows. Table 2 shows a summary of the offsite flows. See Appendix D for the Existing Drainage Map and Appendix E for the rational method calculations.

Table 1: Pre-Development Flows

Drainage Area ID	Drainage Area (AC)	Q_{100} (cfs)
OFF 1	3.07	17.76
DA 1	12.3	
OFF 2.1	5.02	23.57
OFF 2.2	18.19	
DA 2	1.08	
OFF 3	0.77	3.68
DA 3	1.09	
Total	41.52	45.01

POST-DEVELOPMENT CONDITION

The proposed project area(s) will be developed to include (8) eight new CGCS modular buildings, (3) three new aircraft launch spots, a proposed 98,950 sf Hangar facility, a 19,500 sf Ground Control facility, additional structures, and an additional parking lot.

The Hangar development extents do not propose any storm drain structures but will rather be graded to sheet flow into the existing basin. The CGCS southern development extents proposes two inlets to capture and convey runoff into the existing basin. Rip-Rap is proposed at the bottom of the basin to reduce velocity and protect against erosion. The CGCS northern development proposes swales to capture and convey runoff into the existing basin. Rip-Rap is also proposed at the bottom of the basin to reduce velocity and protect against erosion.

Table 2 shows a summary of the post-development flows. See Appendix D for the Proposed Drainage Map and Appendix E for the rational method calculations.

Table 2: Post-Development Flows

Drainage Area ID	Drainage Area (AC)	Q_{100} (cfs)
DA 1.1	2.28	16.47
DA 1.2	10.02	
DA 2.1	0.19	2.11
DA 2.2	0.89	
DA 3	1.09	0.88
Total	14.47	19.46

BASIN CAPACITY ANALYSIS

As previously mentioned, the existing channel/basin has an excess capacity of 1.16 acre-ft. The required mitigated volume for the project improvements was calculated to be 0.54 acre-ft. Since the basin has the capacity to store the additional volume from post-development condition, the proposed development does not expect to cause a significant impact to downstream systems in the event of an 100-year design storm.

Table 3 shows a comparison of required and provided volume to demonstrate that the existing channel/basin has the capacity to store additional volume generated by the CGCS and Hanger/Ground Control expansion. It is important to note that the offsite flows/volume was not considered when determining the existing basin capacity since these parameters were previously accounted for in previously approved hydrology reports. Refer Appendix H for previously approved hydrology reports for the project site.

Table 3: Required vs Proposed Volume

Drainage Area ID	Area (AC)	Required Volume (AC-FT)	Allowable Volume (AC-FT)
DA 1	12.30	0.27	1.16
DA 2	1.08	0.26	
DA 3	1.09	0.01	
Total	14.47	0.54	

HYDRAULIC ANALYSIS

The calculated peak flows from the analyses discussed above along with the offsite flows will be used to size the onsite drainage devices. All drainage devices will be sized in the Final Hydrology Report.

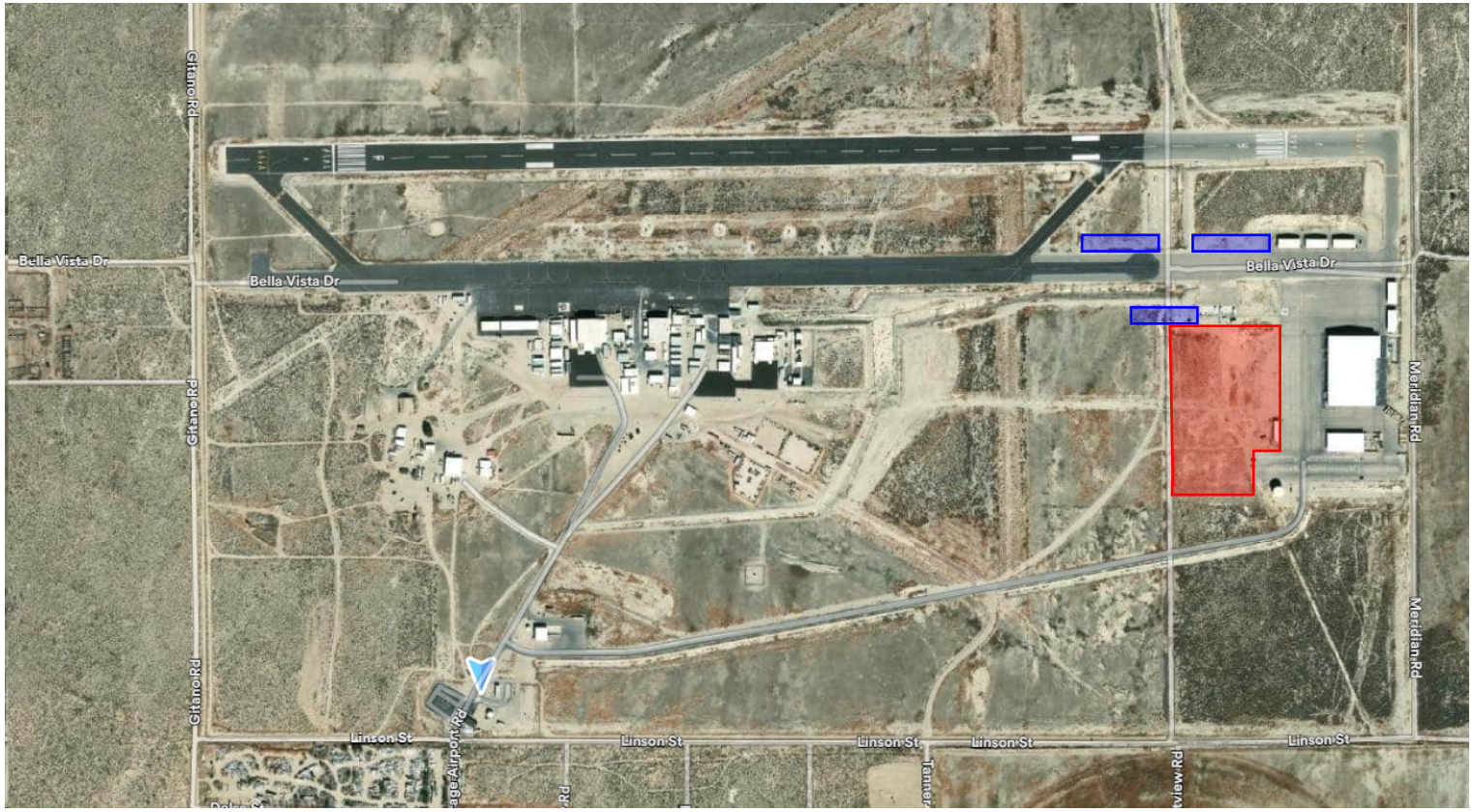
CONCLUSION

In conclusion, the following was covered in this report:

- The pre-development discharge patterns and points were discussed
- The post-development discharge patterns and points were discussed
- The pre-development flow rates for the 100-year events were determined
- The post-development un-mitigated flow rates for the 100-year events were determined
- The post-development stormwater mitigation for the 100-year event was analyzed
- The post-development final flow rate was proven to be less than the existing design flowrate for the downstream systems

As discussed in the contents of this report, the development of the existing vacant site into the proposed development is not expected to cause a significant impact to downstream systems for storms up to the 100-year condition. The mitigated development discharges less stormwater flows than the existing site conditions.

Appendix A - Location Map



CGCS Expansion

Hangar/Ground Control Expansion

Appendix B – NOAA Rain Data

NOAA Atlas 14, Volume 6, Version 2
Location name: Adelanto, California, USA*
Latitude: 34.6218°, Longitude: -117.5909°
Elevation: 2856 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.055** (0.046-0.068)	**0.075** (0.062-0.092)	**0.103** (0.085-0.127)	**0.127** (0.104-0.157)	**0.161** (0.127-0.206)	**0.189** (0.146-0.246)	**0.218** (0.164-0.292)	**0.249** (0.183-0.343)	**0.293** (0.206-0.421)	**0.329** (0.223-0.488)
10-min	**0.079** (0.065-0.097)	**0.108** (0.089-0.132)	**0.148** (0.122-0.182)	**0.182** (0.148-0.225)	**0.231** (0.182-0.296)	**0.270** (0.209-0.353)	**0.312** (0.235-0.418)	**0.357** (0.262-0.492)	**0.420** (0.296-0.603)	**0.471** (0.320-0.700)
15-min	**0.096** (0.079-0.117)	**0.131** (0.108-0.160)	**0.179** (0.147-0.220)	**0.220** (0.179-0.273)	**0.279** (0.220-0.357)	**0.327** (0.253-0.427)	**0.378** (0.285-0.506)	**0.432** (0.317-0.594)	**0.508** (0.358-0.729)	**0.570** (0.387-0.846)
30-min	**0.136** (0.112-0.166)	**0.185** (0.153-0.227)	**0.253** (0.208-0.311)	**0.312** (0.254-0.386)	**0.395** (0.312-0.506)	**0.463** (0.358-0.605)	**0.535** (0.403-0.716)	**0.611** (0.448-0.842)	**0.720** (0.506-1.03)	**0.807** (0.549-1.20)
60-min	**0.188** (0.155-0.230)	**0.256** (0.211-0.313)	**0.350** (0.288-0.430)	**0.431** (0.351-0.534)	**0.546** (0.431-0.700)	**0.640** (0.494-0.836)	**0.739** (0.557-0.990)	**0.845** (0.620-1.16)	**0.995** (0.700-1.43)	**1.12** (0.758-1.66)
2-hr	**0.271** (0.224-0.332)	**0.369** (0.304-0.452)	**0.503** (0.414-0.618)	**0.618** (0.504-0.766)	**0.783** (0.618-1.00)	**0.916** (0.708-1.20)	**1.06** (0.797-1.42)	**1.21** (0.885-1.66)	**1.42** (0.998-2.04)	**1.59** (1.08-2.36)
3-hr	**0.336** (0.278-0.411)	**0.456** (0.376-0.559)	**0.622** (0.512-0.765)	**0.764** (0.623-0.946)	**0.967** (0.763-1.24)	**1.13** (0.874-1.48)	**1.30** (0.983-1.75)	**1.49** (1.09-2.05)	**1.75** (1.23-2.51)	**1.96** (1.33-2.91)
6-hr	**0.477** (0.394-0.584)	**0.647** (0.534-0.793)	**0.882** (0.725-1.08)	**1.08** (0.882-1.34)	**1.36** (1.08-1.75)	**1.59** (1.23-2.08)	**1.83** (1.38-2.46)	**2.09** (1.53-2.88)	**2.45** (1.73-3.52)	**2.74** (1.86-4.07)
12-hr	**0.639** (0.528-0.782)	**0.875** (0.722-1.07)	**1.20** (0.985-1.47)	**1.47** (1.20-1.82)	**1.85** (1.46-2.37)	**2.16** (1.67-2.82)	**2.48** (1.87-3.32)	**2.82** (2.07-3.88)	**3.30** (2.32-4.73)	**3.67** (2.50-5.46)
24-hr	**0.875** (0.776-1.01)	**1.21** (1.07-1.39)	**1.66** (1.47-1.92)	**2.04** (1.79-2.38)	**2.58** (2.18-3.10)	**3.00** (2.49-3.69)	**3.44** (2.78-4.33)	**3.90** (3.07-5.05)	**4.54** (3.43-6.13)	**5.05** (3.68-7.06)
2-day	**1.02** (0.902-1.17)	**1.42** (1.26-1.63)	**1.96** (1.73-2.26)	**2.41** (2.12-2.81)	**3.05** (2.58-3.67)	**3.54** (2.94-4.36)	**4.06** (3.29-5.12)	**4.61** (3.63-5.97)	**5.36** (4.05-7.25)	**5.96** (4.35-8.34)
3-day	**1.09** (0.967-1.26)	**1.53** (1.35-1.76)	**2.12** (1.88-2.45)	**2.62** (2.29-3.05)	**3.31** (2.80-3.98)	**3.85** (3.20-4.73)	**4.41** (3.58-5.56)	**5.01** (3.94-6.49)	**5.83** (4.40-7.87)	**6.48** (4.73-9.06)
4-day	**1.16** (1.03-1.33)	**1.63** (1.44-1.88)	**2.27** (2.00-2.62)	**2.80** (2.46-3.26)	**3.54** (3.00-4.27)	**4.13** (3.42-5.07)	**4.73** (3.83-5.96)	**5.37** (4.23-6.96)	**6.25** (4.72-8.44)	**6.95** (5.07-9.72)
7-day	**1.25** (1.11-1.44)	**1.77** (1.56-2.03)	**2.48** (2.19-2.86)	**3.07** (2.69-3.57)	**3.89** (3.30-4.69)	**4.54** (3.77-5.59)	**5.22** (4.22-6.57)	**5.92** (4.66-7.67)	**6.89** (5.21-9.31)	**7.66** (5.59-10.7)
10-day	**1.30** (1.15-1.49)	**1.85** (1.64-2.13)	**2.60** (2.30-3.00)	**3.23** (2.83-3.76)	**4.12** (3.49-4.96)	**4.82** (4.00-5.92)	**5.54** (4.48-6.98)	**6.29** (4.96-8.15)	**7.34** (5.55-9.92)	**8.16** (5.96-11.4)
20-day	**1.50** (1.33-1.73)	**2.17** (1.92-2.50)	**3.09** (2.73-3.57)	**3.87** (3.39-4.51)	**4.98** (4.22-6.00)	**5.86** (4.87-7.21)	**6.78** (5.49-8.55)	**7.75** (6.10-10.0)	**9.08** (6.86-12.3)	**10.1** (7.39-14.2)
30-day	**1.65** (1.47-1.90)	**2.41** (2.13-2.77)	**3.47** (3.06-4.00)	**4.37** (3.83-5.09)	**5.67** (4.80-6.82)	**6.70** (5.56-8.24)	**7.78** (6.30-9.80)	**8.91** (7.02-11.5)	**10.5** (7.92-14.2)	**11.7** (8.54-16.4)
45-day	**1.93** (1.71-2.22)	**2.83** (2.51-3.26)	**4.10** (3.62-4.74)	**5.20** (4.55-6.05)	**6.78** (5.75-8.16)	**8.06** (6.69-9.91)	**9.40** (7.61-11.8)	**10.8** (8.52-14.0)	**12.8** (9.65-17.3)	**14.3** (10.4-20.0)
60-day	**2.19** (1.94-2.52)	**3.21** (2.84-3.70)	**4.66** (4.12-5.39)	**5.92** (5.19-6.90)	**7.75** (6.57-9.34)	**9.24** (7.67-11.4)	**10.8** (8.76-13.6)	**12.5** (9.82-16.2)	**14.8** (11.2-20.0)	**16.6** (12.1-23.3)

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

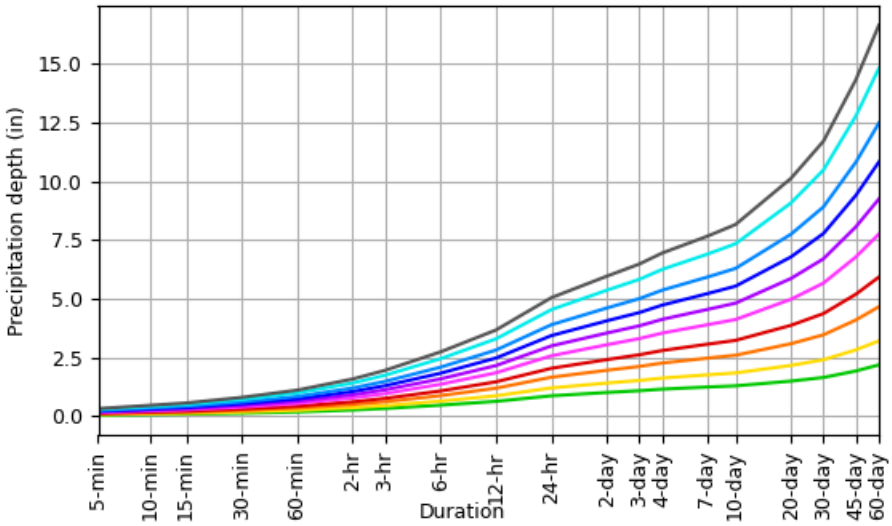
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper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

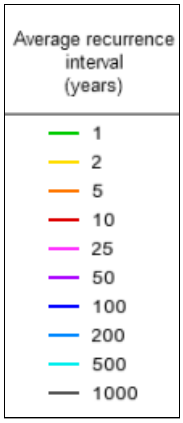
Please refer to NOAA Atlas 14 document for more information.

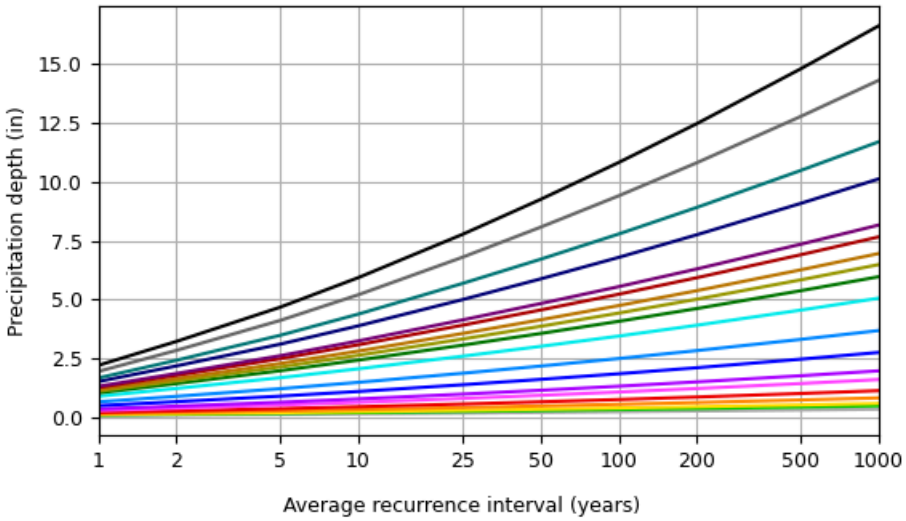
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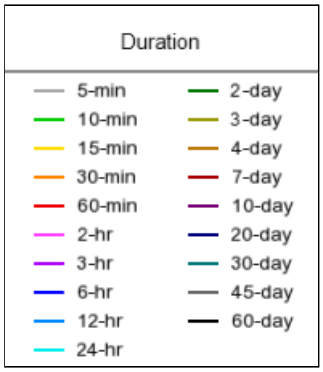
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 34.6218°, Longitude: -117.5909°









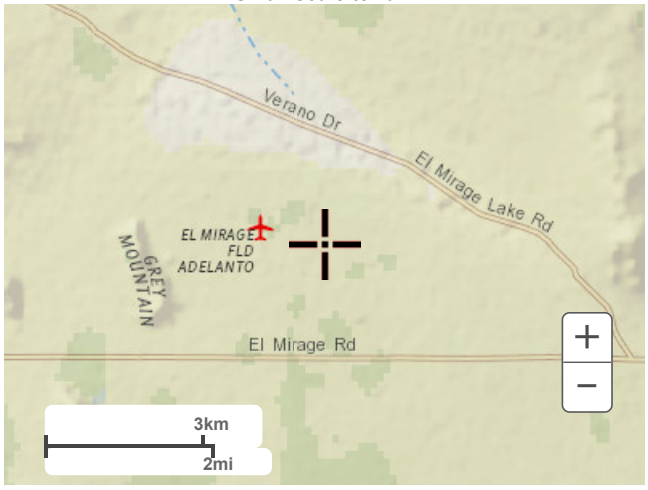
NOAA Atlas 14, Volume 6, Version 2

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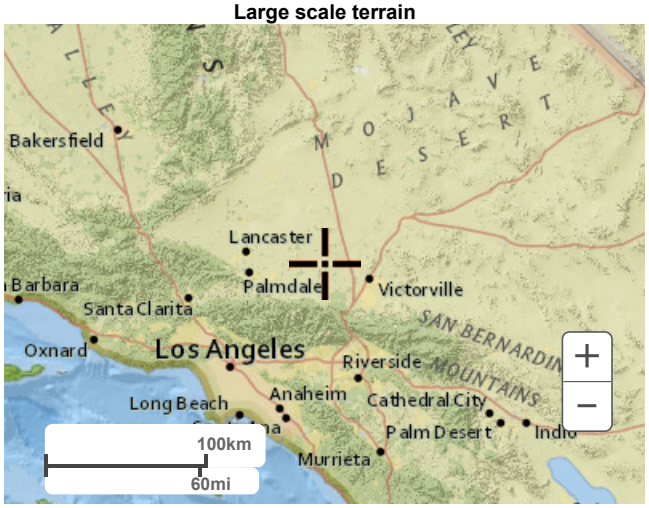
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Maps & aerials

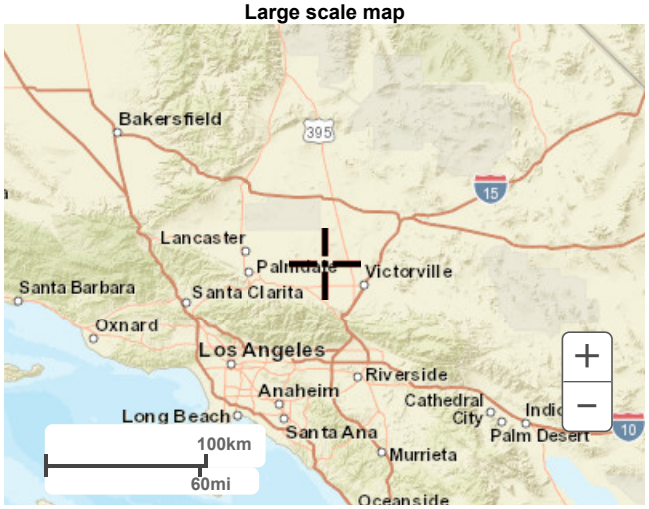
Small scale terrain



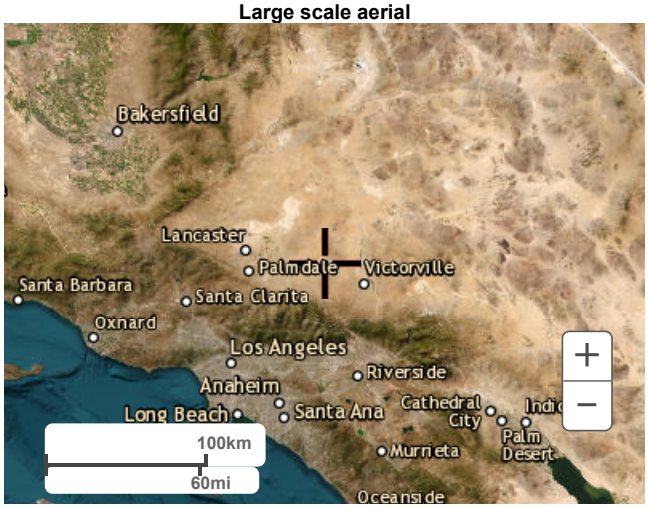
Large scale terrain



Large scale map



Large scale aerial



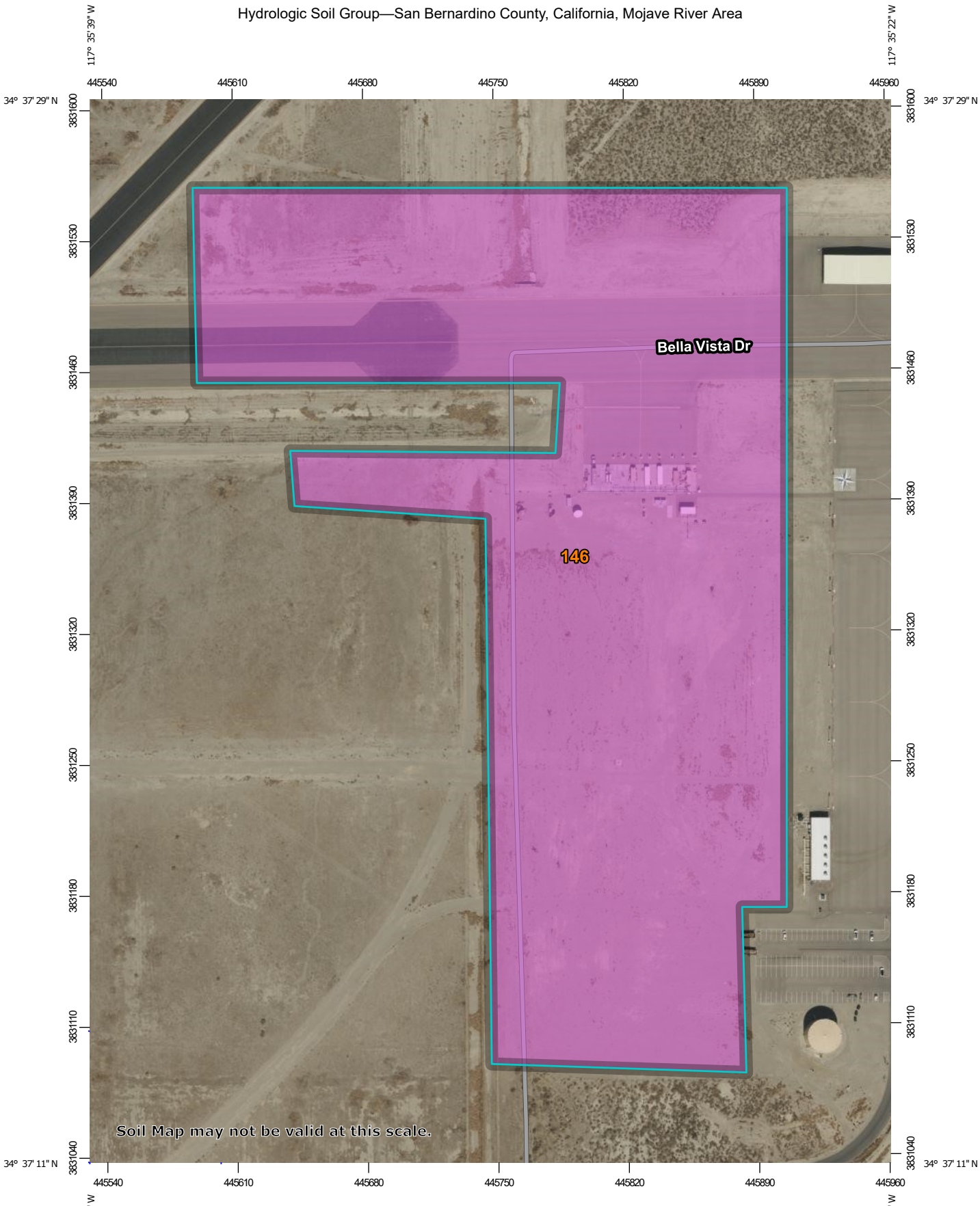
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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Appendix C - Web Soils Report

Hydrologic Soil Group—San Bernardino County, California, Mojave River Area



Map Scale: 1:2,770 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 40 80 160 240

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Bernardino County, California, Mojave River Area
Survey Area Data: Version 16, Aug 30, 2024

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 17, 2022—Jun 12, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
146	MANET LOAMY SAND, LOAMY SUBSTRATUM, 0 TO 2 PERCENT SLOPES	A	22.8	100.0%
Totals for Area of Interest			**22.8**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

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

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

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

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

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix D - Existing and Proposed Drainage Maps

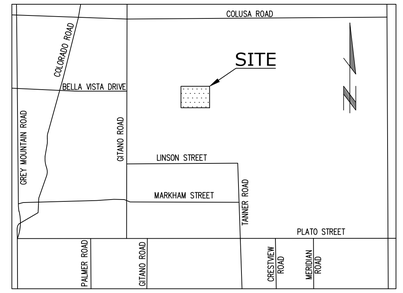
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EXISTING CHANNEL/BASIN
EXISTING CULVERT
EXISTING CULVERT
EXISTING CHANNEL/BASIN
EXISTING WATERWAY (NOT IMPACTING PROJECT IMPROVEMENTS)
EXISTING WATERWAY (IMPACTING PROJECT IMPROVEMENTS)
EXISTING RUNWAY
EXISTING SHADE STRUCTURES
EXISTING BASIN
EXISTING CONCRETE SWALE
EXISTING HANGAR FACILITY
EXISTING STOCKROOM
EXISTING ROAD
MERIDIAN ROAD
44'

DA 3 — 1.09 ac — cfs
OFF 3 — 0.77 ac — cfs
DA 2 — 1.08 ac — cfs
OFF 2.2 — 18.19 ac — cfs
OFF 2.1 — 5.02 ac — cfs
DA 1 — 12.30 ac — cfs
OFF 1 — 3.07 ac — cfs

L=284'
L=73'
L=194'
L=1,033'
L=961'
L=651'
L=285'

302 — 2849.6
301 — 2851.7
300 — 2852.6
203 — 2850.5
202 — 2852.9
102 — 2853.3
201 — 2859.0
101 — 2857.5
200 — 2863.3
100 — 2860.0



VICINITY MAP
NOT TO SCALE

LEGEND

- DMA ID / SUB-DMA ID
- XX.XX / X.XX ac / X.X cfs — RUNOFF
- XXX — NODE DESIGNATION
- L=XXX' — FLOW PATH LENGTH (FEET)
- DRAINAGE SUB AREA
- DRAINAGE SUB BOUNDARY
- DRAINAGE BOUNDARY
- FLOW PATH
- (???) — NODE ELEVATION (FEET)
- EXISTING FLOW DIRECTION
- PROPOSED FLOW DIRECTION
- PROPERTY LINE
- CENTERLINE

NORTH

GRAPHIC SCALE IN FEET
0 50 100 200

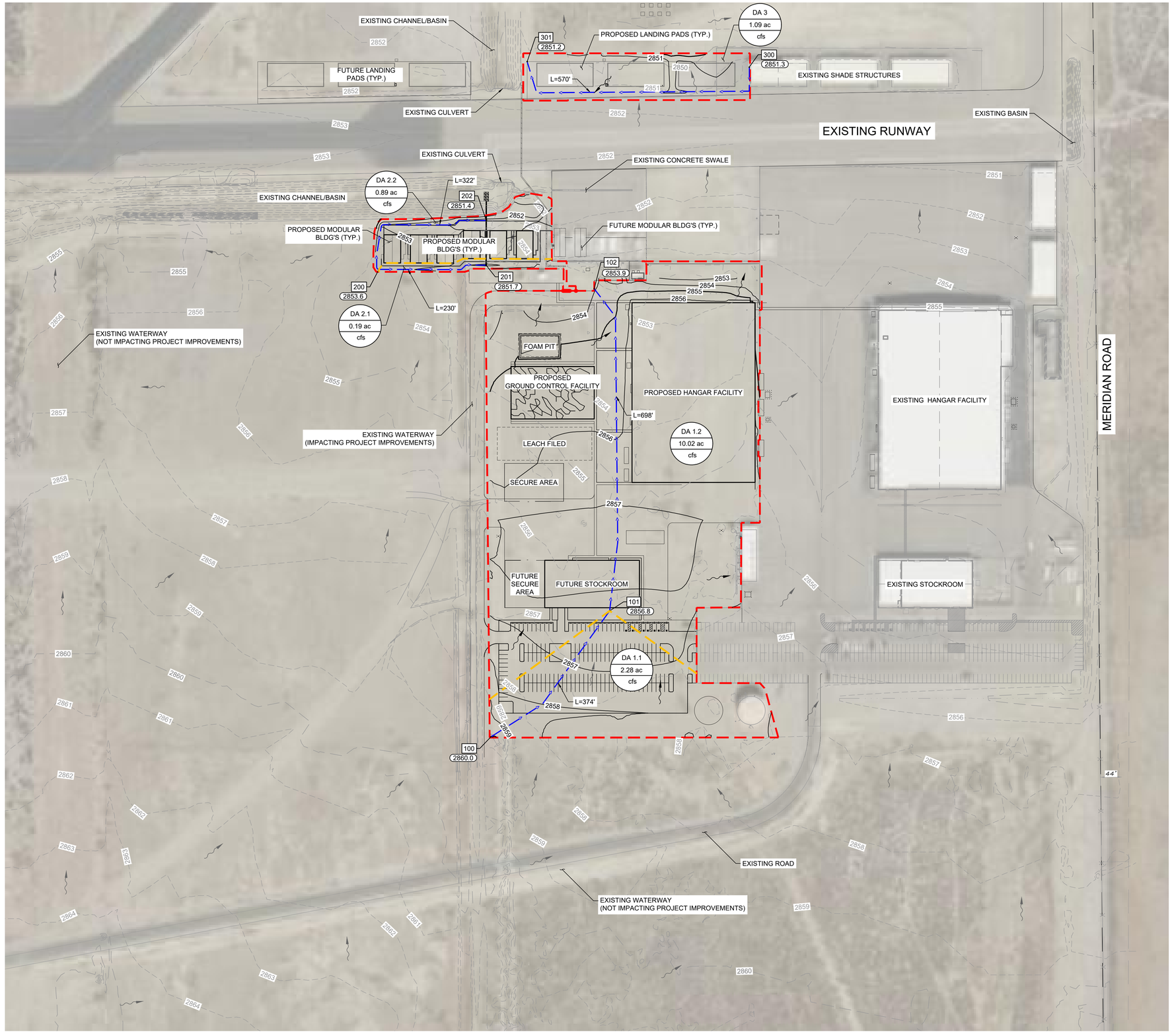
No.	REVISIONS	DATE	BY

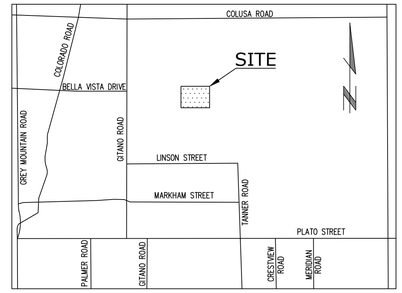
Kimley»Horn
1100 TOWN AND COUNTRY RD. SUITE 700
ORANGE, CA 92868
PHONE: 714-939-1030
WWW.KIMLEY-HORN.COM

KHA PROJECT	
DATE	
SCALE	AS SHOWN
DESIGNED BY	
DRAWN BY	
CHECKED BY	

GENERAL ATOMICS
CITY OF ADELANTO, CA
EXISTING DRAINAGE EXHIBIT

SHEET NUMBER
1 OF 1





VICINITY MAP
NOT TO SCALE

LEGEND

- DMA ID / SUB-DMA ID
- XX.XX / X.XX ac / X.X cfs — RUNOFF
- XXX — NODE DESIGNATION
- L=XXX' — FLOW PATH LENGTH (FEET)
- DRAINAGE SUB AREA
- DRAINAGE SUB BOUNDARY
- DRAINAGE BOUNDARY
- FLOW PATH
- (???) — NODE ELEVATION (FEET)
- EXISTING FLOW DIRECTION
- PROPOSED FLOW DIRECTION
- PROPERTY LINE
- CENTERLINE

NORTH

GRAPHIC SCALE IN FEET
0 50 100 200

No.	REVISIONS	DATE	BY

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ORANGE, CA 92868
PHONE: 714-939-1030
WWW.KIMLEY-HORN.COM

KHA PROJECT	
DATE	
SCALE	AS SHOWN
DESIGNED BY	
DRAWN BY	
CHECKED BY	

GENERAL ATOMICS
CITY OF ADELANTO, CA
EXISTING DRAINAGE EXHIBIT

SHEET NUMBER
1 OF 1

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Appendix E - Rational Method Analysis

EXISTING

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        (c) Copyright 1983-2016 Advanced Engineering Software (aes)
            Ver. 23.0  Release Date: 07/01/2016  License ID 1499

                          Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* GENERAL ATOMICS                                                      *
* EXISTING CONDITION RATIONAL METHOD ANALYSIS                          *
* 100-YR DESGIN STORM 3/20/2025                                        *
 ************************************************************************

  FILE NAME: EX100GAH.DAT
  TIME/DATE OF STUDY: 13:30 03/31/2025
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   8.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.01
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.7000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.7400

  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

```
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   285.00
  ELEVATION DATA: UPSTREAM(FEET) =   2860.00  DOWNSTREAM(FEET) =   2857.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   12.986
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.160
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   A        3.07      0.18     1.000    93   12.99
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      5.47
  TOTAL AREA(ACRES) =      3.07   PEAK FLOW RATE(CFS) =      5.47

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2857.50  DOWNSTREAM(FEET) =   2853.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1033.00   CHANNEL SLOPE =  0.0041
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.020   MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.464
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "BARREN"                   A       12.30      0.18     1.000    93
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.76
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.78
  AVERAGE FLOW DEPTH(FEET) =   0.28   TRAVEL TIME(MIN.) =   9.65
  Tc(MIN.) =   22.64
  SUBAREA AREA(ACRES) =    12.30       SUBAREA RUNOFF(CFS) =   14.21
  EFFECTIVE AREA(ACRES) =     15.37     AREA-AVERAGED Fm(INCH/HR) =   0.18
  AREA-AVERAGED Fp(INCH/HR) =   0.18  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       15.4         PEAK FLOW RATE(CFS) =      17.76
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.34   FLOW VELOCITY(FEET/SEC.) =   1.96
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =    1318.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   651.00
  ELEVATION DATA: UPSTREAM(FEET) =   2863.30  DOWNSTREAM(FEET) =   2859.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   19.126
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.647
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   A        5.02      0.18     1.000    93   19.13
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      6.63
  TOTAL AREA(ACRES) =      5.02   PEAK FLOW RATE(CFS) =      6.63

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2859.00  DOWNSTREAM(FEET) =   2852.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   961.00   CHANNEL SLOPE =  0.0063
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.020   MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.294
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "BARREN"                   A       18.19      0.18     1.000    93
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      15.86
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.03
  AVERAGE FLOW DEPTH(FEET) =   0.23   TRAVEL TIME(MIN.) =   7.88
  Tc(MIN.) =   27.01
  SUBAREA AREA(ACRES) =    18.19       SUBAREA RUNOFF(CFS) =   18.24
```

```
  EFFECTIVE AREA(ACRES) =     23.21     AREA-AVERAGED Fm(INCH/HR) =   0.18
  AREA-AVERAGED Fp(INCH/HR) =   0.18  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       23.2         PEAK FLOW RATE(CFS) =      23.27

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.29   FLOW VELOCITY(FEET/SEC.) =   2.29
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =    1612.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2852.90  DOWNSTREAM(FEET) =   2850.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   194.00   CHANNEL SLOPE =  0.0124
  CHANNEL BASE(FEET) =   30.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.020   MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.258
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "BARREN"                    A        1.08      0.18     1.000    93
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      23.79
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.94
  AVERAGE FLOW DEPTH(FEET) =   0.23   TRAVEL TIME(MIN.) =   1.10
  Tc(MIN.) =   28.11
  SUBAREA AREA(ACRES) =     1.08       SUBAREA RUNOFF(CFS) =    1.05
  EFFECTIVE AREA(ACRES) =     24.29     AREA-AVERAGED Fm(INCH/HR) =   0.18
  AREA-AVERAGED Fp(INCH/HR) =   0.18  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       24.3         PEAK FLOW RATE(CFS) =      23.57

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.23   FLOW VELOCITY(FEET/SEC.) =   2.91
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    203.00 =    1806.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    73.00
  ELEVATION DATA: UPSTREAM(FEET) =   2852.60  DOWNSTREAM(FEET) =   2851.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.035
```

```
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.318
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                    A        0.77      0.18     1.000    93    7.04
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.17
  TOTAL AREA(ACRES) =      0.77   PEAK FLOW RATE(CFS) =      2.17

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2851.70  DOWNSTREAM(FEET) =   2849.60
  CHANNEL LENGTH THRU SUBAREA(FEET) =   284.00   CHANNEL SLOPE =  0.0074
  CHANNEL BASE(FEET) =   40.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.020   MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.375
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "BARREN"                    A        1.09      0.18     1.000    93
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.26
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.10
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   4.30
  Tc(MIN.) =   11.34
  SUBAREA AREA(ACRES) =     1.09       SUBAREA RUNOFF(CFS) =    2.15
  EFFECTIVE AREA(ACRES) =      1.86     AREA-AVERAGED Fm(INCH/HR) =   0.18
  AREA-AVERAGED Fp(INCH/HR) =   0.18  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        1.9         PEAK FLOW RATE(CFS) =       3.68

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.08   FLOW VELOCITY(FEET/SEC.) =   1.12
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     357.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.9  TC(MIN.) =     11.34
  EFFECTIVE AREA(ACRES) =      1.86  AREA-AVERAGED Fm(INCH/HR)=  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =       3.68
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```



PROPOSED

```
******************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        (c) Copyright 1983-2016 Advanced Engineering Software (aes)
            Ver. 23.0  Release Date: 07/01/2016  License ID 1499

                          Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* GENERAL ATOMICS                                                      *
* PROPOSED CONDITION RATIONAL METHOD ANALYSIS                          *
* 100-YR DESGIN STORM 3/20/2025                                        *
 ************************************************************************

  FILE NAME: PR100GAH.DAT
  TIME/DATE OF STUDY: 08:13 03/31/2025
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   8.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.7000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.7400

  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

```
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   374.00
  ELEVATION DATA: UPSTREAM(FEET) =   2860.00  DOWNSTREAM(FEET) =   2856.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.979
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.797
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
                A         2.28      0.74     0.200    52    8.98
  SUBAREA AVERAGEAPARTMENTS   PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      5.43
  TOTAL AREA(ACRES) =      2.28   PEAK FLOW RATE(CFS) =      5.43

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2856.80  DOWNSTREAM(FEET) =   2853.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   698.00   CHANNEL SLOPE =  0.0042
  CHANNEL BASE(FEET) =  150.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.636
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 A       10.02      0.74     0.200    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.52
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.13
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =  10.34
  Tc(MIN.) =   19.32
  SUBAREA AREA(ACRES) =    1002  .     SUBAREA RUNOFF(CFS) =   13.42
  EFFECTIVE AREA(ACRES) =     12.30     AREA-AVERAGED Fm(INCH/HR) =   0.15
  AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.20
  TOTAL AREA(ACRES) =       12.3         PEAK FLOW RATE(CFS) =      16.47

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   1.25
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =    1072.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   230.00
  ELEVATION DATA: UPSTREAM(FEET) =   2853.60  DOWNSTREAM(FEET) =   2851.70

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.938
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.806
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        0.19      0.74     0.500    52    8.94
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.42
  TOTAL AREA(ACRES) =      0.19   PEAK FLOW RATE(CFS) =      0.42

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    202.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   322.00
  ELEVATION DATA: UPSTREAM(FEET) =   2853.60  DOWNSTREAM(FEET) =   2851.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.621
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.487
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        0.89      0.74     0.500    52   10.62
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.69
  TOTAL AREA(ACRES) =      0.89   PEAK FLOW RATE(CFS) =      1.69

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
```

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   570.00
  ELEVATION DATA: UPSTREAM(FEET) =   2851.30  DOWNSTREAM(FEET) =   2851.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   27.758
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.269
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       A        1.09      0.74     0.500    52   27.76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      0.88
  TOTAL AREA(ACRES) =      1.09   PEAK FLOW RATE(CFS) =      0.88
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.1  TC(MIN.) =     27.76
  EFFECTIVE AREA(ACRES) =      1.09  AREA-AVERAGED Fm(INCH/HR)=  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap = 0.500
  PEAK FLOW RATE(CFS)   =       0.88
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```



Appendix F - Unit Hydrograph Analysis

EXISTING

```
******************************************************************************
                    SMALL AREA UNIT HYDROGRAPH MODEL
==============================================================================
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             Ver. 23.0  Release Date: 07/01/2016  License ID 1499

                          Analysis prepared by:




******************************************************************************
------------------------------------------------------------------------------

 Problem Descriptions:
  GENERAL ATOMICS
  EXISTING UNIT HYDROGRAPH ANAYSIS - DA 1
  100 YR DESIGN STORM 3.31.25
------------------------------------------------------------------------------


    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.66
    TOTAL CATCHMENT AREA(ACRES) =   12.30
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.124
    LOW LOSS FRACTION = 0.132
    TIME OF CONCENTRATION(MIN.) =  9.65
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    USER SPECIFIED RAINFALL VALUES ARE USED
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.22
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.54
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.74
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.30
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.83
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  3.44

------------------------------------------------------------------------------

    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     2.01
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     1.52

******************************************************************************
  TIME      VOLUME        Q    0.        5.0       10.0       15.0       20.0
 (HOURS)     (AF)      (CFS)
------------------------------------------------------------------------------
  0.08      0.0015      0.46  Q          .         .          .          .
  0.24      0.0076      0.46  Q          .         .          .          .
  0.40      0.0137      0.46  Q          .         .          .          .
  0.56      0.0198      0.46  Q          .         .          .          .
  0.72      0.0260      0.47  Q          .         .          .          .
  0.88      0.0322      0.47  Q          .         .          .          .
  1.04      0.0385      0.47  Q          .         .          .          .
  1.20      0.0448      0.47  Q          .         .          .          .
  1.36      0.0511      0.48  Q          .         .          .          .
  1.53      0.0575      0.48  Q          .         .          .          .
  1.69      0.0639      0.48  Q          .         .          .          .
  1.85      0.0703      0.49  Q          .         .          .          .
  2.01      0.0768      0.49  Q          .         .          .          .
  2.17      0.0834      0.49  Q          .         .          .          .
  2.33      0.0899      0.50  Q          .         .          .          .
  2.49      0.0965      0.50  Q          .         .          .          .
  2.65      0.1032      0.50  .Q         .         .          .          .
```

2.81	0.1099	0.50	.Q	.	.	.	.
2.97	0.1166	0.51	.Q	.	.	.	.
3.13	0.1234	0.51	.Q	.	.	.	.
3.29	0.1302	0.52	.Q	.	.	.	.
3.46	0.1371	0.52	.Q	.	.	.	.
3.62	0.1440	0.52	.Q	.	.	.	.
3.78	0.1510	0.53	.Q	.	.	.	.
3.94	0.1580	0.53	.Q	.	.	.	.
4.10	0.1651	0.53	.Q	.	.	.	.
4.26	0.1722	0.54	.Q	.	.	.	.
4.42	0.1794	0.54	.Q	.	.	.	.
4.58	0.1866	0.55	.Q	.	.	.	.
4.74	0.1939	0.55	.Q	.	.	.	.
4.90	0.2013	0.56	.Q	.	.	.	.
5.06	0.2087	0.56	.Q	.	.	.	.
5.22	0.2161	0.56	.Q	.	.	.	.
5.39	0.2237	0.57	.Q	.	.	.	.
5.55	0.2312	0.57	.Q	.	.	.	.
5.71	0.2389	0.58	.Q	.	.	.	.
5.87	0.2466	0.58	.Q	.	.	.	.
6.03	0.2544	0.59	.Q	.	.	.	.
6.19	0.2622	0.59	.Q	.	.	.	.
6.35	0.2701	0.60	.Q	.	.	.	.
6.51	0.2781	0.60	.Q	.	.	.	.
6.67	0.2862	0.61	.Q	.	.	.	.
6.83	0.2943	0.62	.Q	.	.	.	.
6.99	0.3025	0.62	.Q	.	.	.	.
7.15	0.3108	0.63	.Q	.	.	.	.
7.32	0.3192	0.63	.Q	.	.	.	.
7.48	0.3276	0.64	.Q	.	.	.	.
7.64	0.3362	0.64	.Q	.	.	.	.
7.80	0.3448	0.65	.Q	.	.	.	.
7.96	0.3535	0.66	.Q	.	.	.	.
8.12	0.3623	0.67	.Q	.	.	.	.
8.28	0.3712	0.67	.Q	.	.	.	.
8.44	0.3802	0.68	.Q	.	.	.	.
8.60	0.3893	0.69	.Q	.	.	.	.
8.76	0.3986	0.70	.Q	.	.	.	.
8.92	0.4079	0.70	.Q	.	.	.	.
9.08	0.4173	0.72	.Q	.	.	.	.
9.24	0.4269	0.72	.Q	.	.	.	.
9.41	0.4366	0.73	.Q	.	.	.	.
9.57	0.4464	0.74	.Q	.	.	.	.
9.73	0.4563	0.75	.Q	.	.	.	.
9.89	0.4664	0.76	.Q	.	.	.	.
10.05	0.4766	0.78	.Q	.	.	.	.
10.21	0.4870	0.78	.Q	.	.	.	.
10.37	0.4975	0.80	.Q	.	.	.	.
10.53	0.5082	0.81	.Q	.	.	.	.
10.69	0.5191	0.83	.Q	.	.	.	.
10.85	0.5301	0.83	.Q	.	.	.	.
11.01	0.5413	0.85	.Q	.	.	.	.
11.18	0.5527	0.86	.Q	.	.	.	.
11.34	0.5643	0.88	.Q	.	.	.	.
11.50	0.5762	0.90	.Q	.	.	.	.
11.66	0.5882	0.92	.Q	.	.	.	.
11.82	0.6005	0.93	.Q	.	.	.	.
11.98	0.6130	0.96	.Q	.	.	.	.
12.14	0.6260	1.00	.Q	.	.	.	.
12.30	0.6398	1.08	. Q	.	.	.	.
12.46	0.6543	1.10	. Q	.	.	.	.
12.62	0.6691	1.13	. Q	.	.	.	.
12.78	0.6843	1.15	. Q	.	.	.	.
12.94	0.6998	1.19	. Q	.	.	.	.
13.10	0.7157	1.21	. Q	.	.	.	.

13.27	0.7321	1.25	. Q . . . .
13.43	0.7489	1.28	. Q . . . .
13.59	0.7663	1.33	. Q . . . .
13.75	0.7842	1.36	. Q . . . .
13.91	0.8028	1.43	. Q . . . .
14.07	0.8220	1.47	. Q . . . .
14.23	0.8424	1.61	. Q . . . .
14.39	0.8641	1.66	. Q . . . .
14.55	0.8869	1.77	. Q . . . .
14.71	0.9108	1.83	. Q . . . .
14.87	0.9360	1.98	. Q . . . .
15.03	0.9629	2.07	. Q . . . .
15.20	0.9918	2.29	. Q . . . .
15.36	1.0232	2.43	. Q . . . .
15.52	1.0565	2.58	. Q . . . .
15.68	1.0928	2.87	. Q . . . .
15.84	1.1399	4.21	. Q . . . .
16.00	1.2043	5.48	. Q . . . .
16.16	1.3352	14.21	. . . Q . .
16.32	1.4517	3.32	. Q . . . .
16.48	1.4908	2.55	. Q . . . .
16.64	1.5221	2.17	. Q . . . .
16.80	1.5492	1.90	. Q . . . .
16.97	1.5731	1.71	. Q . . . .
17.13	1.5948	1.55	. Q . . . .
17.29	1.6143	1.39	. Q . . . .
17.45	1.6322	1.31	. Q . . . .
17.61	1.6491	1.23	. Q . . . .
17.77	1.6650	1.17	. Q . . . .
17.93	1.6802	1.11	. Q . . . .
18.09	1.6947	1.07	. Q . . . .
18.25	1.7080	0.94	.Q . . . .
18.41	1.7203	0.91	.Q . . . .
18.57	1.7322	0.87	.Q . . . .
18.73	1.7436	0.84	.Q . . . .
18.89	1.7546	0.82	.Q . . . .
19.06	1.7653	0.79	.Q . . . .
19.22	1.7757	0.77	.Q . . . .
19.38	1.7858	0.75	.Q . . . .
19.54	1.7956	0.73	.Q . . . .
19.70	1.8051	0.71	.Q . . . .
19.86	1.8145	0.69	.Q . . . .
20.02	1.8236	0.68	.Q . . . .
20.18	1.8325	0.66	.Q . . . .
20.34	1.8412	0.65	.Q . . . .
20.50	1.8497	0.64	.Q . . . .
20.66	1.8581	0.62	.Q . . . .
20.83	1.8663	0.61	.Q . . . .
20.99	1.8744	0.60	.Q . . . .
21.15	1.8823	0.59	.Q . . . .
21.31	1.8901	0.58	.Q . . . .
21.47	1.8977	0.57	.Q . . . .
21.63	1.9052	0.56	.Q . . . .
21.79	1.9126	0.55	.Q . . . .
21.95	1.9199	0.54	.Q . . . .
22.11	1.9271	0.54	.Q . . . .
22.27	1.9342	0.53	.Q . . . .
22.43	1.9412	0.52	.Q . . . .
22.59	1.9480	0.51	.Q . . . .
22.75	1.9548	0.51	.Q . . . .
22.92	1.9615	0.50	.Q . . . .
23.08	1.9681	0.49	Q . . . .
23.24	1.9747	0.49	Q . . . .
23.40	1.9811	0.48	Q . . . .
23.56	1.9875	0.48	Q . . . .

23.72	1.9938	0.47	Q	.	.	.	.
23.88	2.0000	0.47	Q	.	.	.	.
24.04	2.0061	0.46	Q	.	.	.	.
24.20	2.0092	0.00	Q	.	.	.	.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1447.5
10%	202.6
20%	48.2
30%	19.3
40%	9.6
50%	9.6
60%	9.6
70%	9.6
80%	9.6
90%	9.6

Problem Descriptions:
GENERAL ATOMICS
EXISTING UNIT HYDROGRAPH ANALYSIS - DA 2
100 YE DESIGN STORM 3.31.25

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.39
TOTAL CATCHMENT AREA(ACRES) = 1.08
SOIL-LOSS RATE, Fm,(INCH/HR) = 0.124
LOW LOSS FRACTION = 0.434
TIME OF CONCENTRATION(MIN.) = 5.00
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
USER SPECIFIED RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 100
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.22
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.54
1-HOUR POINT RAINFALL VALUE(INCHES) = 0.74
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.30
6-HOUR POINT RAINFALL VALUE(INCHES) = 1.83
24-HOUR POINT RAINFALL VALUE(INCHES) = 3.44

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 0.08
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.23

****

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	2.5	5.0	7.5	10.0
0.08	0.0001	0.02	Q	.	.	.	.
0.17	0.0002	0.02	Q	.	.	.	.
0.25	0.0003	0.02	Q	.	.	.	.
0.33	0.0004	0.02	Q	.	.	.	.
0.42	0.0005	0.02	Q	.	.	.	.
0.50	0.0006	0.02	Q	.	.	.	.
0.58	0.0007	0.02	Q	.	.	.	.
0.67	0.0008	0.02	Q	.	.	.	.
0.75	0.0009	0.02	Q	.	.	.	.
0.83	0.0010	0.02	Q	.	.	.	.
0.92	0.0011	0.02	Q	.	.	.	.
1.00	0.0013	0.02	Q	.	.	.	.
1.08	0.0014	0.02	Q	.	.	.	.
1.17	0.0015	0.02	Q	.	.	.	.
1.25	0.0016	0.02	Q	.	.	.	.
1.33	0.0017	0.02	Q	.	.	.	.
1.42	0.0018	0.02	Q	.	.	.	.
1.50	0.0019	0.02	Q	.	.	.	.
1.58	0.0020	0.02	Q	.	.	.	.
1.67	0.0021	0.02	Q	.	.	.	.
1.75	0.0023	0.02	Q	.	.	.	.
1.83	0.0024	0.02	Q	.	.	.	.
1.92	0.0025	0.02	Q	.	.	.	.
2.00	0.0026	0.02	Q	.	.	.	.
2.08	0.0027	0.02	Q	.	.	.	.
2.17	0.0028	0.02	Q	.	.	.	.
2.25	0.0030	0.02	Q	.	.	.	.
2.33	0.0031	0.02	Q	.	.	.	.
2.42	0.0032	0.02	Q	.	.	.	.
2.50	0.0033	0.02	Q	.	.	.	.
2.58	0.0034	0.02	Q	.	.	.	.
2.67	0.0035	0.02	Q	.	.	.	.
2.75	0.0037	0.02	Q	.	.	.	.
2.83	0.0038	0.02	Q	.	.	.	.

2.92	0.0039	0.02	Q	.	.	.	.
3.00	0.0040	0.02	Q	.	.	.	.
3.08	0.0041	0.02	Q	.	.	.	.
3.17	0.0043	0.02	Q	.	.	.	.
3.25	0.0044	0.02	Q	.	.	.	.
3.33	0.0045	0.02	Q	.	.	.	.
3.42	0.0046	0.02	Q	.	.	.	.
3.50	0.0047	0.02	Q	.	.	.	.
3.58	0.0049	0.02	Q	.	.	.	.
3.67	0.0050	0.02	Q	.	.	.	.
3.75	0.0051	0.02	Q	.	.	.	.
3.83	0.0052	0.02	Q	.	.	.	.
3.92	0.0054	0.02	Q	.	.	.	.
4.00	0.0055	0.02	Q	.	.	.	.
4.08	0.0056	0.02	Q	.	.	.	.
4.17	0.0057	0.02	Q	.	.	.	.
4.25	0.0059	0.02	Q	.	.	.	.
4.33	0.0060	0.02	Q	.	.	.	.
4.42	0.0061	0.02	Q	.	.	.	.
4.50	0.0062	0.02	Q	.	.	.	.
4.58	0.0064	0.02	Q	.	.	.	.
4.67	0.0065	0.02	Q	.	.	.	.
4.75	0.0066	0.02	Q	.	.	.	.
4.83	0.0068	0.02	Q	.	.	.	.
4.92	0.0069	0.02	Q	.	.	.	.
5.00	0.0070	0.02	Q	.	.	.	.
5.08	0.0071	0.02	Q	.	.	.	.
5.17	0.0073	0.02	Q	.	.	.	.
5.25	0.0074	0.02	Q	.	.	.	.
5.33	0.0075	0.02	Q	.	.	.	.
5.42	0.0077	0.02	Q	.	.	.	.
5.50	0.0078	0.02	Q	.	.	.	.
5.58	0.0079	0.02	Q	.	.	.	.
5.67	0.0081	0.02	Q	.	.	.	.
5.75	0.0082	0.02	Q	.	.	.	.
5.83	0.0084	0.02	Q	.	.	.	.
5.92	0.0085	0.02	Q	.	.	.	.
6.00	0.0086	0.02	Q	.	.	.	.
6.08	0.0088	0.02	Q	.	.	.	.
6.17	0.0089	0.02	Q	.	.	.	.
6.25	0.0090	0.02	Q	.	.	.	.
6.33	0.0092	0.02	Q	.	.	.	.
6.42	0.0093	0.02	Q	.	.	.	.
6.50	0.0095	0.02	Q	.	.	.	.
6.58	0.0096	0.02	Q	.	.	.	.
6.67	0.0097	0.02	Q	.	.	.	.
6.75	0.0099	0.02	Q	.	.	.	.
6.83	0.0100	0.02	Q	.	.	.	.
6.92	0.0102	0.02	Q	.	.	.	.
7.00	0.0103	0.02	Q	.	.	.	.
7.08	0.0105	0.02	Q	.	.	.	.
7.17	0.0106	0.02	Q	.	.	.	.
7.25	0.0108	0.02	Q	.	.	.	.
7.33	0.0109	0.02	Q	.	.	.	.
7.42	0.0111	0.02	Q	.	.	.	.
7.50	0.0112	0.02	Q	.	.	.	.
7.58	0.0114	0.02	Q	.	.	.	.
7.67	0.0115	0.02	Q	.	.	.	.
7.75	0.0117	0.02	Q	.	.	.	.
7.83	0.0118	0.02	Q	.	.	.	.
7.92	0.0120	0.02	Q	.	.	.	.
8.00	0.0121	0.02	Q	.	.	.	.
8.08	0.0123	0.02	Q	.	.	.	.
8.17	0.0124	0.02	Q	.	.	.	.
8.25	0.0126	0.02	Q	.	.	.	.

8.33	0.0128	0.02	Q	.	.	.	.
8.42	0.0129	0.02	Q	.	.	.	.
8.50	0.0131	0.02	Q	.	.	.	.
8.58	0.0132	0.02	Q	.	.	.	.
8.67	0.0134	0.02	Q	.	.	.	.
8.75	0.0136	0.02	Q	.	.	.	.
8.83	0.0137	0.02	Q	.	.	.	.
8.92	0.0139	0.02	Q	.	.	.	.
9.00	0.0141	0.02	Q	.	.	.	.
9.08	0.0142	0.02	Q	.	.	.	.
9.17	0.0144	0.02	Q	.	.	.	.
9.25	0.0146	0.02	Q	.	.	.	.
9.33	0.0147	0.02	Q	.	.	.	.
9.42	0.0149	0.03	Q	.	.	.	.
9.50	0.0151	0.03	Q	.	.	.	.
9.58	0.0153	0.03	Q	.	.	.	.
9.67	0.0154	0.03	Q	.	.	.	.
9.75	0.0156	0.03	Q	.	.	.	.
9.83	0.0158	0.03	Q	.	.	.	.
9.92	0.0160	0.03	Q	.	.	.	.
10.00	0.0162	0.03	Q	.	.	.	.
10.08	0.0163	0.03	Q	.	.	.	.
10.17	0.0165	0.03	Q	.	.	.	.
10.25	0.0167	0.03	Q	.	.	.	.
10.33	0.0169	0.03	Q	.	.	.	.
10.42	0.0171	0.03	Q	.	.	.	.
10.50	0.0173	0.03	Q	.	.	.	.
10.58	0.0175	0.03	Q	.	.	.	.
10.67	0.0177	0.03	Q	.	.	.	.
10.75	0.0179	0.03	Q	.	.	.	.
10.83	0.0180	0.03	Q	.	.	.	.
10.92	0.0182	0.03	Q	.	.	.	.
11.00	0.0184	0.03	Q	.	.	.	.
11.08	0.0186	0.03	Q	.	.	.	.
11.17	0.0188	0.03	Q	.	.	.	.
11.25	0.0191	0.03	Q	.	.	.	.
11.33	0.0193	0.03	Q	.	.	.	.
11.42	0.0195	0.03	Q	.	.	.	.
11.50	0.0197	0.03	Q	.	.	.	.
11.58	0.0199	0.03	Q	.	.	.	.
11.67	0.0201	0.03	Q	.	.	.	.
11.75	0.0203	0.03	Q	.	.	.	.
11.83	0.0205	0.03	Q	.	.	.	.
11.92	0.0208	0.03	Q	.	.	.	.
12.00	0.0210	0.03	Q	.	.	.	.
12.08	0.0212	0.04	Q	.	.	.	.
12.17	0.0215	0.04	Q	.	.	.	.
12.25	0.0217	0.04	Q	.	.	.	.
12.33	0.0220	0.04	Q	.	.	.	.
12.42	0.0222	0.04	Q	.	.	.	.
12.50	0.0225	0.04	Q	.	.	.	.
12.58	0.0228	0.04	Q	.	.	.	.
12.67	0.0230	0.04	Q	.	.	.	.
12.75	0.0233	0.04	Q	.	.	.	.
12.83	0.0236	0.04	Q	.	.	.	.
12.92	0.0239	0.04	Q	.	.	.	.
13.00	0.0241	0.04	Q	.	.	.	.
13.08	0.0244	0.04	Q	.	.	.	.
13.17	0.0247	0.04	Q	.	.	.	.
13.25	0.0250	0.04	Q	.	.	.	.
13.33	0.0253	0.04	Q	.	.	.	.
13.42	0.0256	0.04	Q	.	.	.	.
13.50	0.0259	0.04	Q	.	.	.	.
13.58	0.0262	0.05	Q	.	.	.	.
13.67	0.0265	0.05	Q	.	.	.	.

13.75	0.0269	0.05	Q	.	.	.	.
13.83	0.0272	0.05	Q	.	.	.	.
13.92	0.0275	0.05	Q	.	.	.	.
14.00	0.0279	0.05	Q	.	.	.	.
14.08	0.0282	0.05	Q	.	.	.	.
14.17	0.0286	0.05	Q	.	.	.	.
14.25	0.0290	0.06	Q	.	.	.	.
14.33	0.0294	0.06	Q	.	.	.	.
14.42	0.0298	0.06	Q	.	.	.	.
14.50	0.0302	0.06	Q	.	.	.	.
14.58	0.0306	0.06	Q	.	.	.	.
14.67	0.0310	0.06	Q	.	.	.	.
14.75	0.0314	0.07	Q	.	.	.	.
14.83	0.0319	0.07	Q	.	.	.	.
14.92	0.0324	0.07	Q	.	.	.	.
15.00	0.0329	0.07	Q	.	.	.	.
15.08	0.0334	0.08	Q	.	.	.	.
15.17	0.0340	0.08	Q	.	.	.	.
15.25	0.0346	0.09	Q	.	.	.	.
15.33	0.0353	0.10	Q	.	.	.	.
15.42	0.0359	0.10	Q	.	.	.	.
15.50	0.0366	0.10	Q	.	.	.	.
15.58	0.0374	0.12	Q	.	.	.	.
15.67	0.0383	0.13	Q	.	.	.	.
15.75	0.0394	0.18	Q	.	.	.	.
15.83	0.0407	0.21	Q	.	.	.	.
15.92	0.0425	0.30	.Q	.	.	.	.
16.00	0.0449	0.41	.Q	.	.	.	.
16.08	0.0499	1.05	. Q	.	.	.	.
16.17	0.0544	0.24	Q	.	.	.	.
16.25	0.0557	0.15	Q	.	.	.	.
16.33	0.0566	0.11	Q	.	.	.	.
16.42	0.0574	0.10	Q	.	.	.	.
16.50	0.0580	0.09	Q	.	.	.	.
16.58	0.0586	0.08	Q	.	.	.	.
16.67	0.0591	0.07	Q	.	.	.	.
16.75	0.0596	0.06	Q	.	.	.	.
16.83	0.0600	0.06	Q	.	.	.	.
16.92	0.0604	0.06	Q	.	.	.	.
17.00	0.0608	0.06	Q	.	.	.	.
17.08	0.0612	0.05	Q	.	.	.	.
17.17	0.0615	0.05	Q	.	.	.	.
17.25	0.0618	0.05	Q	.	.	.	.
17.33	0.0621	0.05	Q	.	.	.	.
17.42	0.0624	0.04	Q	.	.	.	.
17.50	0.0627	0.04	Q	.	.	.	.
17.58	0.0630	0.04	Q	.	.	.	.
17.67	0.0633	0.04	Q	.	.	.	.
17.75	0.0636	0.04	Q	.	.	.	.
17.83	0.0639	0.04	Q	.	.	.	.
17.92	0.0641	0.04	Q	.	.	.	.
18.00	0.0644	0.04	Q	.	.	.	.
18.08	0.0646	0.03	Q	.	.	.	.
18.17	0.0648	0.03	Q	.	.	.	.
18.25	0.0651	0.03	Q	.	.	.	.
18.33	0.0653	0.03	Q	.	.	.	.
18.42	0.0655	0.03	Q	.	.	.	.
18.50	0.0657	0.03	Q	.	.	.	.
18.58	0.0659	0.03	Q	.	.	.	.
18.67	0.0661	0.03	Q	.	.	.	.
18.75	0.0663	0.03	Q	.	.	.	.
18.83	0.0665	0.03	Q	.	.	.	.
18.92	0.0667	0.03	Q	.	.	.	.
19.00	0.0669	0.03	Q	.	.	.	.
19.08	0.0670	0.03	Q	.	.	.	.

19.17	0.0672	0.03	Q	.	.	.	.
19.25	0.0674	0.03	Q	.	.	.	.
19.33	0.0676	0.03	Q	.	.	.	.
19.42	0.0677	0.03	Q	.	.	.	.
19.50	0.0679	0.02	Q	.	.	.	.
19.58	0.0681	0.02	Q	.	.	.	.
19.67	0.0683	0.02	Q	.	.	.	.
19.75	0.0684	0.02	Q	.	.	.	.
19.83	0.0686	0.02	Q	.	.	.	.
19.92	0.0687	0.02	Q	.	.	.	.
20.00	0.0689	0.02	Q	.	.	.	.
20.08	0.0691	0.02	Q	.	.	.	.
20.17	0.0692	0.02	Q	.	.	.	.
20.25	0.0694	0.02	Q	.	.	.	.
20.33	0.0695	0.02	Q	.	.	.	.
20.42	0.0697	0.02	Q	.	.	.	.
20.50	0.0698	0.02	Q	.	.	.	.
20.58	0.0700	0.02	Q	.	.	.	.
20.67	0.0701	0.02	Q	.	.	.	.
20.75	0.0703	0.02	Q	.	.	.	.
20.83	0.0704	0.02	Q	.	.	.	.
20.92	0.0705	0.02	Q	.	.	.	.
21.00	0.0707	0.02	Q	.	.	.	.
21.08	0.0708	0.02	Q	.	.	.	.
21.17	0.0710	0.02	Q	.	.	.	.
21.25	0.0711	0.02	Q	.	.	.	.
21.33	0.0712	0.02	Q	.	.	.	.
21.42	0.0714	0.02	Q	.	.	.	.
21.50	0.0715	0.02	Q	.	.	.	.
21.58	0.0716	0.02	Q	.	.	.	.
21.67	0.0718	0.02	Q	.	.	.	.
21.75	0.0719	0.02	Q	.	.	.	.
21.83	0.0720	0.02	Q	.	.	.	.
21.92	0.0721	0.02	Q	.	.	.	.
22.00	0.0723	0.02	Q	.	.	.	.
22.08	0.0724	0.02	Q	.	.	.	.
22.17	0.0725	0.02	Q	.	.	.	.
22.25	0.0726	0.02	Q	.	.	.	.
22.33	0.0728	0.02	Q	.	.	.	.
22.42	0.0729	0.02	Q	.	.	.	.
22.50	0.0730	0.02	Q	.	.	.	.
22.58	0.0731	0.02	Q	.	.	.	.
22.67	0.0732	0.02	Q	.	.	.	.
22.75	0.0734	0.02	Q	.	.	.	.
22.83	0.0735	0.02	Q	.	.	.	.
22.92	0.0736	0.02	Q	.	.	.	.
23.00	0.0737	0.02	Q	.	.	.	.
23.08	0.0738	0.02	Q	.	.	.	.
23.17	0.0739	0.02	Q	.	.	.	.
23.25	0.0741	0.02	Q	.	.	.	.
23.33	0.0742	0.02	Q	.	.	.	.
23.42	0.0743	0.02	Q	.	.	.	.
23.50	0.0744	0.02	Q	.	.	.	.
23.58	0.0745	0.02	Q	.	.	.	.
23.67	0.0746	0.02	Q	.	.	.	.
23.75	0.0747	0.02	Q	.	.	.	.
23.83	0.0748	0.02	Q	.	.	.	.
23.92	0.0749	0.02	Q	.	.	.	.
24.00	0.0751	0.02	Q	.	.	.	.
24.08	0.0751	0.00	Q	.	.	.	.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1440.0
10%	50.0
20%	20.0
30%	10.0
40%	5.0
50%	5.0
60%	5.0
70%	5.0
80%	5.0
90%	5.0

```
******************************************************************************
          NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
                    AND LOW LOSS FRACTION ESTIMATIONS
==============================================================================
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            Ver. 23.0  Release Date: 07/01/2016  License ID 1499

                          Analysis prepared by:




******************************************************************************
------------------------------------------------------------------------------

 Problem Descriptions:



==============================================================================
*** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
    AND LOW LOSS FRACTION ESTIMATIONS FOR AMC III:

    TOTAL 24-HOUR DURATION RAINFALL DEPTH =     3.44 (inches)

    SOIL-COVER     AREA      PERCENT OF    SCS CURVE    LOSS RATE
       TYPE      (Acres)   PERVIOUS AREA     NUMBER    Fp(in./hr.)    YIELD
         1          1.09      100.00       84.(AMC II)     0.124       0.868

    TOTAL AREA (Acres) =      1.09

    AREA-AVERAGED LOSS RATE, Fm (in./hr.) =  0.124

    AREA-AVERAGED LOW LOSS FRACTION, Y = 0.132
==============================================================================

 Problem Descriptions:
  GENERAL ATOMICS
  EXISTING UNIT HYDROGRAPH ANALYSIS - DA 3
  100 YR DESIGN STORM 3.31.25
------------------------------------------------------------------------------


    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.79
    TOTAL CATCHMENT AREA(ACRES) =    1.09
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.124
    LOW LOSS FRACTION = 0.132
    TIME OF CONCENTRATION(MIN.) =  5.00
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    USER SPECIFIED RAINFALL VALUES ARE USED
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.22
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.54
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.74
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.30
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.83
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  3.44

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    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.21
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.10
```

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	2.5	5.0	7.5	10.0
0.08	0.0002	0.05	Q	.	.	.	.
0.17	0.0005	0.05	Q	.	.	.	.
0.25	0.0008	0.05	Q	.	.	.	.
0.33	0.0012	0.05	Q	.	.	.	.
0.42	0.0015	0.05	Q	.	.	.	.
0.50	0.0019	0.05	Q	.	.	.	.
0.58	0.0022	0.05	Q	.	.	.	.
0.67	0.0025	0.05	Q	.	.	.	.
0.75	0.0029	0.05	Q	.	.	.	.
0.83	0.0032	0.05	Q	.	.	.	.
0.92	0.0036	0.05	Q	.	.	.	.
1.00	0.0039	0.05	Q	.	.	.	.
1.08	0.0043	0.05	Q	.	.	.	.
1.17	0.0046	0.05	Q	.	.	.	.
1.25	0.0050	0.05	Q	.	.	.	.
1.33	0.0053	0.05	Q	.	.	.	.
1.42	0.0057	0.05	Q	.	.	.	.
1.50	0.0060	0.05	Q	.	.	.	.
1.58	0.0064	0.05	Q	.	.	.	.
1.67	0.0067	0.05	Q	.	.	.	.
1.75	0.0071	0.05	Q	.	.	.	.
1.83	0.0074	0.05	Q	.	.	.	.
1.92	0.0078	0.05	Q	.	.	.	.
2.00	0.0082	0.05	Q	.	.	.	.
2.08	0.0085	0.05	Q	.	.	.	.
2.17	0.0089	0.05	Q	.	.	.	.
2.25	0.0093	0.05	Q	.	.	.	.
2.33	0.0096	0.05	Q	.	.	.	.
2.42	0.0100	0.05	Q	.	.	.	.
2.50	0.0104	0.05	Q	.	.	.	.
2.58	0.0107	0.05	Q	.	.	.	.
2.67	0.0111	0.05	Q	.	.	.	.
2.75	0.0115	0.05	Q	.	.	.	.
2.83	0.0118	0.05	Q	.	.	.	.
2.92	0.0122	0.05	Q	.	.	.	.
3.00	0.0126	0.05	Q	.	.	.	.
3.08	0.0130	0.05	Q	.	.	.	.
3.17	0.0133	0.05	Q	.	.	.	.
3.25	0.0137	0.06	Q	.	.	.	.
3.33	0.0141	0.06	Q	.	.	.	.
3.42	0.0145	0.06	Q	.	.	.	.
3.50	0.0149	0.06	Q	.	.	.	.
3.58	0.0152	0.06	Q	.	.	.	.
3.67	0.0156	0.06	Q	.	.	.	.
3.75	0.0160	0.06	Q	.	.	.	.
3.83	0.0164	0.06	Q	.	.	.	.
3.92	0.0168	0.06	Q	.	.	.	.
4.00	0.0172	0.06	Q	.	.	.	.
4.08	0.0176	0.06	Q	.	.	.	.
4.17	0.0180	0.06	Q	.	.	.	.
4.25	0.0184	0.06	Q	.	.	.	.
4.33	0.0188	0.06	Q	.	.	.	.
4.42	0.0192	0.06	Q	.	.	.	.
4.50	0.0196	0.06	Q	.	.	.	.
4.58	0.0200	0.06	Q	.	.	.	.
4.67	0.0204	0.06	Q	.	.	.	.
4.75	0.0208	0.06	Q	.	.	.	.
4.83	0.0212	0.06	Q	.	.	.	.
4.92	0.0216	0.06	Q	.	.	.	.
5.00	0.0220	0.06	Q	.	.	.	.

5.08	0.0224	0.06	Q	.	.	.	.
5.17	0.0228	0.06	Q	.	.	.	.
5.25	0.0232	0.06	Q	.	.	.	.
5.33	0.0236	0.06	Q	.	.	.	.
5.42	0.0241	0.06	Q	.	.	.	.
5.50	0.0245	0.06	Q	.	.	.	.
5.58	0.0249	0.06	Q	.	.	.	.
5.67	0.0253	0.06	Q	.	.	.	.
5.75	0.0258	0.06	Q	.	.	.	.
5.83	0.0262	0.06	Q	.	.	.	.
5.92	0.0266	0.06	Q	.	.	.	.
6.00	0.0270	0.06	Q	.	.	.	.
6.08	0.0275	0.06	Q	.	.	.	.
6.17	0.0279	0.06	Q	.	.	.	.
6.25	0.0283	0.06	Q	.	.	.	.
6.33	0.0288	0.06	Q	.	.	.	.
6.42	0.0292	0.06	Q	.	.	.	.
6.50	0.0297	0.06	Q	.	.	.	.
6.58	0.0301	0.06	Q	.	.	.	.
6.67	0.0306	0.07	Q	.	.	.	.
6.75	0.0310	0.07	Q	.	.	.	.
6.83	0.0315	0.07	Q	.	.	.	.
6.92	0.0319	0.07	Q	.	.	.	.
7.00	0.0324	0.07	Q	.	.	.	.
7.08	0.0328	0.07	Q	.	.	.	.
7.17	0.0333	0.07	Q	.	.	.	.
7.25	0.0338	0.07	Q	.	.	.	.
7.33	0.0342	0.07	Q	.	.	.	.
7.42	0.0347	0.07	Q	.	.	.	.
7.50	0.0352	0.07	Q	.	.	.	.
7.58	0.0356	0.07	Q	.	.	.	.
7.67	0.0361	0.07	Q	.	.	.	.
7.75	0.0366	0.07	Q	.	.	.	.
7.83	0.0371	0.07	Q	.	.	.	.
7.92	0.0376	0.07	Q	.	.	.	.
8.00	0.0380	0.07	Q	.	.	.	.
8.08	0.0385	0.07	Q	.	.	.	.
8.17	0.0390	0.07	Q	.	.	.	.
8.25	0.0395	0.07	Q	.	.	.	.
8.33	0.0400	0.07	Q	.	.	.	.
8.42	0.0405	0.07	Q	.	.	.	.
8.50	0.0410	0.07	Q	.	.	.	.
8.58	0.0415	0.07	Q	.	.	.	.
8.67	0.0420	0.07	Q	.	.	.	.
8.75	0.0425	0.07	Q	.	.	.	.
8.83	0.0431	0.08	Q	.	.	.	.
8.92	0.0436	0.08	Q	.	.	.	.
9.00	0.0441	0.08	Q	.	.	.	.
9.08	0.0446	0.08	Q	.	.	.	.
9.17	0.0452	0.08	Q	.	.	.	.
9.25	0.0457	0.08	Q	.	.	.	.
9.33	0.0462	0.08	Q	.	.	.	.
9.42	0.0468	0.08	Q	.	.	.	.
9.50	0.0473	0.08	Q	.	.	.	.
9.58	0.0479	0.08	Q	.	.	.	.
9.67	0.0484	0.08	Q	.	.	.	.
9.75	0.0490	0.08	Q	.	.	.	.
9.83	0.0495	0.08	Q	.	.	.	.
9.92	0.0501	0.08	Q	.	.	.	.
10.00	0.0507	0.08	Q	.	.	.	.
10.08	0.0512	0.08	Q	.	.	.	.
10.17	0.0518	0.08	Q	.	.	.	.
10.25	0.0524	0.08	Q	.	.	.	.
10.33	0.0530	0.09	Q	.	.	.	.
10.42	0.0536	0.09	Q	.	.	.	.

10.50	0.0542	0.09	Q	.	.	.	.
10.58	0.0548	0.09	Q	.	.	.	.
10.67	0.0554	0.09	Q	.	.	.	.
10.75	0.0560	0.09	Q	.	.	.	.
10.83	0.0566	0.09	Q	.	.	.	.
10.92	0.0572	0.09	Q	.	.	.	.
11.00	0.0578	0.09	Q	.	.	.	.
11.08	0.0585	0.09	Q	.	.	.	.
11.17	0.0591	0.09	Q	.	.	.	.
11.25	0.0597	0.09	Q	.	.	.	.
11.33	0.0604	0.09	Q	.	.	.	.
11.42	0.0610	0.10	Q	.	.	.	.
11.50	0.0617	0.10	Q	.	.	.	.
11.58	0.0624	0.10	Q	.	.	.	.
11.67	0.0630	0.10	Q	.	.	.	.
11.75	0.0637	0.10	Q	.	.	.	.
11.83	0.0644	0.10	Q	.	.	.	.
11.92	0.0651	0.10	Q	.	.	.	.
12.00	0.0658	0.10	Q	.	.	.	.
12.08	0.0666	0.11	Q	.	.	.	.
12.17	0.0673	0.11	Q	.	.	.	.
12.25	0.0681	0.12	Q	.	.	.	.
12.33	0.0689	0.12	Q	.	.	.	.
12.42	0.0697	0.12	Q	.	.	.	.
12.50	0.0706	0.12	Q	.	.	.	.
12.58	0.0714	0.12	Q	.	.	.	.
12.67	0.0722	0.12	Q	.	.	.	.
12.75	0.0731	0.12	Q	.	.	.	.
12.83	0.0739	0.12	Q	.	.	.	.
12.92	0.0748	0.13	Q	.	.	.	.
13.00	0.0757	0.13	Q	.	.	.	.
13.08	0.0766	0.13	Q	.	.	.	.
13.17	0.0775	0.13	Q	.	.	.	.
13.25	0.0784	0.13	Q	.	.	.	.
13.33	0.0793	0.14	Q	.	.	.	.
13.42	0.0803	0.14	Q	.	.	.	.
13.50	0.0812	0.14	Q	.	.	.	.
13.58	0.0822	0.14	Q	.	.	.	.
13.67	0.0832	0.15	Q	.	.	.	.
13.75	0.0842	0.15	Q	.	.	.	.
13.83	0.0852	0.15	Q	.	.	.	.
13.92	0.0863	0.15	Q	.	.	.	.
14.00	0.0874	0.16	Q	.	.	.	.
14.08	0.0885	0.17	Q	.	.	.	.
14.17	0.0896	0.17	Q	.	.	.	.
14.25	0.0908	0.18	Q	.	.	.	.
14.33	0.0920	0.18	Q	.	.	.	.
14.42	0.0933	0.18	Q	.	.	.	.
14.50	0.0946	0.19	Q	.	.	.	.
14.58	0.0959	0.19	Q	.	.	.	.
14.67	0.0972	0.20	Q	.	.	.	.
14.75	0.0986	0.20	Q	.	.	.	.
14.83	0.1000	0.21	Q	.	.	.	.
14.92	0.1015	0.22	Q	.	.	.	.
15.00	0.1030	0.22	Q	.	.	.	.
15.08	0.1046	0.24	Q	.	.	.	.
15.17	0.1063	0.24	Q	.	.	.	.
15.25	0.1080	0.26	.Q	.	.	.	.
15.33	0.1098	0.27	.Q	.	.	.	.
15.42	0.1116	0.26	.Q	.	.	.	.
15.50	0.1135	0.28	.Q	.	.	.	.
15.58	0.1155	0.31	.Q	.	.	.	.
15.67	0.1177	0.33	.Q	.	.	.	.
15.75	0.1203	0.42	.Q	.	.	.	.
15.83	0.1233	0.46	.Q	.	.	.	.

15.92	0.1271	0.62	. Q	.	.	.	.
16.00	0.1321	0.83	. Q	.	.	.	.
16.08	0.1423	2.15	. Q	.	.	.	.
16.17	0.1515	0.53	. Q	.	.	.	.
16.25	0.1546	0.36	.Q	.	.	.	.
16.33	0.1568	0.29	.Q	.	.	.	.
16.42	0.1588	0.28	.Q	.	.	.	.
16.50	0.1606	0.25	.Q	.	.	.	.
16.58	0.1622	0.23	Q	.	.	.	.
16.67	0.1638	0.21	Q	.	.	.	.
16.75	0.1652	0.20	Q	.	.	.	.
16.83	0.1665	0.19	Q	.	.	.	.
16.92	0.1678	0.18	Q	.	.	.	.
17.00	0.1690	0.17	Q	.	.	.	.
17.08	0.1702	0.16	Q	.	.	.	.
17.17	0.1712	0.15	Q	.	.	.	.
17.25	0.1723	0.15	Q	.	.	.	.
17.33	0.1733	0.14	Q	.	.	.	.
17.42	0.1742	0.14	Q	.	.	.	.
17.50	0.1752	0.13	Q	.	.	.	.
17.58	0.1761	0.13	Q	.	.	.	.
17.67	0.1769	0.13	Q	.	.	.	.
17.75	0.1778	0.12	Q	.	.	.	.
17.83	0.1786	0.12	Q	.	.	.	.
17.92	0.1795	0.12	Q	.	.	.	.
18.00	0.1802	0.11	Q	.	.	.	.
18.08	0.1810	0.10	Q	.	.	.	.
18.17	0.1817	0.10	Q	.	.	.	.
18.25	0.1824	0.10	Q	.	.	.	.
18.33	0.1831	0.10	Q	.	.	.	.
18.42	0.1837	0.10	Q	.	.	.	.
18.50	0.1844	0.09	Q	.	.	.	.
18.58	0.1850	0.09	Q	.	.	.	.
18.67	0.1856	0.09	Q	.	.	.	.
18.75	0.1863	0.09	Q	.	.	.	.
18.83	0.1869	0.09	Q	.	.	.	.
18.92	0.1875	0.09	Q	.	.	.	.
19.00	0.1880	0.08	Q	.	.	.	.
19.08	0.1886	0.08	Q	.	.	.	.
19.17	0.1892	0.08	Q	.	.	.	.
19.25	0.1897	0.08	Q	.	.	.	.
19.33	0.1903	0.08	Q	.	.	.	.
19.42	0.1908	0.08	Q	.	.	.	.
19.50	0.1914	0.08	Q	.	.	.	.
19.58	0.1919	0.08	Q	.	.	.	.
19.67	0.1924	0.08	Q	.	.	.	.
19.75	0.1929	0.07	Q	.	.	.	.
19.83	0.1935	0.07	Q	.	.	.	.
19.92	0.1940	0.07	Q	.	.	.	.
20.00	0.1945	0.07	Q	.	.	.	.
20.08	0.1949	0.07	Q	.	.	.	.
20.17	0.1954	0.07	Q	.	.	.	.
20.25	0.1959	0.07	Q	.	.	.	.
20.33	0.1964	0.07	Q	.	.	.	.
20.42	0.1969	0.07	Q	.	.	.	.
20.50	0.1973	0.07	Q	.	.	.	.
20.58	0.1978	0.07	Q	.	.	.	.
20.67	0.1982	0.07	Q	.	.	.	.
20.75	0.1987	0.07	Q	.	.	.	.
20.83	0.1991	0.06	Q	.	.	.	.
20.92	0.1996	0.06	Q	.	.	.	.
21.00	0.2000	0.06	Q	.	.	.	.
21.08	0.2005	0.06	Q	.	.	.	.
21.17	0.2009	0.06	Q	.	.	.	.
21.25	0.2013	0.06	Q	.	.	.	.

21.33	0.2017	0.06	Q	.	.	.	.
21.42	0.2022	0.06	Q	.	.	.	.
21.50	0.2026	0.06	Q	.	.	.	.
21.58	0.2030	0.06	Q	.	.	.	.
21.67	0.2034	0.06	Q	.	.	.	.
21.75	0.2038	0.06	Q	.	.	.	.
21.83	0.2042	0.06	Q	.	.	.	.
21.92	0.2046	0.06	Q	.	.	.	.
22.00	0.2050	0.06	Q	.	.	.	.
22.08	0.2054	0.06	Q	.	.	.	.
22.17	0.2058	0.06	Q	.	.	.	.
22.25	0.2062	0.06	Q	.	.	.	.
22.33	0.2066	0.06	Q	.	.	.	.
22.42	0.2069	0.06	Q	.	.	.	.
22.50	0.2073	0.05	Q	.	.	.	.
22.58	0.2077	0.05	Q	.	.	.	.
22.67	0.2081	0.05	Q	.	.	.	.
22.75	0.2085	0.05	Q	.	.	.	.
22.83	0.2088	0.05	Q	.	.	.	.
22.92	0.2092	0.05	Q	.	.	.	.
23.00	0.2096	0.05	Q	.	.	.	.
23.08	0.2099	0.05	Q	.	.	.	.
23.17	0.2103	0.05	Q	.	.	.	.
23.25	0.2106	0.05	Q	.	.	.	.
23.33	0.2110	0.05	Q	.	.	.	.
23.42	0.2113	0.05	Q	.	.	.	.
23.50	0.2117	0.05	Q	.	.	.	.
23.58	0.2120	0.05	Q	.	.	.	.
23.67	0.2124	0.05	Q	.	.	.	.
23.75	0.2127	0.05	Q	.	.	.	.
23.83	0.2131	0.05	Q	.	.	.	.
23.92	0.2134	0.05	Q	.	.	.	.
24.00	0.2138	0.05	Q	.	.	.	.
24.08	0.2139	0.00	Q	.	.	.	.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1440.0
10%	105.0
20%	25.0
30%	10.0
40%	5.0
50%	5.0
60%	5.0
70%	5.0
80%	5.0
90%	5.0

PROPOSED

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******************************************************************************
                    SMALL AREA UNIT HYDROGRAPH MODEL
==============================================================================
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             Ver. 23.0  Release Date: 07/01/2016  License ID 1499

                          Analysis prepared by:



******************************************************************************
------------------------------------------------------------------------------

 Problem Descriptions:
  GENERAL ATOMICS
  PROPOSED UNIT HYDROGRAPH ANALYSIS - DA 1
  100 YR DESIGN STORM 3.31.25
------------------------------------------------------------------------------


    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.74
    TOTAL CATCHMENT AREA(ACRES) =   12.30
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.021
    LOW LOSS FRACTION = 0.197
    TIME OF CONCENTRATION(MIN.) = 10.34
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    USER SPECIFIED RAINFALL VALUES ARE USED
    RETURN FREQUENCY(YEARS) =  98
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.22
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.54
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.74
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.30
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.83
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  3.44

------------------------------------------------------------------------------

    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     2.28
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     1.25

******************************************************************************
  TIME      VOLUME        Q    0.        5.0       10.0       15.0       20.0
 (HOURS)     (AF)      (CFS)
------------------------------------------------------------------------------
  0.15      0.0034      0.48  Q          .         .          .          .
  0.32      0.0103      0.48  Q          .         .          .          .
  0.49      0.0172      0.48  Q          .         .          .          .
  0.66      0.0241      0.49  Q          .         .          .          .
  0.83      0.0311      0.49  Q          .         .          .          .
  1.01      0.0381      0.49  Q          .         .          .          .
  1.18      0.0452      0.50  Q          .         .          .          .
  1.35      0.0523      0.50  .Q         .         .          .          .
  1.52      0.0594      0.50  .Q         .         .          .          .
  1.70      0.0666      0.51  .Q         .         .          .          .
  1.87      0.0738      0.51  .Q         .         .          .          .
  2.04      0.0811      0.51  .Q         .         .          .          .
  2.21      0.0885      0.52  .Q         .         .          .          .
  2.39      0.0959      0.52  .Q         .         .          .          .
  2.56      0.1033      0.52  .Q         .         .          .          .
  2.73      0.1108      0.53  .Q         .         .          .          .
  2.90      0.1183      0.53  .Q         .         .          .          .
```

3.07	0.1259	0.54	.Q	.	.	.	.
3.25	0.1336	0.54	.Q	.	.	.	.
3.42	0.1413	0.54	.Q	.	.	.	.
3.59	0.1491	0.55	.Q	.	.	.	.
3.76	0.1569	0.55	.Q	.	.	.	.
3.94	0.1648	0.56	.Q	.	.	.	.
4.11	0.1727	0.56	.Q	.	.	.	.
4.28	0.1807	0.56	.Q	.	.	.	.
4.45	0.1888	0.57	.Q	.	.	.	.
4.63	0.1969	0.57	.Q	.	.	.	.
4.80	0.2051	0.58	.Q	.	.	.	.
4.97	0.2134	0.58	.Q	.	.	.	.
5.14	0.2218	0.59	.Q	.	.	.	.
5.32	0.2302	0.59	.Q	.	.	.	.
5.49	0.2387	0.60	.Q	.	.	.	.
5.66	0.2472	0.60	.Q	.	.	.	.
5.83	0.2559	0.61	.Q	.	.	.	.
6.00	0.2646	0.61	.Q	.	.	.	.
6.18	0.2734	0.62	.Q	.	.	.	.
6.35	0.2822	0.63	.Q	.	.	.	.
6.52	0.2912	0.63	.Q	.	.	.	.
6.69	0.3003	0.64	.Q	.	.	.	.
6.87	0.3094	0.65	.Q	.	.	.	.
7.04	0.3187	0.65	.Q	.	.	.	.
7.21	0.3280	0.66	.Q	.	.	.	.
7.38	0.3374	0.66	.Q	.	.	.	.
7.56	0.3470	0.67	.Q	.	.	.	.
7.73	0.3566	0.68	.Q	.	.	.	.
7.90	0.3663	0.69	.Q	.	.	.	.
8.07	0.3762	0.69	.Q	.	.	.	.
8.24	0.3862	0.71	.Q	.	.	.	.
8.42	0.3963	0.71	.Q	.	.	.	.
8.59	0.4065	0.72	.Q	.	.	.	.
8.76	0.4168	0.73	.Q	.	.	.	.
8.93	0.4273	0.74	.Q	.	.	.	.
9.11	0.4379	0.75	.Q	.	.	.	.
9.28	0.4487	0.76	.Q	.	.	.	.
9.45	0.4596	0.77	.Q	.	.	.	.
9.62	0.4706	0.78	.Q	.	.	.	.
9.80	0.4819	0.79	.Q	.	.	.	.
9.97	0.4933	0.81	.Q	.	.	.	.
10.14	0.5050	0.82	.Q	.	.	.	.
10.31	0.5169	0.85	.Q	.	.	.	.
10.49	0.5290	0.86	.Q	.	.	.	.
10.66	0.5414	0.88	.Q	.	.	.	.
10.83	0.5540	0.89	.Q	.	.	.	.
11.00	0.5669	0.92	.Q	.	.	.	.
11.17	0.5801	0.93	.Q	.	.	.	.
11.35	0.5936	0.96	.Q	.	.	.	.
11.52	0.6074	0.98	.Q	.	.	.	.
11.69	0.6216	1.01	. Q	.	.	.	.
11.86	0.6361	1.03	. Q	.	.	.	.
12.04	0.6510	1.07	. Q	.	.	.	.
12.21	0.6669	1.17	. Q	.	.	.	.
12.38	0.6841	1.23	. Q	.	.	.	.
12.55	0.7018	1.26	. Q	.	.	.	.
12.73	0.7201	1.31	. Q	.	.	.	.
12.90	0.7388	1.33	. Q	.	.	.	.
13.07	0.7582	1.39	. Q	.	.	.	.
13.24	0.7782	1.42	. Q	.	.	.	.
13.41	0.7989	1.49	. Q	.	.	.	.
13.59	0.8204	1.53	. Q	.	.	.	.
13.76	0.8427	1.61	. Q	.	.	.	.
13.93	0.8660	1.65	. Q	.	.	.	.
14.10	0.8905	1.79	. Q	.	.	.	.

14.28	0.9168	1.90	. Q . . . .
14.45	0.9448	2.04	. Q . . . .
14.62	0.9744	2.12	. Q . . . .
14.79	1.0059	2.30	. Q . . . .
14.97	1.0394	2.41	. Q . . . .
15.14	1.0759	2.70	. Q . . . .
15.31	1.1156	2.88	. Q . . . .
15.48	1.1583	3.12	. Q . . . .
15.66	1.2049	3.42	. Q . . . .
15.83	1.2655	5.09	. Q . . .
16.00	1.3496	6.73	. . Q . . .
16.17	1.5147	16.47	. . . . Q .
16.34	1.6601	3.95	. Q . . . .
16.52	1.7103	3.10	. Q . . . .
16.69	1.7505	2.55	. Q . . . .
16.86	1.7843	2.20	. Q . . . .
17.03	1.8140	1.97	. Q . . . .
17.21	1.8401	1.70	. Q . . . .
17.38	1.8634	1.57	. Q . . . .
17.55	1.8849	1.45	. Q . . . .
17.72	1.9050	1.36	. Q . . . .
17.90	1.9238	1.28	. Q . . . .
18.07	1.9415	1.21	. Q . . . .
18.24	1.9576	1.05	. Q . . . .
18.41	1.9721	0.99	.Q . . . .
18.58	1.9860	0.95	.Q . . . .
18.76	1.9992	0.91	.Q . . . .
18.93	2.0118	0.87	.Q . . . .
19.10	2.0239	0.83	.Q . . . .
19.27	2.0356	0.80	.Q . . . .
19.45	2.0468	0.78	.Q . . . .
19.62	2.0578	0.76	.Q . . . .
19.79	2.0684	0.74	.Q . . . .
19.96	2.0787	0.72	.Q . . . .
20.14	2.0888	0.70	.Q . . . .
20.31	2.0987	0.68	.Q . . . .
20.48	2.1083	0.67	.Q . . . .
20.65	2.1177	0.66	.Q . . . .
20.83	2.1270	0.64	.Q . . . .
21.00	2.1360	0.63	.Q . . . .
21.17	2.1449	0.62	.Q . . . .
21.34	2.1536	0.61	.Q . . . .
21.51	2.1622	0.60	.Q . . . .
21.69	2.1706	0.59	.Q . . . .
21.86	2.1789	0.58	.Q . . . .
22.03	2.1870	0.57	.Q . . . .
22.20	2.1950	0.56	.Q . . . .
22.38	2.2029	0.55	.Q . . . .
22.55	2.2107	0.54	.Q . . . .
22.72	2.2183	0.53	.Q . . . .
22.89	2.2259	0.53	.Q . . . .
23.07	2.2333	0.52	.Q . . . .
23.24	2.2407	0.51	.Q . . . .
23.41	2.2479	0.51	.Q . . . .
23.58	2.2551	0.50	Q . . . .
23.76	2.2621	0.49	Q . . . .
23.93	2.2691	0.49	Q . . . .
24.10	2.2760	0.48	Q . . . .
24.27	2.2794	0.00	Q . . . .

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1447.6
10%	206.8
20%	51.7
30%	31.0
40%	20.7
50%	10.3
60%	10.3
70%	10.3
80%	10.3
90%	10.3

```
**************************************************************************
                    SMALL AREA UNIT HYDROGRAPH MODEL
==========================================================================
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             Ver. 23.0  Release Date: 07/01/2016  License ID 1499

                          Analysis prepared by:



**************************************************************************
--------------------------------------------------------------------------

 Problem Descriptions:
  GENERAL ATOMICS
  PROPOSED UNIT HYDROGRAPH ANALYSIS - DA 2
  100 YR DESIGN STORM 3.31.25
--------------------------------------------------------------------------


    RATIONAL METHOD CALIBRATION COEFFICIENT = 1.09
    TOTAL CATCHMENT AREA(ACRES) =    1.08
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.000
    LOW LOSS FRACTION = 0.068
    TIME OF CONCENTRATION(MIN.) = 10.62
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    USER SPECIFIED RAINFALL VALUES ARE USED
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.22
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.54
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.74
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.30
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.83
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  3.44

--------------------------------------------------------------------------

    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.34
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =    -0.03

**************************************************************************
  TIME      VOLUME       Q    0.        2.5       5.0       7.5      10.0
 (HOURS)     (AF)      (CFS)
--------------------------------------------------------------------------
  0.07      0.0000      0.00  Q         .         .         .         .
  0.25      0.0006      0.08  Q         .         .         .         .
  0.42      0.0017      0.08  Q         .         .         .         .
  0.60      0.0028      0.08  Q         .         .         .         .
  0.78      0.0040      0.08  Q         .         .         .         .
  0.95      0.0051      0.08  Q         .         .         .         .
  1.13      0.0063      0.08  Q         .         .         .         .
  1.31      0.0075      0.08  Q         .         .         .         .
  1.48      0.0086      0.08  Q         .         .         .         .
  1.66      0.0098      0.08  Q         .         .         .         .
  1.84      0.0110      0.08  Q         .         .         .         .
  2.02      0.0122      0.08  Q         .         .         .         .
  2.19      0.0134      0.08  Q         .         .         .         .
  2.37      0.0146      0.08  Q         .         .         .         .
  2.55      0.0158      0.08  Q         .         .         .         .
  2.72      0.0171      0.08  Q         .         .         .         .
  2.90      0.0183      0.09  Q         .         .         .         .
```

3.08	0.0196	0.09	Q	.	.	.	.
3.25	0.0208	0.09	Q	.	.	.	.
3.43	0.0221	0.09	Q	.	.	.	.
3.61	0.0234	0.09	Q	.	.	.	.
3.79	0.0247	0.09	Q	.	.	.	.
3.96	0.0260	0.09	Q	.	.	.	.
4.14	0.0273	0.09	Q	.	.	.	.
4.32	0.0286	0.09	Q	.	.	.	.
4.49	0.0299	0.09	Q	.	.	.	.
4.67	0.0313	0.09	Q	.	.	.	.
4.85	0.0326	0.09	Q	.	.	.	.
5.02	0.0340	0.09	Q	.	.	.	.
5.20	0.0354	0.09	Q	.	.	.	.
5.38	0.0367	0.10	Q	.	.	.	.
5.56	0.0381	0.10	Q	.	.	.	.
5.73	0.0396	0.10	Q	.	.	.	.
5.91	0.0410	0.10	Q	.	.	.	.
6.09	0.0424	0.10	Q	.	.	.	.
6.26	0.0439	0.10	Q	.	.	.	.
6.44	0.0454	0.10	Q	.	.	.	.
6.62	0.0468	0.10	Q	.	.	.	.
6.80	0.0483	0.10	Q	.	.	.	.
6.97	0.0498	0.10	Q	.	.	.	.
7.15	0.0514	0.10	Q	.	.	.	.
7.33	0.0529	0.11	Q	.	.	.	.
7.50	0.0545	0.11	Q	.	.	.	.
7.68	0.0561	0.11	Q	.	.	.	.
7.86	0.0577	0.11	Q	.	.	.	.
8.03	0.0593	0.11	Q	.	.	.	.
8.21	0.0609	0.11	Q	.	.	.	.
8.39	0.0626	0.11	Q	.	.	.	.
8.57	0.0643	0.12	Q	.	.	.	.
8.74	0.0660	0.12	Q	.	.	.	.
8.92	0.0677	0.12	Q	.	.	.	.
9.10	0.0694	0.12	Q	.	.	.	.
9.27	0.0712	0.12	Q	.	.	.	.
9.45	0.0730	0.12	Q	.	.	.	.
9.63	0.0748	0.12	Q	.	.	.	.
9.80	0.0766	0.13	Q	.	.	.	.
9.98	0.0785	0.13	Q	.	.	.	.
10.16	0.0804	0.13	Q	.	.	.	.
10.34	0.0824	0.13	Q	.	.	.	.
10.51	0.0843	0.14	Q	.	.	.	.
10.69	0.0863	0.14	Q	.	.	.	.
10.87	0.0884	0.14	Q	.	.	.	.
11.04	0.0904	0.14	Q	.	.	.	.
11.22	0.0926	0.15	Q	.	.	.	.
11.40	0.0947	0.15	Q	.	.	.	.
11.57	0.0969	0.15	Q	.	.	.	.
11.75	0.0992	0.15	Q	.	.	.	.
11.93	0.1015	0.16	Q	.	.	.	.
12.11	0.1038	0.16	Q	.	.	.	.
12.28	0.1063	0.18	Q	.	.	.	.
12.46	0.1090	0.18	Q	.	.	.	.
12.64	0.1117	0.19	Q	.	.	.	.
12.81	0.1145	0.19	Q	.	.	.	.
12.99	0.1174	0.20	Q	.	.	.	.
13.17	0.1204	0.20	Q	.	.	.	.
13.34	0.1234	0.21	Q	.	.	.	.
13.52	0.1266	0.22	Q	.	.	.	.
13.70	0.1298	0.23	Q	.	.	.	.
13.88	0.1332	0.23	Q	.	.	.	.
14.05	0.1368	0.25	Q	.	.	.	.
14.23	0.1405	0.27	.Q	.	.	.	.
14.41	0.1445	0.28	.Q	.	.	.	.

14.58	0.1487	0.29	.Q	.	.	.	.
14.76	0.1532	0.32	.Q	.	.	.	.
14.94	0.1579	0.33	.Q	.	.	.	.
15.11	0.1630	0.37	.Q	.	.	.	.
15.29	0.1686	0.39	.Q	.	.	.	.
15.47	0.1745	0.43	.Q	.	.	.	.
15.65	0.1810	0.46	.Q	.	.	.	.
15.82	0.1892	0.67	. Q	.	.	.	.
16.00	0.2005	0.88	. Q	.	.	.	.
16.18	0.2224	2.11	.	Q .	.	.	.
16.35	0.2417	0.52	. Q	.	.	.	.
16.53	0.2486	0.42	.Q	.	.	.	.
16.71	0.2542	0.35	.Q	.	.	.	.
16.89	0.2590	0.30	.Q	.	.	.	.
17.06	0.2632	0.27	.Q	.	.	.	.
17.24	0.2670	0.24	Q	.	.	.	.
17.42	0.2704	0.22	Q	.	.	.	.
17.59	0.2736	0.21	Q	.	.	.	.
17.77	0.2765	0.20	Q	.	.	.	.
17.95	0.2793	0.19	Q	.	.	.	.
18.12	0.2820	0.18	Q	.	.	.	.
18.30	0.2844	0.16	Q	.	.	.	.
18.48	0.2867	0.15	Q	.	.	.	.
18.66	0.2888	0.14	Q	.	.	.	.
18.83	0.2909	0.14	Q	.	.	.	.
19.01	0.2929	0.13	Q	.	.	.	.
19.19	0.2948	0.13	Q	.	.	.	.
19.36	0.2967	0.13	Q	.	.	.	.
19.54	0.2985	0.12	Q	.	.	.	.
19.72	0.3003	0.12	Q	.	.	.	.
19.89	0.3020	0.12	Q	.	.	.	.
20.07	0.3037	0.11	Q	.	.	.	.
20.25	0.3053	0.11	Q	.	.	.	.
20.43	0.3069	0.11	Q	.	.	.	.
20.60	0.3085	0.11	Q	.	.	.	.
20.78	0.3100	0.10	Q	.	.	.	.
20.96	0.3115	0.10	Q	.	.	.	.
21.13	0.3130	0.10	Q	.	.	.	.
21.31	0.3144	0.10	Q	.	.	.	.
21.49	0.3159	0.10	Q	.	.	.	.
21.66	0.3172	0.09	Q	.	.	.	.
21.84	0.3186	0.09	Q	.	.	.	.
22.02	0.3200	0.09	Q	.	.	.	.
22.20	0.3213	0.09	Q	.	.	.	.
22.37	0.3226	0.09	Q	.	.	.	.
22.55	0.3239	0.09	Q	.	.	.	.
22.73	0.3251	0.09	Q	.	.	.	.
22.90	0.3264	0.08	Q	.	.	.	.
23.08	0.3276	0.08	Q	.	.	.	.
23.26	0.3288	0.08	Q	.	.	.	.
23.43	0.3300	0.08	Q	.	.	.	.
23.61	0.3311	0.08	Q	.	.	.	.
23.79	0.3323	0.08	Q	.	.	.	.
23.97	0.3335	0.08	Q	.	.	.	.
24.14	0.3346	0.08	Q	.	.	.	.
24.32	0.3351	0.00	Q	.	.	.	.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
==========	=========

0%	1444.5
10%	254.9
20%	63.7
30%	31.9
40%	21.2
50%	10.6
60%	10.6
70%	10.6
80%	10.6
90%	10.6

```
**************************************************************************
                    SMALL AREA UNIT HYDROGRAPH MODEL
==========================================================================
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             Ver. 23.0  Release Date: 07/01/2016  License ID 1499

                          Analysis prepared by:



**************************************************************************
--------------------------------------------------------------------------

 Problem Descriptions:
  GENERAL ATOMICS
  PROPOSED UNIT HYDROGRAPH ANALYSIS - DA 3
  100 YR DESIGN STORM 3.31.25
--------------------------------------------------------------------------


    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.73
    TOTAL CATCHMENT AREA(ACRES) =    1.09
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.000
    LOW LOSS FRACTION = 0.197
    TIME OF CONCENTRATION(MIN.) = 27.76
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    USER SPECIFIED RAINFALL VALUES ARE USED
    RETURN FREQUENCY(YEARS) = 100
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.22
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.54
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.74
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  1.30
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  1.83
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  3.44

--------------------------------------------------------------------------

    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.22
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.09

**************************************************************************
  TIME      VOLUME       Q    0.        2.5       5.0       7.5      10.0
 (HOURS)     (AF)      (CFS)
--------------------------------------------------------------------------
  0.27      0.0000      0.00  Q         .         .         .         .
  0.73      0.0010      0.05  Q         .         .         .         .
  1.20      0.0030      0.05  Q         .         .         .         .
  1.66      0.0051      0.05  Q         .         .         .         .
  2.12      0.0071      0.05  Q         .         .         .         .
  2.58      0.0093      0.06  Q         .         .         .         .
  3.05      0.0114      0.06  Q         .         .         .         .
  3.51      0.0136      0.06  Q         .         .         .         .
  3.97      0.0159      0.06  Q         .         .         .         .
  4.43      0.0181      0.06  Q         .         .         .         .
  4.90      0.0205      0.06  Q         .         .         .         .
  5.36      0.0229      0.06  Q         .         .         .         .
  5.82      0.0253      0.06  Q         .         .         .         .
  6.28      0.0278      0.07  Q         .         .         .         .
  6.75      0.0304      0.07  Q         .         .         .         .
  7.21      0.0330      0.07  Q         .         .         .         .
  7.67      0.0357      0.07  Q         .         .         .         .
```

8.14	0.0385	0.07	Q	.	.	.	.
8.60	0.0414	0.08	Q	.	.	.	.
9.06	0.0444	0.08	Q	.	.	.	.
9.52	0.0474	0.08	Q	.	.	.	.
9.99	0.0506	0.09	Q	.	.	.	.
10.45	0.0539	0.09	Q	.	.	.	.
10.91	0.0574	0.09	Q	.	.	.	.
11.37	0.0610	0.10	Q	.	.	.	.
11.84	0.0648	0.10	Q	.	.	.	.
12.30	0.0689	0.11	Q	.	.	.	.
12.76	0.0733	0.13	Q	.	.	.	.
13.22	0.0783	0.13	Q	.	.	.	.
13.69	0.0836	0.15	Q	.	.	.	.
14.15	0.0894	0.16	Q	.	.	.	.
14.61	0.0961	0.19	Q	.	.	.	.
15.07	0.1038	0.21	Q	.	.	.	.
15.54	0.1131	0.28	.Q	.	.	.	.
16.00	0.1248	0.34	.Q	.	.	.	.
16.46	0.1481	0.88	. Q	.	.	.	.
16.93	0.1695	0.24	Q	.	.	.	.
17.39	0.1773	0.17	Q	.	.	.	.
17.85	0.1833	0.14	Q	.	.	.	.
18.31	0.1882	0.12	Q	.	.	.	.
18.78	0.1925	0.10	Q	.	.	.	.
19.24	0.1961	0.09	Q	.	.	.	.
19.70	0.1994	0.08	Q	.	.	.	.
20.16	0.2025	0.08	Q	.	.	.	.
20.63	0.2054	0.07	Q	.	.	.	.
21.09	0.2081	0.07	Q	.	.	.	.
21.55	0.2106	0.07	Q	.	.	.	.
22.01	0.2131	0.06	Q	.	.	.	.
22.48	0.2154	0.06	Q	.	.	.	.
22.94	0.2177	0.06	Q	.	.	.	.
23.40	0.2198	0.06	Q	.	.	.	.
23.86	0.2219	0.05	Q	.	.	.	.
24.33	0.2239	0.05	Q	.	.	.	.
24.79	0.2249	0.00	Q	.	.	.	.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1443.4
10%	527.4
20%	166.5
30%	83.3
40%	27.8
50%	27.8
60%	27.8
70%	27.8
80%	27.8
90%	27.8

Appendix G - Excerpt from Geotechnical Report



SOILS INVESTIGATION REPORT

GENERAL ATOMICS, DESERT HORIZONS II
73 El Mirage Airport Road
Adelanto, CA 92301

Prepared for Parkway Construction
Submitted by Merrell Johnson Geotechnical, Inc.
April 11, 2025
Project No. 24185P1

MERRELL JOHNSON

MERRELL JOHNSON
12277 Apple Valley Rd. #291, Apple Valley, CA 92308
760 240 8000 | www.merrelljohnson.com

April 11, 2025

Attn: Rick Siegfried
Parkway Construction & Architecture
18400 Von Karman, Suite 650
Irvine, CA 92612

Re: Soils Investigation Report | General Atomics, Desert Horizons II | 73 El Mirage Airport Road, Adelanto, CA 92301 | MJG Project No. 24185P1

Mr. Siegfried:

This letter transmits Merrell Johnson Geotechnical's (MJG) Soils Investigation Report for the subject project. The investigation was planned and performed based on the proposed project development illustrated on the Complete Project Site Plan prepared by Parkway Construction & Architecture dated 12/17/24.

We trust that the enclosed information will be useful for the design and construction phases of this project. If you have any questions, please do not hesitate to contact our firm.

Sincerely,

Brad S. Merrell, P.E., President
Merrell Johnson Geotechnical, Inc.
R.C.E. 49423



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INTRODUCTION

Project Description

This report presents the results of the Geotechnical Investigation Merrell Johnson Geotechnical (MJG) performed for the General Atomics, Desert Horizons II Project. The location of the proposed project development is shown on the Site Vicinity Map, Google Earth Site Image, and Complete Project Site Plan, included with this report as Appendix A, Figures 1-3.

MJG understands that the improvements will include the construction of a 98,950 SF Hangar, 20,000 SF stockroom, 19,500 SF Ground Control building, parking and other ancillary site improvements.

Scope of Services

The scope of work for this project consisted of field exploration, laboratory testing, engineering analyses, and preparation of this report. The results of the field exploration and laboratory test programs were analyzed to develop conclusions and recommendations regarding:

- Subsurface conditions underlying areas to be developed
- Site preparation and grading
- Excavation conditions
- Foundation support for the new structure along with soils engineering criteria for foundation design
- Support for slab-on-grade floors
- Estimated soil corrosivity with respect to concrete and ferrous metals
- Seismic design parameters
- Flexible pavement structural sections

FIELD EXPLORATION AND LABORATORY TESTING

Field Exploration

Subsurface conditions were explored by drilling nine (9), 8-inch-diameter, test borings; one (1) to a depth of 50 feet, four (4) to 25 feet, and four (4) to 5 feet below the existing ground surface. The locations of the test borings are shown on Complete Project Site Plan, Figure 3 in Appendix A.

The borings were logged by an MJG representative, who also collected samples of the materials encountered for examination and laboratory testing. Bulk samples were collected from drill cuttings. Relatively undisturbed samples were obtained by driving a 2.5-inch inside diameter modified California sampler with a 140-pound hammer falling 30 inches. Blow counts required to drive the sampler each 6 inches of an 18-inch (or less) drive are noted on the boring logs as “N” value.

Standard Penetration Tests (SPTs) were performed at selected depths by driving a 1.4-inch inside diameter sampler 18 inches with a 140-pound hammer falling 30 inches. The blow counts required to drive the sampler each 6 inches of the drive are noted on the boring logs as “N” value. Disturbed samples were collected from the SPT sampler at the time of driving.

The logs of the test borings are in Appendix B. The soils are described according to the Unified Soil Classification System, which is explained in the same appendix.

Laboratory Testing

The laboratory program included the following tests:

- ASTM D422 - Particle Size Analysis
- ASTM D4318 – Plasticity Index of Soils
- ASTM D1557 - Maximum Density
- ASTM D2937 - In-Place Moisture Content and Dry Density
- ASTM D4829 - Expansion Index of Soil
- ASTM D2844 / CT 301 - Resistance R-value
- ASTM D2435 / CT-219 - Consolidation of Soils
- ASTM D3080 - Direct Shear
- ASTM G51 / CT643, CT417, CT422 - Corrosion Potential

The results of the laboratory tests are summarized in Appendix C.

SITE AND SUBSURFACE CONDITIONS

Site Conditions

The proposed improvements will be located west of the existing Hangar 80 and its accompanying stockroom, where the topography is essentially flat. The area appears to have been previously graded, with some areas having sparse desert vegetation.

Subsurface Conditions

The site is blanketed by medium dense silty sand (SM) to a depth of 5-feet. Beneath the silty sand, are stiff to hard silty clays with sand (CLML) to a depth of approximately 40-feet. Below 40-feet, we discovered stiff to very stiff fat clays (CH) to a depth of 50-feet, which was the maximum depth explored.

Expansion Potential

Results of expansion index tests (ASTM D4829) performed on near-surface soil samples from Borings B1 and B4 exhibited expansion indexes of 21 and 30, respectively. These values correspond to a low expansion potential.

Seismic Design Considerations

Included with this study was an assessment of the seismic ground motion parameters of the subject site with respect to the most recently adopted 2022 California Building Code (CBC) and ASCE/SEI Standard 7-16 (ASCE, 2017) as partially summarized and tabulated below. Geographically, the subject site is centrally located at Latitude 34..622107 and Longitude -117.590307.

SUMMARY OF SEISMIC DESIGN PARAMETERS	
Factor or Coefficient	***Value***
S_s	1.125
S_1	0.445
F_a	1.2
F_v	N/A
S_{DS}	0.9g
S_{D1}	N/A
S_{MS}	1.349
S_{M1}	N/A
T_L	12
PGA	0.486
PGA_M	0.583
F_{PGA}	1.2
I_e	1
C_V	1.325

Site Classification (CBC 1613.3.2) – Based on the presence of mapped Quaternary age alluvial deposits underlying the site and the absence of site-specific shear-wave data, the design Site Class is estimated to be **"D."** This class is defined as having the upper 100 feet (30 meters) of thew subsurface being underlain by "stiff soil" with average shear-wave velocities of 600 to 1,200 feet/second (180 to 360 meters/second). In accordance with the CBC, the proposed structures are considered Risk Category II structures.

Liquefaction

Liquefaction is a phenomenon that occurs when saturated, cohesionless soils experience a loss of strength or stiffness due to repeated disturbances. This can lead to building settlement, ground failures, or other related hazards. The primary factors that contribute to this are cohesionless, granular soils having relatively low densities, shallow groundwater (usually less than 40 feet deep), and moderate to high seismic ground shaking.

Groundwater was encountered during MJG's field exploration at a depth of approximately 43-feet below the existing ground surface. A review of the California Department of Water Resources website indicate that the historic high groundwater level is approximately 20 feet below the subject site. (https://wdl.water.ca.gov/waterdatalibrary/)

The liquefaction potential was evaluated with the computer program GeoLiqu (GeoAdvanced, 2025) using the Boulanger & Idriss method (2010-16) with an earthquake magnitude of 7 at a site source distance of 15 kilometers. Due to the presence of stiff to hard silty clay and fat clay at the projected groundwater and boring groundwater depths, the potential for liquefaction induced settlement is nil. A graph of the liquefaction analysis is presented with this report in Appendix D.

CONCLUSIONS AND RECOMMENDATIONS

The soils onsite consist of medium dense silty sands at the surface that are underlain by stiff to hard silty clays with sand. These soils are considered adequate for support of the new facilities.

The site is not within an Alquist Priolo Earthquake Fault Zone. The potential for dynamically induced settlement of the soils is also very low. In addition, the soils have a low potential for expansion due to changes in moisture content.

The potential for encountering groundwater within the anticipated relatively shallow excavations is minimal. There is a potential for minor amounts of water to enter open excavations because of direct rainfall and runoff.

Earthwork

At the time of MJG's investigation, the site appeared partially cleared of vegetation. Any debris, remaining vegetation, and other deleterious materials should be stripped and removed from the site prior to grading work. Organic materials should be disposed of off-site in accordance with the owner's instructions. Roots should be removed to a depth of 6 inches below foundation and pavement subgrade elevations.

Areas to receive fill should be scarified to a depth of 12 inches, brought to near optimum moisture content, and compacted to a minimum of 95% relative compaction based on the ASTM D1557 laboratory test method. All references to optimum moisture content and relative compaction in this report are based on this test method.

Compacted Fill Placement

Fill should be placed in 8-inch-thick loose lifts, moisture conditioned to near optimum moisture content and compacted to a minimum of 95% relative compaction. The existing onsite soils are considered suitable to be used as fill provided, they are free from significant organic matter and other deleterious materials.

Imported Soils

Imported soils, if needed, should consist of predominantly granular material with an expansion index less than 20 when tested in accordance with ASTM D4829, and should have a minimum R-value of 40. Imported material should be inspected and approved by an MJG representative prior to being brought to the site.

Shallow Foundation and Building Slab-On-Grade Support

The existing soils below the proposed structures should be over-excavated to a depth of at least 3 feet below the existing ground surface or 12 inches below the proposed footing base grade, whichever depth is greater. Over-excavation should extend, at least, 5 feet horizontally beyond the inside and outside limits of the footings and grade-beams. The existing soils below floor slab areas should be over-excavated to a depth of at least 3 feet below the bottom of the finished subgrade elevation. The bottom of the over-excavation should be scarified to a depth of at least 6 inches, moistened to near the optimum moisture content, and compacted to a relative compaction of at least 95 percent (ASTM D1557).

Fill should be placed in 8-inch-thick loose lifts, moisture conditioned to within 2 percentage points above or below optimum moisture content and compacted to a minimum of 95% relative compaction.

The planned structures can be supported on shallow spread footings with bottom levels in the compacted fill at a minimum depth of 18 inches below the lowest adjacent finished grade.

A minimum width of 24 inches is recommended for continuous footings. Isolated footings should be at least 24 inches wide. Footings can be designed for an allowable bearing pressure of

3,000 pounds per square foot (psf) for dead plus long-term live loads. This value can be increased by ⅓ when considering the total of all loads, including wind or seismic forces.

Total post-construction settlement is estimated to be approximately ¾ inch. Post-construction differential settlements are anticipated to be ½ inch or less between isolated footings, and between the middle and end of a continuous footing.

Continuous (strip) foundations should be reinforced with a minimum of #5 deformed reinforcing bars at the top and bottom of the footings.

Spread footing reinforcement should be designed by the structural engineer for punching shear and bending. As a minimum, the spread footings should be reinforced with a #5 deformed reinforcing bars, spaced 18 inches on center each way and placed 3 inches above the bottom of the spread footing.

All grade beam reinforcement should be designed and specified by the building's designer/structural engineer.

Foundations should be reinforced as necessary to reduce the potential for distress caused by differential foundation movement. The use of joints at openings or other discontinuities in masonry walls is recommended.

Footing excavations should be observed by an MJG representative to check bearing materials and cleaning.

Lateral Loading

Resistance to lateral loads will be provided by passive earth pressure against the faces of footings and other structural elements below grade, and by friction along the bases of footings and slabs. Passive earth pressure can be taken as 350 pounds per square foot (psf) per foot of depth. Base friction can be taken as 0.35 times the actual dead load. Base friction and passive earth pressure can be combined without reduction. Retaining structures free to rotate at the top should be designed for an active equivalent fluid pressure of 35 psf per foot of height, plus any additional building or equipment surcharge. MJG should be notified if retaining walls greater than 10 feet in height, restrained walls, or tieback walls are planned so that geotechnical recommendations specific to wall conditions can be developed.

Building Floor Slabs

During grading operations, the building pad soils should be compacted to a relative compaction of at least 95 percent (ASTM D1557). Prior to placing the slab-on-grade concrete, the final pad surfaces should be proof-rolled to provide a smooth, dense surface upon which to place the concrete.

A 15-mil vapor retarder membrane, conforming to ASTM E1745 and installed per ASTM E1643, should be placed beneath concrete slabs-on-grade covered with moisture sensitive or impervious floor coverings, or where the slab will support equipment or materials sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder.

Reinforcing for slabs-on-grade should be designed by the project structural engineer based on anticipated storage and equipment loads. A modulus of subgrade reaction of 150 pounds per cubic inch (pci) can be used. Reinforcing should extend down into the footings. Concrete

construction (i.e. jointing, etc.) should be in conformance with the American Concrete Institute Manual of Concrete Practice Design and Construction Standards.

The project's designer should be responsible for the slabs-on-grade recommendations based on the anticipated floor loading requirements. Minimum reinforcing for 6-inch-thick slabs-on-grade should consist of at least #4 deformed reinforcing bars at 18 inches on center each way placed at mid-height in the slab.

Where the project's structural engineer's reinforcement recommendations exceed MJG's above minimum slab reinforcement recommendations, the structural engineer's recommendations should be followed.

Saw-cut control joints should be placed in the slab to help control the location and extent of cracking. For additional recommendations refer to the ACI Design Manual. Joints or cracks should be sealed with a waterproof, non-extruding compressible compound specifically recommended for heavy duty concrete pavement and wet environments.

Where floor slabs are tied to perimeter walls or turn-down slabs to meet structural or other construction objectives, our experience indicates differential movement between the walls and slabs will likely be observed in adjacent slab expansion joints or floor slab cracks beyond the length of the structural dowels. The structural engineer should account for potential differential settlement through use of sufficient control joints, appropriate reinforcing, or other means.

Surface Drainage

It is important that water be kept a minimum of 5 feet from structures and slabs. No ponding adjacent to buildings and structures should be allowed. Final surfaces should have a positive 2 percent minimum slope away from structures.

Retaining walls should be designed to resist hydrostatic pressures or be provided with a back-drain, weep holes or other drainage facilities. If a basement or underground structure is constructed, a subsurface drainage system is recommended.

Concrete and Flexible Asphalt Concrete Pavement Subgrade Preparation

The existing soils below proposed concrete and asphalt concrete pavement areas should be over-excavated to a depth of at least 12 inches below the existing ground surface or finish grade, whichever depth is greater. The soils exposed on the bottoms of the over-excavations should be scarified to a depth of at least 12 inches, brought to within 2 percent of the optimum moisture content and compacted to a relative compaction of at least 95 percent (ASTM D1557). The over-excavated soils and any additional fill required to prepare the finish subgrade should be placed in maximum 8-inch-thick lifts, each lift moistened to within 2 percent of the optimum moisture content and compacted to a relative compaction of at least 95 percent.

Flexible Pavement Structural Sections

New flexible pavement structural sections were determined following California Department of Transportation (Caltrans) procedures.

Based on our laboratory test data, an R-value of 24 was used to calculate the recommended on-site flexible pavement sections for the project. Recommended on-site flexible pavement structural sections are listed in the table below.

ON-SITE FLEXIBLE PAVEMENT STRUCTURAL SECTIONS		
Traffic Index	***Asphalt Concrete (inches)***	***Class 2 Aggregate Base (inches)***
5	3.0	6.0
6	5.0	6.0
7	6.0	7.0
8	6.0	11.0

PORTLAND CEMENT CONCRETE PAVEMENTS AND FLATWORK

The subgrade surface beneath rigid (Portland cement concrete) pavements should be proof-rolled with a smooth-wheel roller to form a dense, uniform surface. Any pumping or yielding areas should be excavated and replaced with compacted fill.

Rigid pavements to support automobile and light truck traffic should be a minimum of 6 inches thick and reinforced with a minimum of #4 deformed reinforcing bars spaced 12 inches on center each way. Joints should be provided at intervals of no more than 12 feet. Smooth dowels should be provided across pavement joints.

Rigid pavement to support heavy truck traffic should be a minimum of 8 inches thick and reinforced with #4 deformed reinforcing bars spaced 12 inches of center each way. Joints should be provided at intervals of no more than 12 feet. Smooth dowels should be provided across pavement joints.

Pedestrian walkways and other lightly loaded concrete flatwork areas should be proof rolled as described above. The flatwork in these areas should have a minimum thickness of 4 inches and be provided with doweled joints at no more than 12-foot intervals. Minimum reinforcement should consist of 6 x 6 W1.4/1.4 welded wire fabric supported mid height in the slab by concrete blocks or dobies. Positioning the wire fabric by lifting after concrete placement should not be allowed.

UTILITY EXCAVATIONS

Excavations for this project will require sloping sidewalls or shoring. Excavations should be made in accordance with California Administrative Code, Title 8, Industrial Relations, Chapter 4, Division of Industrial Safety, Subchapter 4, Construction Safety Orders, Article 6. Temporary excavations should be shored or sloped in accordance with Cal OSHA requirements. On-site soils can be considered Type C for purposes of excavation design.

In general, temporary excavations in on-site soils should be sloped no steeper than 1.5 horizontal to 1 vertical for excavations up to 20 feet in depth. Compound excavations with vertical sides in lower portions should be properly shielded to a minimum height of 18 inches above the top of the vertical side, with the upper portion having a maximum slope of 1.5 horizontal to 1 vertical. A Registered Professional Engineer should design slopes or benching for excavations greater than 20 feet in depth.

Temporary excavation slopes should be inspected twice daily by the contractor's competent person before personnel are allowed to enter the excavation. If sloughing, raveling or other evidence for slope instability is noted, corrective measures should be implemented.

Temporary shoring will be required for those excavations where temporary cut slopes as described above are not feasible. Cantilever shoring, and shoring with 1 level of bracing, can be

designed to resist an equivalent fluid pressure of 30 psf per foot of depth. For shoring with multiple levels of bracing, a uniform lateral pressure equal to 25H in psf, where H is the height of shoring in feet, should be used. The recommended soil pressure applies to level soil conditions behind the shoring. Where a combination of sloped embankment and shoring is used, the soil pressure will be greater and should be evaluated for actual conditions.

In addition to the above recommended lateral earth pressures, a minimum uniform lateral pressure of 125 psf should be incorporated in the design of the upper 10 feet of shoring when normal traffic is permitted within 10 feet of the shoring. The design of temporary shoring should also include the surcharge loads from delivery and construction equipment, as appropriate.

CORROSIVITY

Laboratory test results of soils encountered between 0' to 5' in Boring 1 show low saturated resistivity, which is indicative of a corrosive environment with respect to ferrous metals. Foundations should be designed with continuous reinforcing steel top and bottom. Reinforcing steel should maintain minimum clearances specified by applicable codes and good construction practice.

The test results also indicate a severe soluble sulfate content (Exposure Class S2) per ACI 318 Table 19.3.1.1. Type V cement is recommended for concrete in contact with the ground. Per ACI 318 Table 19.3.2.1 concrete should have a maximum water-cementitious material ratio of 0.45 and a minimum compressive strength of 4,500 psi.

In addition, it is recommended that additional sampling and corrosivity testing be performed on soils from proposed foundation and slab-on-grade levels during construction. If a corrosive environment is determined to be present based on this additional testing, a corrosion engineer should be contacted to develop recommendations for appropriate corrosion protection measures.

LIMITATIONS

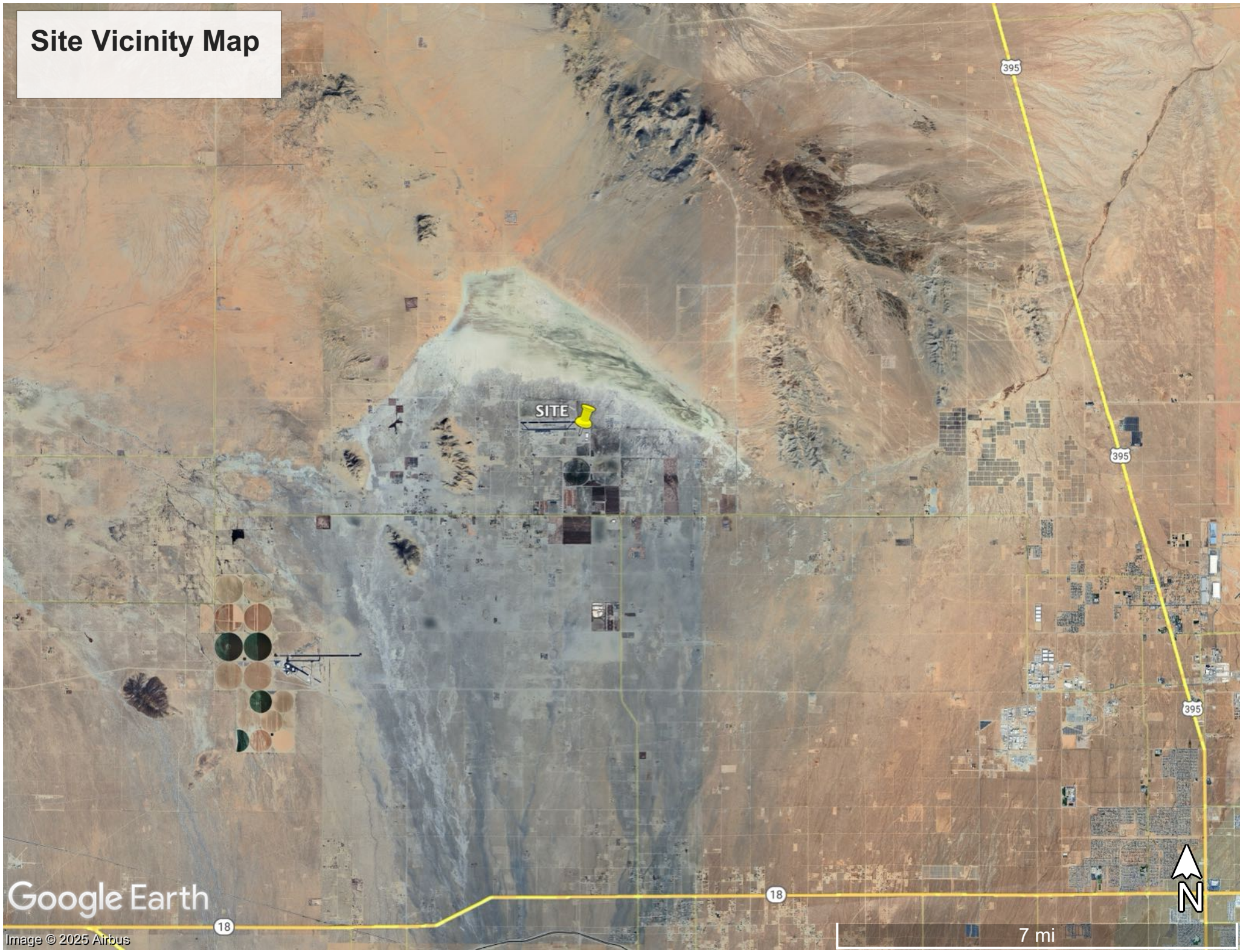
The recommendations in this report are based on results of the field exploration and laboratory test programs, combined with interpolation and extrapolation of subsurface conditions between and beyond boring locations. The nature and extent of variations in these conditions may not become evident until construction. If variations are encountered during construction, MJG should be notified so these variations can be reviewed and the recommendations in this report modified if necessary. If changes in the nature, design or location of the structures are planned, these changes should be reviewed by MJG so that modifications to the recommendations in this report can be made if needed.

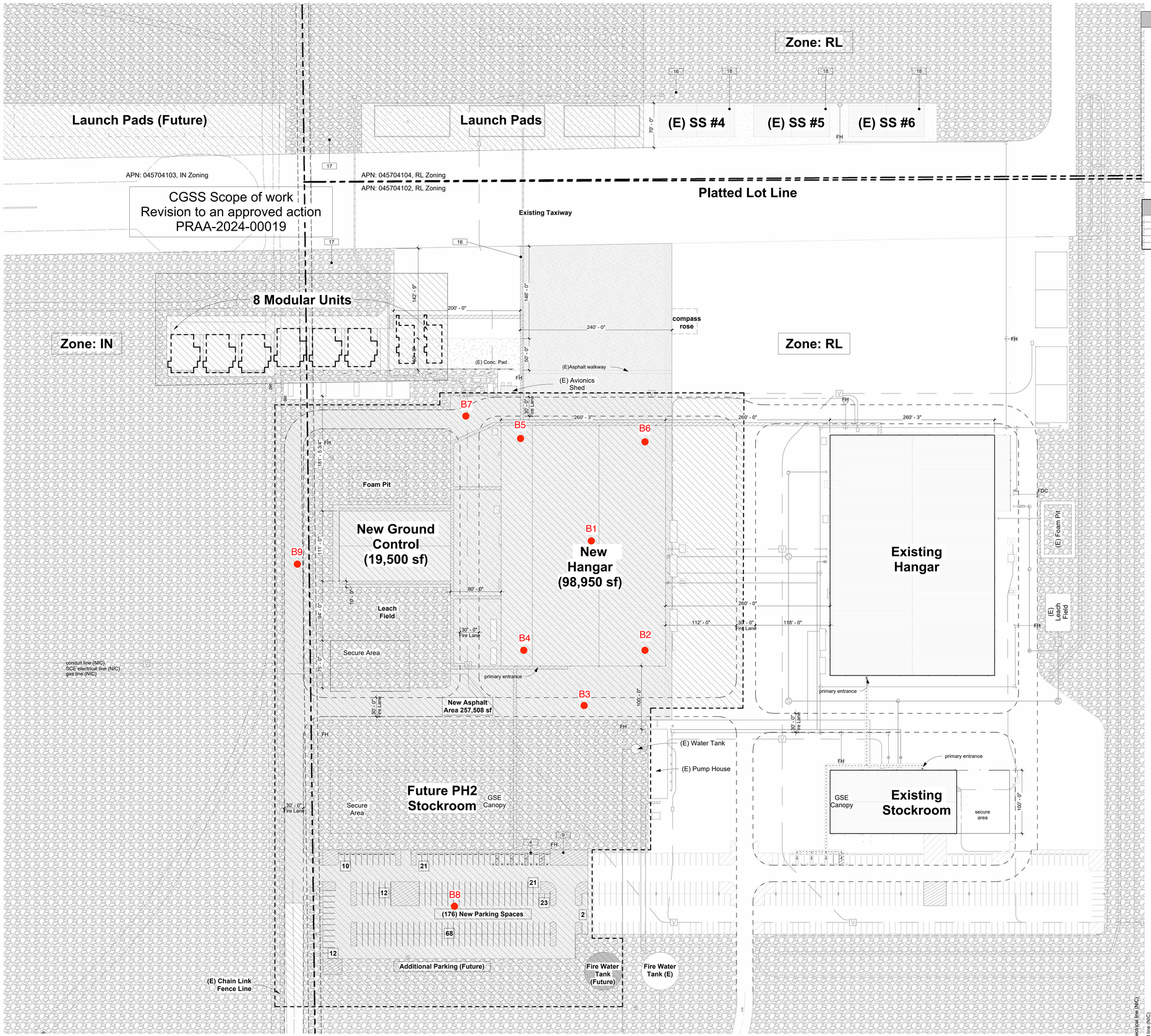
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APPENDIX A

Figure 1 – Site Vicinity Map
Figure 2 – Complete Project Site Plan with Boring Locations

Site Vicinity Map





1 **Site Plan - GCS**
1" = 60'-0"

Site Plan Legend

- Property Line
- Property Setback Line
- Scope of Work
- Landscape Area - Reference landscape drawings
- French Drain/ Riprap stone
- Accessible Path of Travel
- Accessible Parking (NIC)
- Keynote Tag
- New Asphalt Paving
- Existing Chainlink Fence
- FH — Fire Hydrant
- E — Existing Building / Equipment

Site Plan Keynotes

4	Unloading zone
9	Paint stripe for accessible pedestrian walk
16	
17	
18	

Parking Tabulation

Parking Spaces (Existing)

Total Parking Spaces Required (Hangar):	193 spaces
Total Parking Spaces Required (Stockroom):	25 spaces
Total Parking Spaces Required:	218 spaces
Total Parking Spaces Existing:	299 spaces

Parking Spaces (New)

Total Parking Spaces Required (Hangar):	74 spaces
Total Parking Spaces Required (Ground Control):	+ 80 spaces
Total Parking Spaces Required (Modular):	+ 49 spaces
Total Parking Spaces Required (Stockroom): Future	+ 20 spaces
Total Parking Spaces Required:	223 spaces
Total Spaces Existing (extra from previous project):	-81 spaces
Total Parking Spaces Provided (new):	**142 spaces**

(San Bernardino County Development Code - Table 83-15 - Parking Ratios)

Accessible Space Requirements (2022 CBC - Table 11B-208.2)

Total Parking Spaces Provided:	142 spaces
Minimum Accessible Parking Spaces Required:	5 spaces
Total Accessible Parking Spaces Provided:	**Min. 7 spaces** -including 2 Van spaces (2022 CBC - 11B-208.2.4)

Designated Parking for Clean Air Vehicles (2022 CGBSC - A5.106.5.1)

Total Parking Spaces Provided:	142 spaces
Minimum Spaces Required (8% of total):	12 spaces

Designated Parking for EV Charging (2022 CGBSC - Table A5.106.5.3.1 Tier1)

Total Parking Spaces Provided:	142 spaces
Minimum # of EV Capable Spaces Required: (Future Ready)	12 spaces

Clean Air Vehicle Parking

Total spaces designated for Clean Air:	0 spaces
Total spaces designated for Car / Van Pool:	12 spaces
Total Spaces Provided (Clean Air/ Van Pool/ EV):	**12 spaces**

CONSTRUCTION • ARCHITECTURE

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1000 Civic Circle Lewisville, TX 75067
pkwycon.com (972) 221-1979

Project Manager: Contact: Raymond A. Morgan 214-111-1111

Architect: Contact: Matt Hodeaux (469) 933-8852

GENERAL ATOMICS

GA - Desert Horizons II

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Contact: Scott Jones
Phone: 949.477.4001

Fire Protection Engineer

Civil Engineer

NOT FOR REGULATORY APPROVAL, PERMITTING OR CONSTRUCTION.
Architect: Matt Hodeaux

No.	Description	Date
SD	Schematic Design	02/28/25
C	Model / Programing Dsgn. Review	01/10/25
B	Programing Review	12/17/24
A	Pre-Development Review	11/14/24

Drawn by: RAM
Checked by: MBH
Project Number: 04-240134

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Complete Project Site Plan

SD1.01

APPENDIX B

Exploratory Logs

Soil Classification Key

Unified Soil Classification System (USCS) and Particle Size Limits

Project Number:	24185P1
Project Title:	Desert Horizons II, General Atomics
Project Location:	El Mirage, CA
Client:	Parkway Construction

Report Date:	02/20/25
Sheet:	1 of 1
Appendix:	B
Permit No:	
Client Project No:	
Other:	
DSA File No:	
DSA Application No:	
DSA LEA No:	

Unified Soil Classification System (USCS)

Coarse Grained Soils More Than 50% Is Larger Than No. 200 Sieve	Gravel and Gravelly Soils More Than 50% Retained on No. 4 Sieve	Clean Gravels Little Or No Fines	GW		Well-graded gravels, gravel-sand mixtures, little or no fines
			GP		Poorly-graded gravels, gravel-sand mixtures, little or no fines
		Gravels w/ Fines Appreciable Amount	GM		Silty gravels, gravel-sand-silt mixtures
			GC		Clayey gravels, gravel-sand-clay mixtures
	Sand and Sandy Soils More Than 50% Passing No. 4 Sieve	Clean Sand Little Or No Fines	SW		Well-graded sands, gravelly sands, little or no fines
			SP		Poorly-graded sands, gravelly sands, little or no fines
		Sands w/ Fines Appreciable Amount	SM		Silty-sands, sand-silt mixtures
			SC		Clayey sands, sand-clay mixtures
Fine Grained Soils More Than 50% Is Smaller Than No. 200 Sieve	Silts and Clays Liquid Limit Less Than 50		ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
			CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL		Organic silts and organic silty clays of low placticity
	Silts and Clays Liquid Limit Greater Than 50		MH		Inorganic silts, micaceous or diatomaceous fine sand or silty soils
			CH		Inorganic clays of high plasticity, fat clays
			OH		Organic clays of medium to high plasticity, organic silts
	Highly Organic Soils		PT		Peat, humus, swamp soils with high organic contents

Particle Size Limits

Divison	Silt or Clay	Sand			Gravel		Cobbles	Boulders
		Fine	Medium	Coarse	Fine	Coarse		
U.S. Sieve		No. 200	No. 40	No. 10	No. 4	3/4"	3"	12"
Grain (mm)		0.075	0.420	2.00	4.76	19.1	76.2	305

Soils possessing characteristics of two classifications are designated by group symbol combination. Soils may be classified initially using the visual manual procedure prior to laboratory test.

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Exploratory Log

ASTM D5434, D1452, D1586, D1587, D2488 (USCS), D3550

Project Number:	24185P1
Project Title:	Desert Horizons II, General Atomics
Project Location:	El Mirage, CA
Client:	Parkway Construction

Report Date:	02/20/25
Sheet:	1 of 2
Appendix:	B
Permit No:	
Client Project No:	
USA Ticket No:	
DSA File No:	
DSA Application No:	
DSA LEA No:	

Location No:	B1 (Hangar)	**Start Date/Time:**	02/21/25 0750	**End Date/Time:**	2/21/25 0915

Conducted By:	J. Albornoz	**Excavation Type:**	Auger Hole	**Elevation:**	2855
Operator:	C. Hartman	**Dimensions:**	8" x 50'	**Groundwater:**	43'
Equipment Type:	CME-75-HSA	**Advance Assist:**	None	**Recent Weather:**	Clear
Drive Weight (lb)**:**	140	**Field Tests:**	D3550	**Sampler Insertion:**	Driven
Drive Drop (in)**:**	30	**Shoring Type:**	None	**Preservation:**	D4220

Depth (ft)	'N' Value	Sample (1)	Moisture (%)	Density (pcf)	Class (USCS)	Graphic	Description / Comments	Lab Tests (2)
0					SM		Light Brown, Dry, Medium Dense, Silty Sand	
	10, 14, 15		1.5	103.2			Bulk Sample at 0' to 5' - JDA02202501	SA, MD, EI, CR
							Tube at 1' - JDA02202502	TD
	6,9,14		1.0	89.3			Tube at 3' - JDA02202503	TD
							Grayish Brown, Dry, Medium Dense, Poorly Graded Sand with Silt	
5	11,14, 32		7.9	107.7	CLML		Tube at 5' - JDA02202504 Grayish Brown, Moist, Hard, Silty Clay with Sand	TD, SA
10	14,22, 26		12.9	100.2			Tube at 10' - JDA02202505 Grayish Brown, Moist, Hard, Silty Clay	SA
15	15,17, 17						Tube at 15' - JDA02202506	CN, TD
20	10,16, 19						Tube at 20' - JDA02202507	
25	3,6,6						SPT at 25' - JDA02202508 Stiff	SA

Comments: "N" Value based on 2.5" diameter modified California Tube Sampler (ASTM D3550) or SPT (ASTM D1586) as noted on log. Some boulder/rock encountered during drilling operations. Partial caving of hole observed.

(1) =Bulk, =Driven

(2) **DS** =Direct Shear, **EI** =Expansion Index, **SA** =Sieve Analysis, **CR** =Corrosion, **MD** =Max Density, **RV** =R-Value, **AL** =Atterberg Limits, **SE** =Sand Equivalent, **CN** =Consolidation, **TD** =Tube Density

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Exploratory Log

ASTM D5434, D1452, D1586, D1587, D2488 (USCS), D3550

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Project Number:	24185P1
Project Title:	Desert Horizons II, General Atomics
Project Location:	El Mirage, CA
Client:	Parkway Construction

Location No:	B1 (Cont.)	**Start Date/Time:**	2/21/25 0750	**End Date/Time:**	2/21/25 0915

Conducted By:	J. Albornoz	**Excavation Type:**	Auger Hole	**Elevation:**	2855
Operator:	C. Hartman	**Dimensions:**	8" x 50'	**Groundwater:**	43'
Equipment Type:	CME-75-HSA	**Advance Assist:**	None	**Recent Weather:**	Clear
Drive Weight (lb)**:**	140	**Field Tests:**	D3550	**Sampler Insertion:**	Driven
Drive Drop (in)**:**	30	**Shoring Type:**	None	**Preservation:**	D4220

Depth (ft)	'N' Value	Sample (1)	Moisture (%)	Density (pcf)	Class (USCS)	Graphic	Description / Comments	Lab Tests (2)
30	4,8,8				CLML		SPT at 30' Dark Brown, Moist, Very Stiff, Silty Clay with Sand	
35	3,4,7						SPT at 35' Stiff	
40	4,7,11	■			CH		SPT at 40' - JDA02202509 Dark Brown, Moist, Very Stiff, Fat Clay Groundwater encountered at 43'	SA, PI
45	6,11, 13						SPT at 45'	
50	3,4,7						SPT at 50' Stiff *Drilling Terminated at Approximately 50'*	

Comments: "N" Value based on 2.5" diameter modified California Tube Sampler (ASTM D3550) or SPT (ASTM D1586) as noted on log. Some boulder/rock encountered during drilling operations. Partial caving of hole observed.

(1) =Bulk, =Driven

(2) **DS** =Direct Shear, **EI** =Expansion Index, **SA** =Sieve Analysis, **CR** =Corrosion, **MD** =Max Density, **RV** =R-Value, **AL** =Atterberg Limits, **SE** =Sand Equivalent, **CN** =Consolidation, **TD** =Tube Density

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Exploratory Log

ASTM D5434, D1452, D1586, D1587, D2488 (USCS), D3550

Project Number:	24185P1
Project Title:	Desert Horizons II, General Atomics
Project Location:	El Mirage, CA
Client:	Parkway Construction

Report Date:	02/20/25
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Location No:	B2 (Hangar)	**Start Date/Time:**	2/21/25 0923	**End Date/Time:**	2/21/25 1000

Conducted By:	J. Albornoz	**Excavation Type:**	Auger Hole	**Elevation:**	2854
Operator:	C. Hartman	**Dimensions:**	8" x 25'	**Groundwater:**	Not Encountered
Equipment Type:	CME-75-HSA	**Advance Assist:**	None	**Recent Weather:**	Clear
Drive Weight (lb)**:**	140	**Field Tests:**	D3550	**Sampler Insertion:**	Driven
Drive Drop (in)**:**	30	**Shoring Type:**	None	**Preservation:**	D4220

Depth (ft)	'N' Value	Sample (1)	Moisture (%)	Density (pcf)	Class (USCS)	Graphic	Description / Comments	Lab Tests (2)
0					SM		Light Brown, Dry, Very Dense, Silty Sand	
	8,31, 50(3")		6.1	109.7			Bulk Sample at 0' to 5' - JDA02202510	MD
							Tube at 1' - JDA02202511	TD
	8, 14, 15		1.4	103.7	SPSM		Tube at 3' - JDA02202512	TD
							Light Brown, Dry, Medium Dense, Poorly Graded Sand with Silt	
5	10, 17, 22		9.4	110.7	SM		Tube at 5' - JDA02202513	TD
							Light Brown, Dry, Dense, Silty Sand	
10	17, 18, 22		6.6	93.3	CLML		Tube at 10' - JDA02202514	TD, DS
							Grayish Brown, Moist, Hard, Silty Clay with Sand	
15	12, 24, 20		7.7	97.5	SM		Tube at 15' - JDA02202515	TD, CN
							Grayish Brown, Moist, Dense, Silty Sand	
20	7, 8, 8				CLML		SPT at 20'	
							Grayish Brown, Moist, Very Stiff, Silty Clay with Sand	
25	7, 4, 7						SPT at 25'	
							Stiff	
							Drilling Terminated at Approximately 25'	

Comments: "N" Value based on 2.5" diameter modified California Tube Sampler (ASTM D3550) or SPT (ASTM D1586) as noted on log. Some boulder/rock encountered during drilling operations. Partial caving of hole observed.

(1) =Bulk =Driven

(2) **DS** =Direct Shear **EI** =Expansion Index **SA** =Sieve Analysis **CR** =Corrosion **MD** =Max Density **RV** =R-Value **AL** =Atterberg Limits **SE** =Sand Equivalent **CN** =Consolidation **TD** =Tube Density

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Exploratory Log

ASTM D5434, D1452, D1586, D1587, D2488 (USCS), D3550

Project Number:	24185P1
Project Title:	Desert Horizons II, General Atomics
Project Location:	El Mirage, CA
Client:	Parkway Construction

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Location No:	B3 (Pavement)	**Start Date/Time:**	2/21/25 1007	**End Date/Time:**	2/21/25 1013

Conducted By:	J. Albornoz	**Excavation Type:**	Auger Hole	**Elevation:**	2856
Operator:	C. Hartman	**Dimensions:**	8" x 5'	**Groundwater:**	Not Encountered
Equipment Type:	CME-75-HSA	**Advance Assist:**	None	**Recent Weather:**	Clear
Drive Weight (lb)**:**	140	**Field Tests:**	D3550	**Sampler Insertion:**	Driven
Drive Drop (in)**:**	30	**Shoring Type:**	None	**Preservation:**	D4220

Depth (ft)	'N' Value	Sample (1)	Moisture (%)	Density (pcf)	Class (USCS)	Graphic	Description / Comments	Lab Tests (2)
0					SM		Light Brown, Dry, Silty Sand	
							Bulk Sample at 0' to 5' - JDA02202516	SA, SE*, RV*
5							*Drilling Terminated at Approximately 5'*	
10								
15								
20								
25								

Comments: "N" Value based on 2.5" diameter modified California Tube Sampler (ASTM D3550) or SPT (ASTM D1586) as noted on log. Some boulder/rock encountered during drilling operations. Partial caving of hole observed.

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Exploratory Log

ASTM D5434, D1452, D1586, D1587, D2488 (USCS), D3550

Project Number:	24185P1
Project Title:	Desert Horizons II, General Atomics
Project Location:	El Mirage, CA
Client:	Parkway Construction

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Location No:	B4 (Hangar)	**Start Date/Time:**	02/21/25 1015	**End Date/Time:**	2/21/25 1040

Conducted By:	J. Albornoz	**Excavation Type:**	Auger Hole	**Elevation:**	2855
Operator:	C. Hartman	**Dimensions:**	8" x 25'	**Groundwater:**	Not Encountered
Equipment Type:	CME-75-HSA	**Advance Assist:**	None	**Recent Weather:**	Clear
Drive Weight (lb)**:**	140	**Field Tests:**	D3550	**Sampler Insertion:**	Driven
Drive Drop (in)**:**	30	**Shoring Type:**	None	**Preservation:**	D4220

Depth (ft)	'N' Value	Sample (1)	Moisture (%)	Density (pcf)	Class (USCS)	Graphic	Description / Comments	Lab Tests (2)
0	11, 10, 13		7.5	103.8	SM		Light Brown, Dry, Medium Dense, Silty Sand Bulk Sample at 0' to 5' - JDA02202517 Tube at 1' - JDA02202518	EI TD
5	12, 16, 25		8.4	89.8	CLML		Tube at 5' - JDA02202519 Grayish Brown, Moist, Hard, Silty Clay with Sand	TD, DS
10	10, 25, 39		15.0	98.6			Tube at 10' - JDA02202520	
15	9, 14, 18				SM		Tube at 15' - JDA02202521 Grayish Brown, Moist, Silty Sand	
20	3, 5, 12				CLML		SPT at 20' Grayish Brown, Moist, Very Stiff, Silty Clay with Sand	
25	3, 5, 4						SPT at 25' Stiff *Drilling Terminated at Approximately 25'*	

Comments: "N" Value based on 2.5" diameter modified California Tube Sampler (ASTM D3550) or SPT (ASTM D1586) as noted on log. Some boulder/rock encountered during drilling operations. Partial caving of hole observed.

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(2) **DS** =Direct Shear **EI** =Expansion Index **SA** =Sieve Analysis **CR** =Corrosion **MD** =Max Density **RV** =R-Value **AL** =Atterberg Limits **SE** =Sand Equivalent **CN** =Consolidation **TD** =Tube Density

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Exploratory Log

ASTM D5434, D1452, D1586, D1587, D2488 (USCS), D3550

Project Number:	24185P1
Project Title:	Desert Horizons II, General Atomics
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Location No:	B5 (Hangar)	**Start Date/Time:**	2/21/25 1055	**End Date/Time:**	2/21/25 1120

Conducted By:	J. Albornoz	**Excavation Type:**	Auger Hole	**Elevation:**	2854
Operator:	C. Hartman	**Dimensions:**	8" x 25'	**Groundwater:**	Not Encountered
Equipment Type:	CME-75-HSA	**Advance Assist:**	None	**Recent Weather:**	Clear
Drive Weight (lb)**:**	140	**Field Tests:**	D3550	**Sampler Insertion:**	Driven
Drive Drop (in)**:**	30	**Shoring Type:**	None	**Preservation:**	D4220

Depth (ft)	'N' Value	Sample (1)	Moisture (%)	Density (pcf)	Class (USCS)	Graphic	Description / Comments	Lab Tests (2)
0					SM		Light Brown, Dry, Medium Dense, Silty Sand	
	5, 8, 9		2.3	103.6			Bulk Sample at 0' to 5' - JDA02202522	SA, MD
							Tube at 1' - JDA02202523	TD
	6, 9, 12		1.3	97.9			Tube at 3' - JDA02202524 (One Tube)	TD
							Sandy	
5	5, 11, 15				SP		Tube at 5' - No Recovery Grayish Brown, Medium Dense, Poorly Graded Sand with Silt	
10	11, 31, 50		18.4	102.7			Tube at 10' - JDA02202525	TD
15	8, 10, 11		8.0	100.6	CLML		Tube at 15' - JDA02202526 Grayish Brown, Moist, Very Stiff, Silty Clay with Sand	TD, CN
20	5, 6, 11						SPT at 20'	
25	11, 10, 9						SPT at 25'	

Comments: "N" Value based on 2.5" diameter modified California Tube Sampler (ASTM D3550) or SPT (ASTM D1586) as noted on log. Some boulder/rock encountered during drilling operations. Partial caving of hole observed.

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Exploratory Log

ASTM D5434, D1452, D1586, D1587, D2488 (USCS), D3550

Project Number:	24185P1
Project Title:	Desert Horizons II, General Atomics
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Location No:	B6 (Hangar)	**Start Date/Time:**	2/21/25 1132	**End Date/Time:**	2/21/2025 1200

Conducted By:	J. Albornoz	**Excavation Type:**	Auger Hole	**Elevation:**	2854
Operator:	C. Hartman	**Dimensions:**	8" x 25'	**Groundwater:**	Not Encountered
Equipment Type:	CME-75-HSA	**Advance Assist:**	None	**Recent Weather:**	Clear
Drive Weight (lb)**:**	140	**Field Tests:**	D3550	**Sampler Insertion:**	Driven
Drive Drop (in)**:**	30	**Shoring Type:**	None	**Preservation:**	D4220

Depth (ft)	'N' Value	Sample (1)	Moisture (%)	Density (pcf)	Class (USCS)	Graphic	Description / Comments	Lab Tests (2)
0					SM		Light Brown, Dry, Dense, Silty Sand	
	13, 17, 23		5.4	96.2			Bulk at 0' to 5' - JDA02202527	
							Tube at 1' - JDA02202528	TD
	12, 14, 14		2.9	99.5			Tube at 3' - JDA02202529	TD
5	12, 20, 27		9.3	97.7			Tube at 5' - JDA02202530	TD, DS
10	13, 22, 23		5.1	101.1			Tube at 10' - JDA02202531 Grayish Brown, Moist, Dense, Silty Sand with Gravel	TD
15	13, 23, 28						Tube at 15' - JDA02202532 Grayish Brown, Very Dense, Silty Sand	
20	10, 12, 11						SPT at 20' Grayish Brown, Moist, Very Stiff, Silty Clay with Sand	
25	4, 6, 8						SPT at 25' Stiff *Drilling Terminated at Approximately 25'*	

Comments: "N" Value based on 2.5" diameter modified California Tube Sampler (ASTM D3550) or SPT (ASTM D1586) as noted on log. Some boulder/rock encountered during drilling operations. Partial caving of hole observed.

(1) =Bulk =Driven

(2) **DS** =Direct Shear **EI** =Expansion Index **SA** =Sieve Analysis **CR** =Corrosion **MD** =Max Density **RV** =R-Value **AL** =Atterberg Limits **SE** =Sand Equivalent **CN** =Consolidation **TD** =Tube Density

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Exploratory Log

ASTM D5434, D1452, D1586, D1587, D2488 (USCS), D3550

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Location No:	B7 (Pavement)	**Start Date/Time:**	2/21/25 1210	**End Date/Time:**	2/21/25 1214

Conducted By:	J. Albornoz	**Excavation Type:**	Auger Hole	**Elevation:**	2854
Operator:	C. Hartman	**Dimensions:**	8" x 5'	**Groundwater:**	Not Encountered
Equipment Type:	CME-75-HSA	**Advance Assist:**	None	**Recent Weather:**	Clear
Drive Weight (lb)**:**	140	**Field Tests:**	D3550	**Sampler Insertion:**	Driven
Drive Drop (in)**:**	30	**Shoring Type:**	None	**Preservation:**	D4220

Depth (ft)	'N' Value	Sample (1)	Moisture (%)	Density (pcf)	Class (USCS)	Graphic	Description / Comments	Lab Tests (2)
0					ML		Light Brown, Dry, Sandy Silt Bulk Sample at 0' to 5' - JDA02202533	SA, SE*, RV*
5							*Drilling Terminated at Approximately 5'*	
10								
15								
20								
25								

Comments: "N" Value based on 2.5" diameter modified California Tube Sampler (ASTM D3550) or SPT (ASTM D1586) as noted on log. Some boulder/rock encountered during drilling operations. Partial caving of hole observed.

(1) =Bulk =Driven

(2) **DS** =Direct Shear **EI** =Expansion Index **SA** =Sieve Analysis **CR** =Corrosion **MD** =Max Density **RV** =R-Value **AL** =Atterberg Limits **SE** =Sand Equivalent **CN** =Consolidation **TD** =Tube Density

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Exploratory Log

ASTM D5434, D1452, D1586, D1587, D2488 (USCS), D3550

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Location No:	B8 (Pavement)	**Start Date/Time:**	2/21/25 1220	**End Date/Time:**	2/21/25 1224

Conducted By:	J. Albornoz	**Excavation Type:**	Auger Hole	**Elevation:**	2857
Operator:	C. Hartman	**Dimensions:**	8" x 5'	**Groundwater:**	Not Encountered
Equipment Type:	CME-75-HSA	**Advance Assist:**	None	**Recent Weather:**	Clear
Drive Weight (lb)**:**	140	**Field Tests:**	D3550	**Sampler Insertion:**	Driven
Drive Drop (in)**:**	30	**Shoring Type:**	None	**Preservation:**	D4220

Depth (ft)	'N' Value	Sample (1)	Moisture (%)	Density (pcf)	Class (USCS)	Graphic	Description / Comments	Lab Tests (2)
0					SM		Light Brown, Dry, Silty Sand Bulk Sample at 0' to 5' - JDA02202534	SA, SE*, RV*
5							*Drilling Terminated at Approximately 5'*	
10								
15								
20								
25								

Comments: "N" Value based on 2.5" diameter modified California Tube Sampler (ASTM D3550) or SPT (ASTM D1586) as noted on log. Some boulder/rock encountered during drilling operations. Partial caving of hole observed.

(1) =Bulk =Driven

(2) **DS** =Direct Shear **EI** =Expansion Index **SA** =Sieve Analysis **CR** =Corrosion **MD** =Max Density **RV** =R-Value **AL** =Atterberg Limits **SE** =Sand Equivalent **CN** =Consolidation **TD** =Tube Density

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Exploratory Log

ASTM D5434, D1452, D1586, D1587, D2488 (USCS), D3550

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Location No:	B9 (Pavement)	**Start Date/Time:**	2/21/25 1300	**End Date/Time:**	2/21/25 1305

Conducted By:	J. Albornoz	**Excavation Type:**	Auger Hole	**Elevation:**	2855
Operator:	C. Hartman	**Dimensions:**	8" x 5'	**Groundwater:**	Not Encountered
Equipment Type:	CME-75-HSA	**Advance Assist:**	None	**Recent Weather:**	Clear
Drive Weight (lb)**:**	140	**Field Tests:**	D3550	**Sampler Insertion:**	Driven
Drive Drop (in)**:**	30	**Shoring Type:**	None	**Preservation:**	D4220

Depth (ft)	'N' Value	Sample (1)	Moisture (%)	Density (pcf)	Class (USCS)	Graphic	Description / Comments	Lab Tests (2)
0					SM		Light Brown, Dry, Silty Sand Bulk Sample at 0' to 5' - JDA02202536	SA, SE*, RV*
5							*Drilling Terminated at Approximately 5'*	
10								
15								
20								
25								

Comments: "N" Value based on 2.5" diameter modified California Tube Sampler (ASTM D3550) or SPT (ASTM D1586) as noted on log. Some boulder/rock encountered during drilling operations. Partial caving of hole observed.

(1) =Bulk =Driven

(2) **DS** =Direct Shear **EI** =Expansion Index **SA** =Sieve Analysis **CR** =Corrosion **MD** =Max Density **RV** =R-Value **AL** =Atterberg Limits **SE** =Sand Equivalent **CN** =Consolidation **TD** =Tube Density

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APPENDIX C

Laboratory Testing

Particle-Size Analysis of Soil

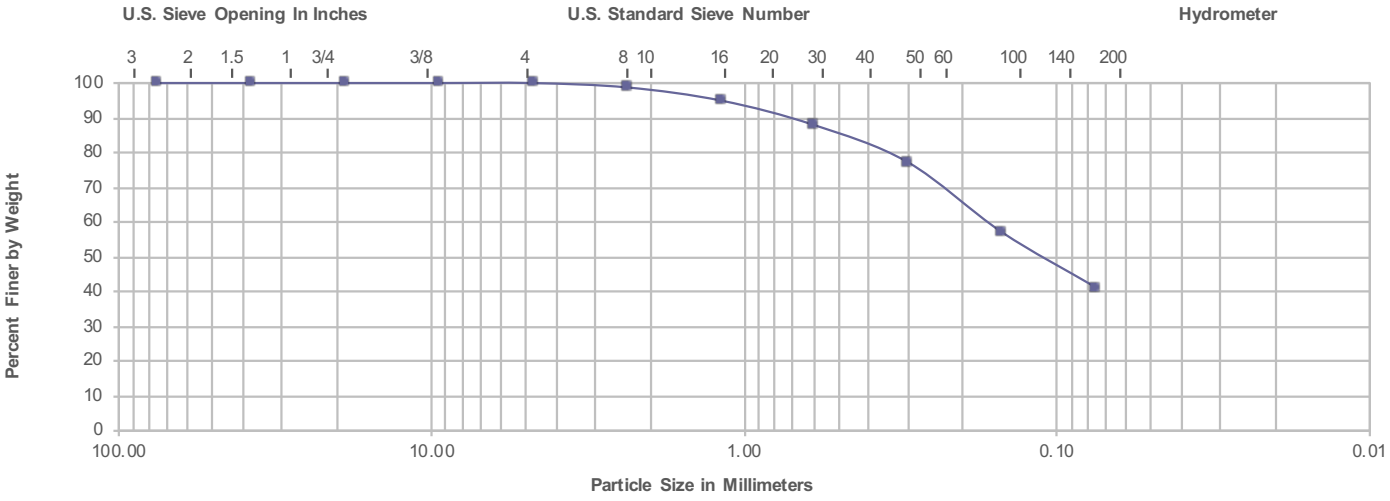
D422, D1140, D2487

Project Number:	24185P1
Project Title:	Desert Horizons II, General Atomics
Project Location:	El Mirage, CA
Client:	Parkway Construction

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Sample ID: JDA02202501 **Gravel** (%): 0.0% **Sand** (%): 58.8% **Fines** (%): 41.2%

Classification, ASTM D2487: (SM) Silty sand
Sample Origin: Boring One at 0' to 5'
Laboratory Remarks:



C_u	C_c	Moisture	D_{100}	D_{60}	D_{30}	D_{10}	LL	PL	PI	SG	FM	SE
NA	NA	5.0%	2.872	0.164	0.000	0.000	ND	ND	ND	ND	ND	ND

Method / Procudure Used: D422, D1140
Size of Initial Dry Mass (g): 1060.9
Determination of Dry Mass: D2216
Particles; Shape, Hardness: ND
Dispersion Device/Period: Manual/2 hr
Type & Amount of Agent: Defloc. & 1.0
Laboratory Comments:

The Material ☐ Was ☐ Was Not Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested ☐ Met ☐ Did Not Meet The requirements of the DSA approved documents.

cc: Project Architect, Structural Engineer, Project Inspector, DSA Regional Office, School District

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Particle-Size Analysis of Soil

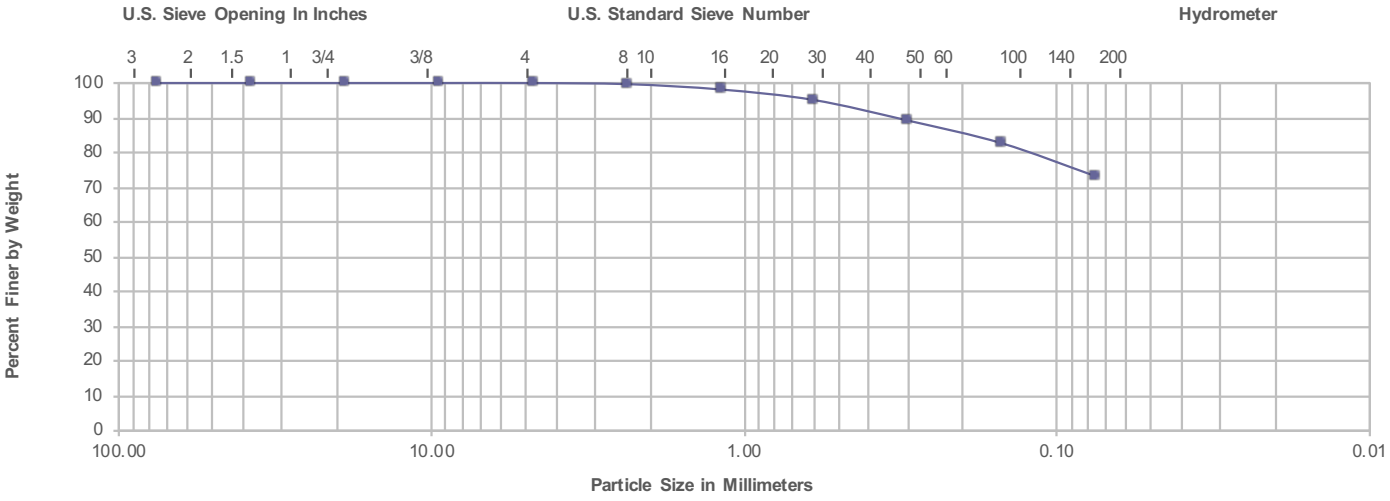
D422, D1140, D2487

Project Number:	24185P1
Project Title:	Desert Horizons II, General Atomics
Project Location:	El Mirage, CA
Client:	Parkway Construction

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Sample ID: JDA02202504 **Gravel** (%): 0.0% **Sand** (%): 26.8% **Fines** (%): 73.2%

Classification, ASTM D2487: (CLML) Silty clay with sand
Sample Origin: Boring One at 5'
Laboratory Remarks:



C_u	C_c	Moisture	D_{100}	D_{60}	D_{30}	D_{10}	LL	PL	PI	SG	FM	SE
NA	NA	11.7%	1.844	0.000	0.000	0.000	ND	ND	ND	ND	ND	ND

Method / Procudure Used: D422, D1140
Size of Initial Dry Mass (g): 314.4
Determination of Dry Mass: D2216
Particles; Shape, Hardness: ND
Dispersion Device/Period: Manual/2 hr
Type & Amount of Agent: Defloc. & 1.0
Laboratory Comments:

The Material ☐ Was ☐ Was Not Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested ☐ Met ☐ Did Not Meet The requirements of the DSA approved documents.

cc: Project Architect, Structural Engineer, Project Inspector, DSA Regional Office, School District

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Particle-Size Analysis of Soil

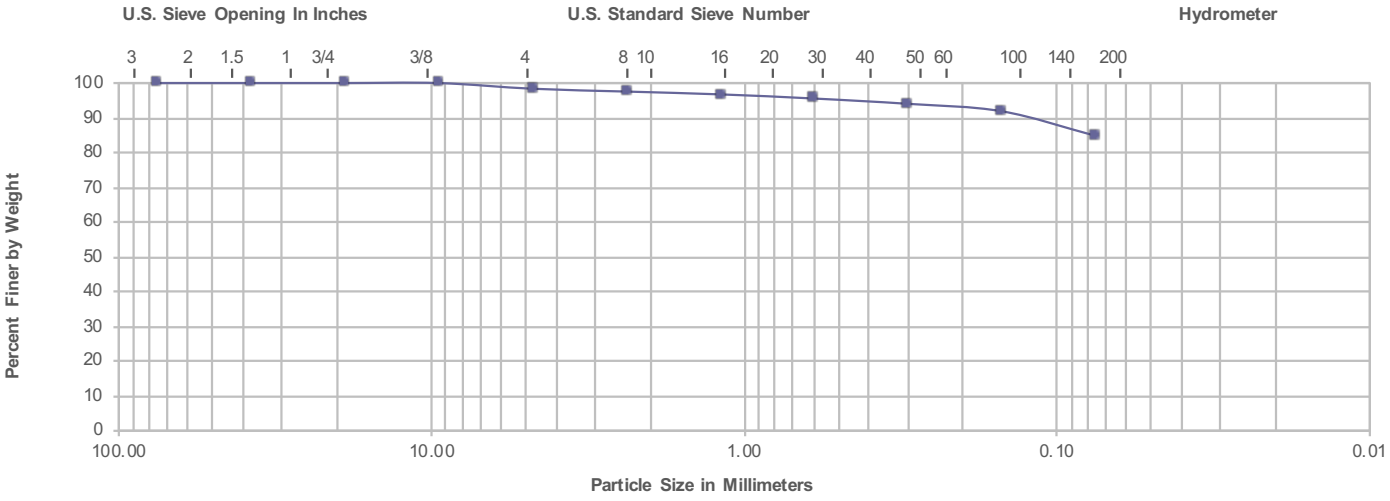
D422, D1140, D2487

Project Number:	24185P1
Project Title:	Desert Horizons II, General Atomics
Project Location:	El Mirage, CA
Client:	Parkway Construction

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Sample ID: JDA02202505 **Gravel** (%): 1.6% **Sand** (%): 13.6% **Fines** (%): 84.8%

Classification, ASTM D2487: (CLML) Silty clay
Sample Origin: Boring One at 10'
Laboratory Remarks:



C_u	C_c	Moisture	D_{100}	D_{60}	D_{30}	D_{10}	LL	PL	PI	SG	FM	SE
NA	NA	13.6%	14.250	0.000	0.000	0.000	ND	ND	ND	ND	ND	ND

Method / Procudure Used: D422, D1140
Size of Initial Dry Mass (g): 366.6
Determination of Dry Mass: D2216
Particles; Shape, Hardness: ND
Dispersion Device/Period: Manual/2 hr
Type & Amount of Agent: Defloc. & 1.0
Laboratory Comments:

The Material ☐ Was ☐ Was Not Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested ☐ Met ☐ Did Not Meet The requirements of the DSA approved documents.

cc: Project Architect, Structural Engineer, Project Inspector, DSA Regional Office, School District

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Particle-Size Analysis of Soil

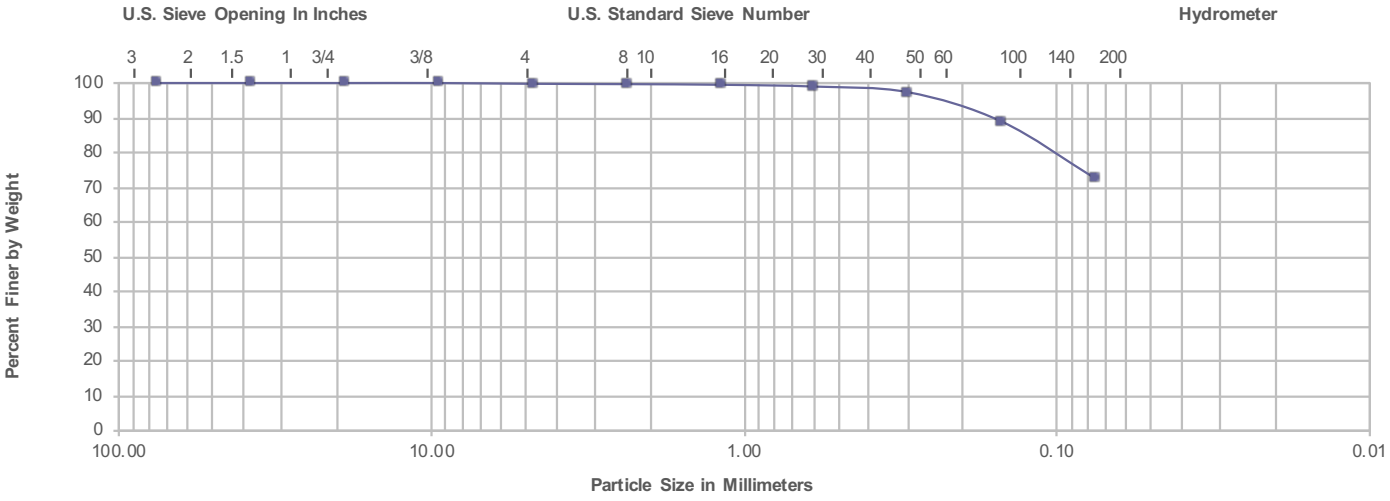
D422, D1140, D2487

Project Number:	24185P1
Project Title:	Desert Horizons II, General Atomics
Project Location:	El Mirage, CA
Client:	Parkway Construction

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Sample ID: JDA02202508 **Gravel** (%): 0.2% **Sand** (%): 27.4% **Fines** (%): 72.4%

Classification, ASTM D2487: (CLML) Silty clay with sand
Sample Origin: Boring One at 25'
Laboratory Remarks:



C_u	C_c	Moisture	D_{100}	D_{60}	D_{30}	D_{10}	LL	PL	PI	SG	FM	SE
NA	NA	23.4%	0.605	0.000	0.000	0.000	ND	ND	ND	ND	ND	ND

Method / Procudure Used: D422, D1140
Size of Initial Dry Mass (g): 667.1
Determination of Dry Mass: D2216
Particles; Shape, Hardness: ND
Dispersion Device/Period: Manual/2 hr
Type & Amount of Agent: Defloc. & 1.0
Laboratory Comments:

The Material ☐ Was ☐ Was Not Sampled & tested in accordance with the reqs. of the DSA approved documents.
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Particle-Size Analysis of Soil

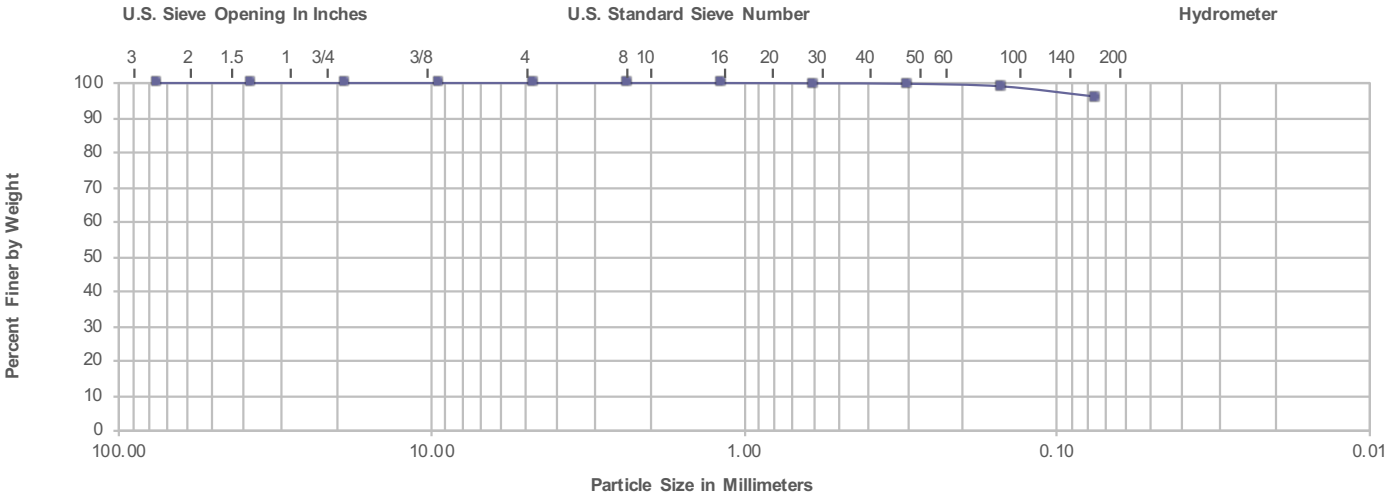
D422, D1140, D2487

Project Number:	24185P1
Project Title:	Desert Horizons II, General Atomics
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Sample ID: JDA02202509 **Gravel** (%): 0.0% **Sand** (%): 3.9% **Fines** (%): 96.1%

Classification, ASTM D2487: (CH) Fat clay
Sample Origin: Boring One at 40'
Laboratory Remarks:



C_u	C_c	Moisture	D_{100}	D_{60}	D_{30}	D_{10}	LL	PL	PI	SG	FM	SE
NA	NA	25.1%	14.250	0.000	0.000	0.000	53	29	25	ND	ND	ND

Method / Procudure Used: D422, D1140
Size of Initial Dry Mass (g): 631.5
Determination of Dry Mass: D2216
Particles; Shape, Hardness: ND
Dispersion Device/Period: Manual/2 hr
Type & Amount of Agent: Defloc. & 1.0
Laboratory Comments:

The Material ☐ Was ☐ Was Not Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested ☐ Met ☐ Did Not Meet The requirements of the DSA approved documents.

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Particle-Size Analysis of Soil

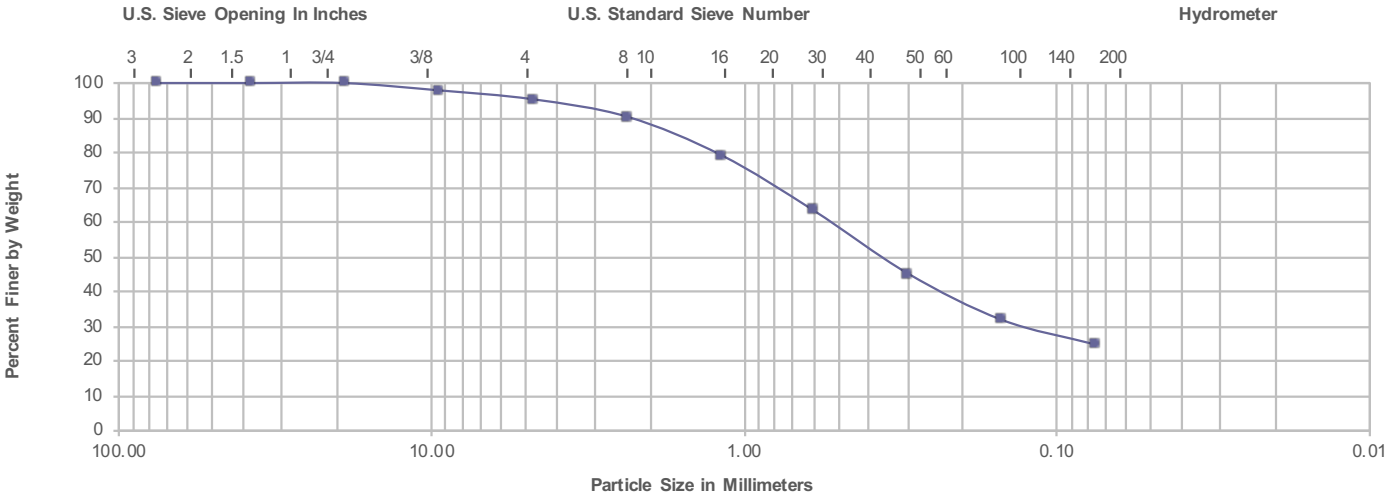
D422, D1140, D2487

Project Number:	24185P1
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Project Location:	El Mirage, CA
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DSA LEA No:	

Sample ID: JDA02202516 **Gravel** (%): 4.7% **Sand** (%): 70.6% **Fines** (%): 24.8%

Classification, ASTM D2487: (SM) Silty sand
Sample Origin: Boring Three at 0' to 5'
Laboratory Remarks:



C_u	C_c	Moisture	D_{100}	D_{60}	D_{30}	D_{10}	LL	PL	PI	SG	FM	SE
NA	NA	3.1%	14.453	0.528	0.120	0.000	ND	ND	ND	ND	ND	ND

Method / Procudure Used: D422, D1140
Size of Initial Dry Mass (g): 1076.9
Determination of Dry Mass: D2216
Particles; Shape, Hardness: ND
Dispersion Device/Period: Manual/2 hr
Type & Amount of Agent: Defloc. & 1.0
Laboratory Comments:

The Material ☐ Was ☐ Was Not Sampled & tested in accordance with the reqs. of the DSA approved documents.
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Particle-Size Analysis of Soil

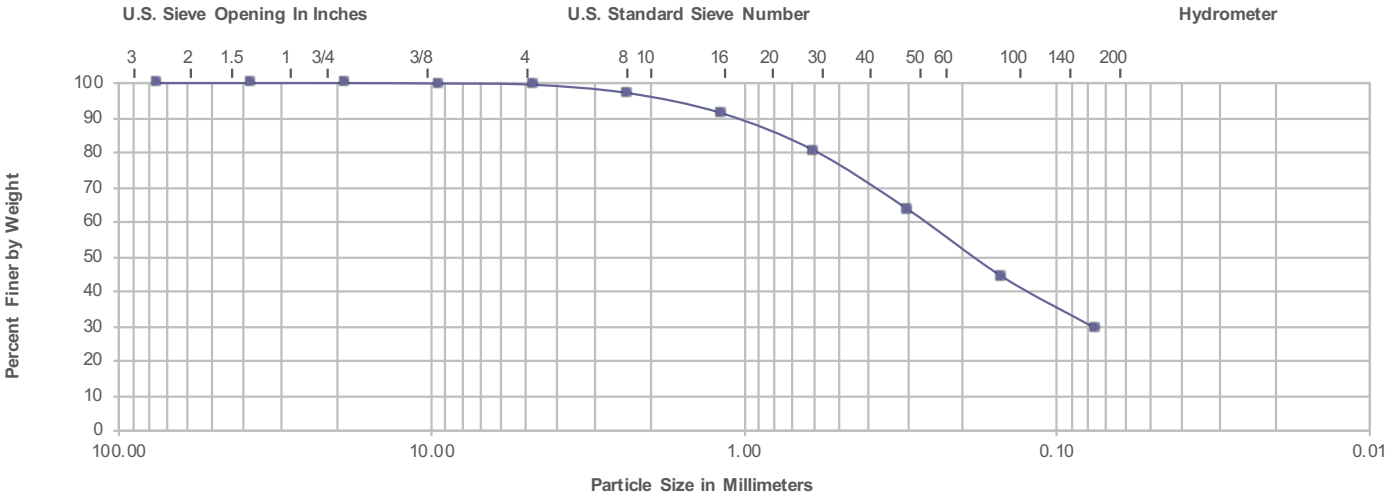
D422, D1140, D2487

Project Number:	24185P1
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Sample ID: JDA02202522 **Gravel** (%): 0.5% **Sand** (%): 70.1% **Fines** (%): 29.4%

Classification, ASTM D2487: (SM) Silty sand
Sample Origin: Boring Five at 0' to 5'
Laboratory Remarks:



C_u	C_c	Moisture	D_{100}	D_{60}	D_{30}	D_{10}	LL	PL	PI	SG	FM	SE
NA	NA	2.4%	4.238	0.264	0.073	0.000	ND	ND	ND	ND	ND	ND

Method / Procudure Used: D422, D1140
Size of Initial Dry Mass (g): 1066.2
Determination of Dry Mass: D2216
Particles; Shape, Hardness: ND
Dispersion Device/Period: Manual/2 hr
Type & Amount of Agent: Defloc. & 1.0
Laboratory Comments:

The Material ☐ Was ☐ Was Not Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested ☐ Met ☐ Did Not Meet The requirements of the DSA approved documents.

cc: Project Architect, Structural Engineer, Project Inspector, DSA Regional Office, School District

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Particle-Size Analysis of Soil

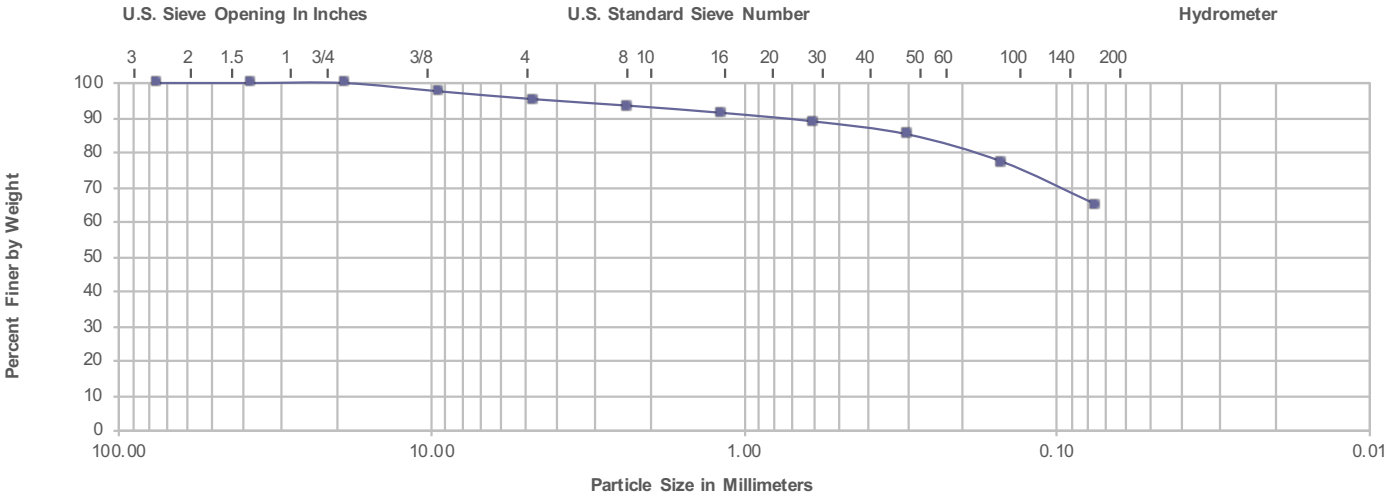
D422, D1140, D2487

Project Number:	24185P1
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Sample ID: JDA02202533 **Gravel** (%): 4.6% **Sand** (%): 30.3% **Fines** (%): 65.1%

Classification, ASTM D2487: (ML) Sandy silt
Sample Origin: Boring Seven at 0' to 5'
Laboratory Remarks:



C_u	C_c	Moisture	D_{100}	D_{60}	D_{30}	D_{10}	LL	PL	PI	SG	FM	SE
NA	NA	5.6%	14.992	0.000	0.000	0.000	26	23	3	ND	ND	7

Method / Procudure Used: D422, D1140
Size of Initial Dry Mass (g): 1232.0
Determination of Dry Mass: D2216
Particles; Shape, Hardness: ND
Dispersion Device/Period: Manual/2 hr
Type & Amount of Agent: Defloc. & 1.0
Laboratory Comments:

The Material ☐ Was ☐ Was Not Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested ☐ Met ☐ Did Not Meet The requirements of the DSA approved documents.

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Particle-Size Analysis of Soil

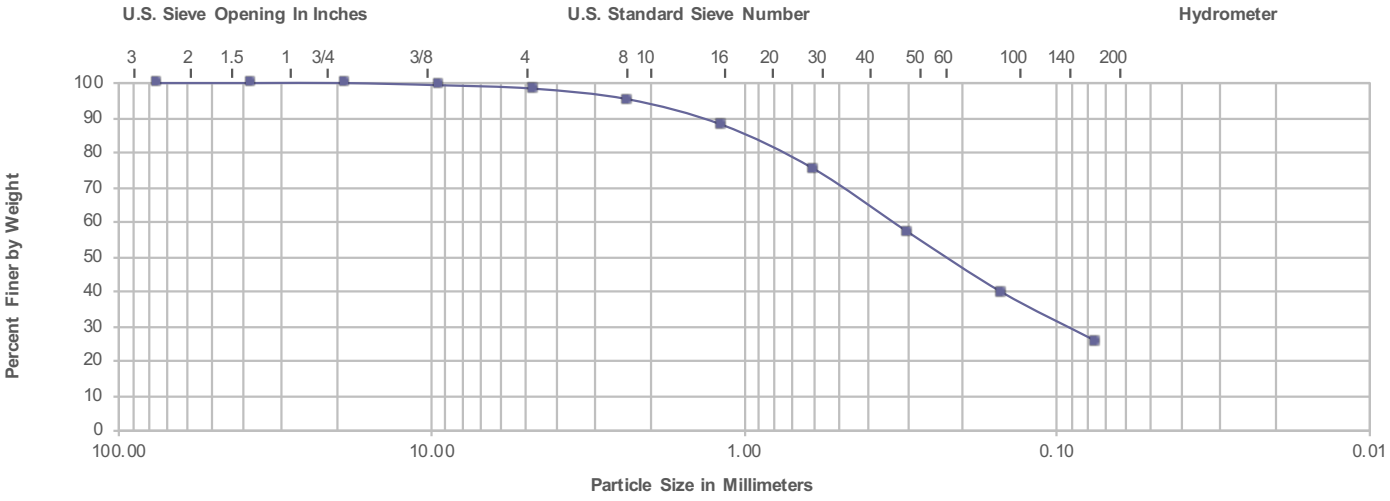
D422, D1140, D2487

Project Number:	24185P1
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Project Location:	El Mirage, CA
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DSA LEA No:	

Sample ID: JDA02202534 **Gravel** (%): 1.6% **Sand** (%): 72.6% **Fines** (%): 25.8%

Classification, ASTM D2487: (SM) Silty sand
Sample Origin: Boring Eight at 0' to 5'
Laboratory Remarks:



C_u	C_c	Moisture	D_{100}	D_{60}	D_{30}	D_{10}	LL	PL	PI	SG	FM	SE
NA	NA	1.5%	7.656	0.330	0.092	0.000	ND	ND	ND	ND	ND	34

Method / Procudure Used: D422, D1140
Size of Initial Dry Mass (g): 1113.2
Determination of Dry Mass: D2216
Particles; Shape, Hardness: ND
Dispersion Device/Period: Manual/2 hr
Type & Amount of Agent: Defloc. & 1.0
Laboratory Comments:

The Material ☐ Was ☐ Was Not Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested ☐ Met ☐ Did Not Meet The requirements of the DSA approved documents.

cc: Project Architect, Structural Engineer, Project Inspector, DSA Regional Office, School District

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Particle-Size Analysis of Soil

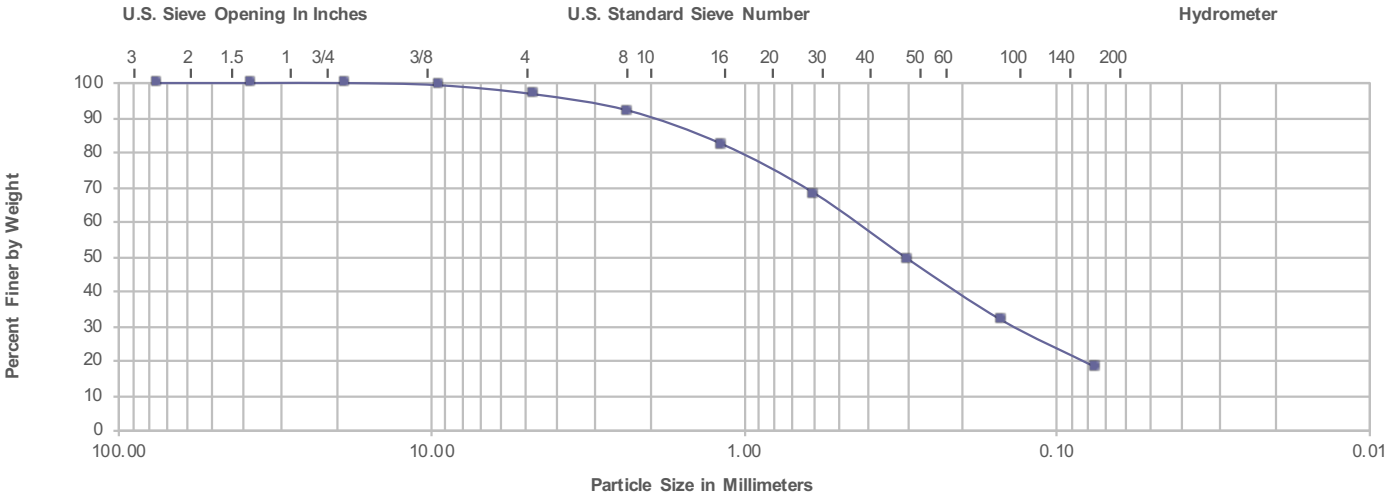
D422, D1140, D2487

Project Number:	24185P1
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Sample ID: JDA02202536 **Gravel** (%): 3.2% **Sand** (%): 78.6% **Fines** (%): 18.2%

Classification, ASTM D2487: (SM) Silty sand
Sample Origin: Boring Nine at 0' to 5'
Laboratory Remarks:



C_u	C_c	Moisture	D_{100}	D_{60}	D_{30}	D_{10}	LL	PL	PI	SG	FM	SE
NA	NA	1.3%	8.800	0.451	0.135	0.000	ND	ND	ND	ND	ND	ND

Method / Procudure Used: D422, D1140
Size of Initial Dry Mass (g): 1184.8
Determination of Dry Mass: D2216
Particles; Shape, Hardness: ND
Dispersion Device/Period: Manual/2 hr
Type & Amount of Agent: Defloc. & 1.0
Laboratory Comments:

The Material ☐ Was ☐ Was Not Sampled & tested in accordance with the reqs. of the DSA approved documents.
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Plasticity Index of Soils

ASTM D4318

Project Number:	24185P1
Project Title:	Desert Horizons II, General Atomics
Project Location:	El Mirage, CA
Client:	Parkway Construction

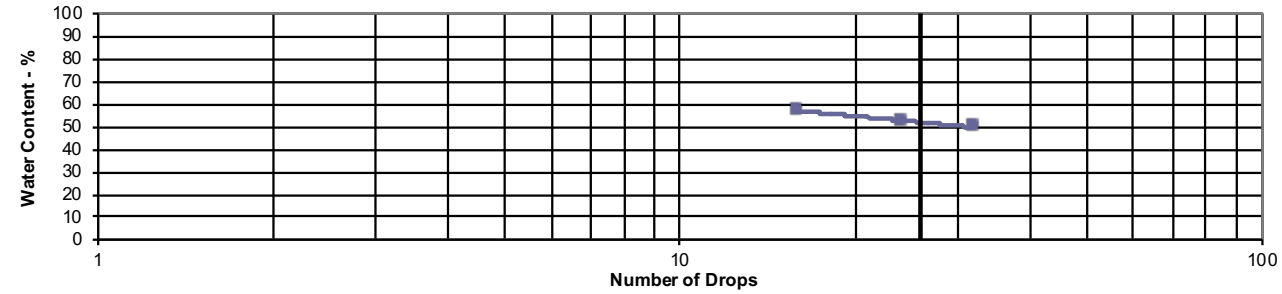
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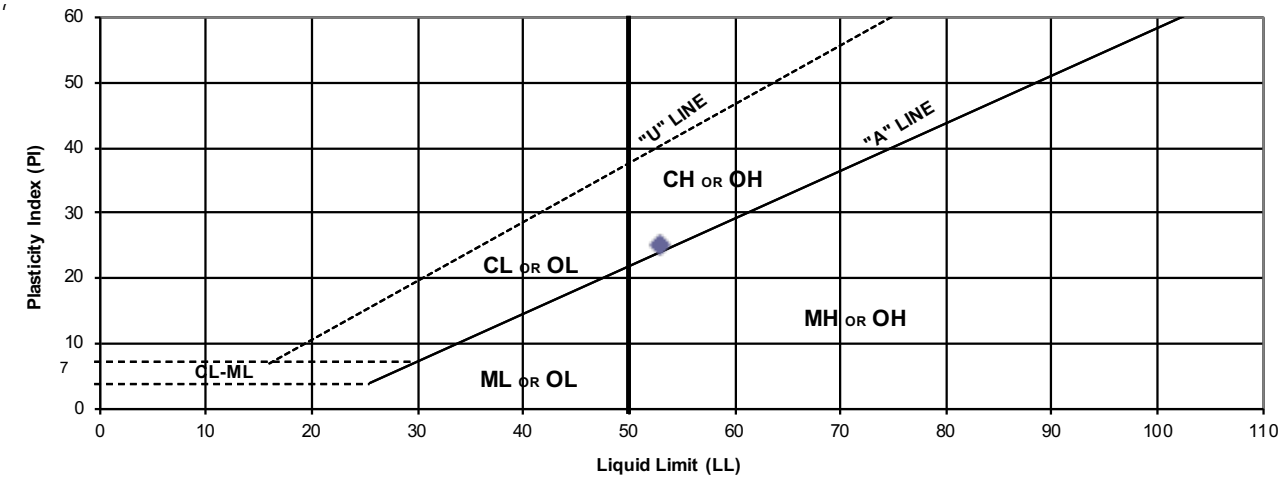
Sample ID: JDA02202509 ☐ **General Compliance** ☐ **Non-Compliance** ☐ **Not Specified**

Desription, D2487:	(CH) Fat clay	**Tested By:**	JJB
Sample Origin:	Boring One at 40'	**Method/Equipment Used:**	Multi Point, Manual
Laboratory Remarks:		**Prep:**	Wet

Plasticity Index (PI):		**Allowable*:**
Liquid Limit (LL):	53	-
Plastic Limit (PL):	29	-
Plasticity Index (LL-PL):	25	-

*Amount Allowable Based On:





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The Material Tested ☐ Met ☐ Did Not Meet The requirements of the DSA approved documents.

cc: Project Architect, Structural Engineer, Project Inspector, DSA Regional Office, School District

Reviewed By (Signature)

Jeremy Beissner/ Laboratory Manager
Name / Title

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Plasticity Index of Soils

ASTM D4318

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Project Number: 24185P1
Project Title: Desert Horizons II, General Atomics
Project Location: El Mirage, CA
Client: Parkway Construction

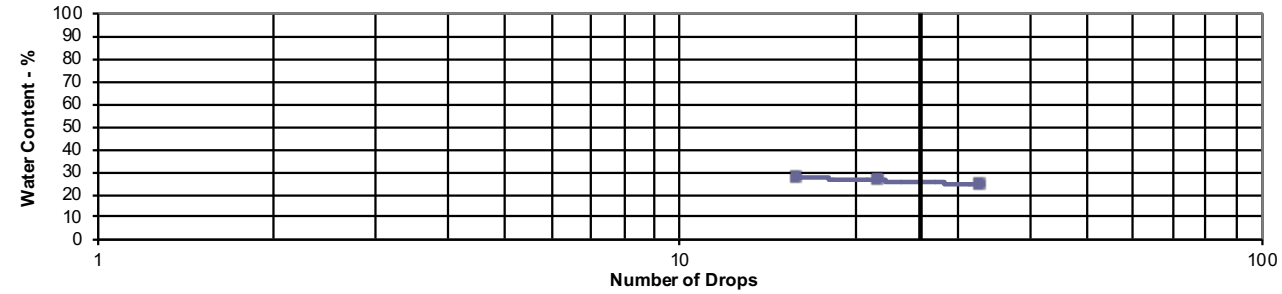
Sample ID: JDA02202533 ☐ General Compliance ☐ Non-Compliance ☐ Not Specified

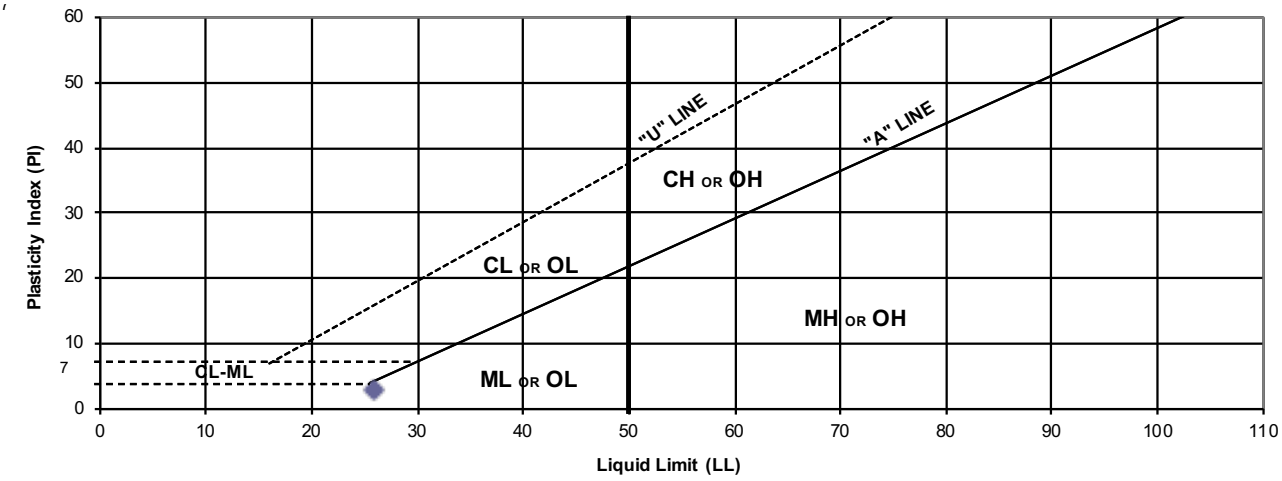
Desription, D2487: (ML) Sandy silt
Sample Origin: Boring Seven at 0' to 5'
Laboratory Remarks:

Tested By: JJB
Method/Equipment Used: Multi Point, Manual
Prep: Wet

Plasticity Index (PI):		Allowable*:
Liquid Limit (LL):	26	-
Plastic Limit (PL):	23	-
Plasticity Index (LL-PL):	3	-

*Amount Allowable Based On:





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The Material Tested ☐ Met ☐ Did Not Meet The requirements of the DSA approved documents.
cc: Project Architect, Structural Engineer, Project Inspector, DSA Regional Office, School District

Reviewed By (Signature)

Jeremy Beissner/ Laboratory Manager
Name / Title

Laboratory Compaction Characteristics

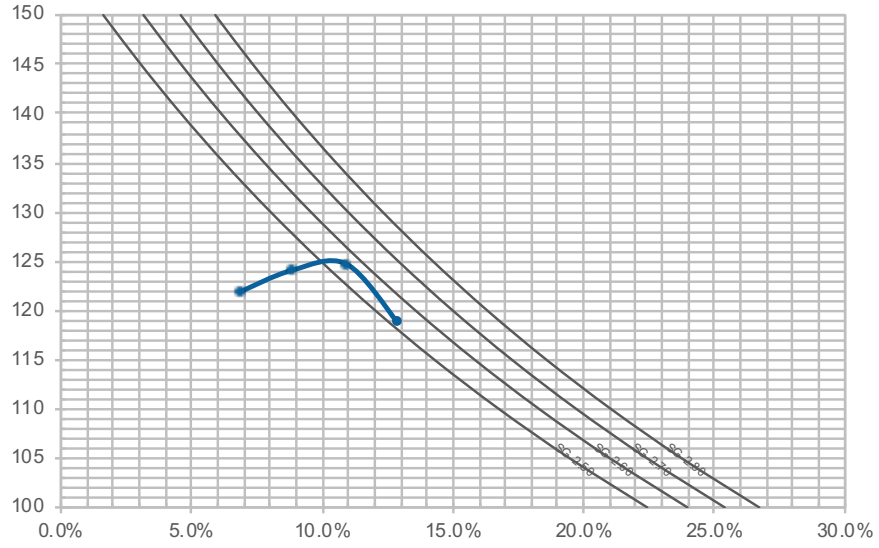
ASTM D1557, D2488

Project Number:	24185P1
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Project Location:	El Mirage, CA
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DSA LEA No.:

Sample ID: JDA02202501 **Maximum Dry Unit Weight** (lbf/ft^3): 125.0 **Optimum Moisture Content** (%): 10.2

Classification, ASTM D2488: (SM) Silty sand
Sample Origin: Boring One at 0' to 5'
Laboratory Remarks:



Tested By:	EJM
Received Moisture:	4.9%
Preparation:	Wet
Specific Gravity:	
SG Method:	
Start Weight (lb):	34.5
Retained on 3/4" (lb):	0.0
Retained on 3/8" (lb):	0.0
Retained on No. 4 (lb):	0.1
Retained on 3/4" (%):	
Retained on 3/8" (%):	
Retained on No. 4 (%):	0.3%
Oversize Correction:	
Mold Volume Factor:	30.01
Tare Weight (lb):	4.32
Rammer Used:	Mechanical
Method Used:	☐ A ☑ B ☐ C

Weight of Soil and Tare (lb):	8.66	8.82	8.93	8.79
Wet Weight (g):	315.0	309.2	313.0	316.8
Dry Weight (g):	294.8	284.1	282.2	280.7
Moisture Content (%):	6.9%	8.8%	10.9%	12.9%
Dry Unit Weight (flb/ft^3):	121.9	124.1	124.7	118.9

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cc: Project Architect, Structural Engineer, Project Inspector, DSA Regional Office, School District

Reviewed By (Signature)

Jeremy Beissner / Laboratory Manager
Name / Title

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Laboratory Compaction Characteristics

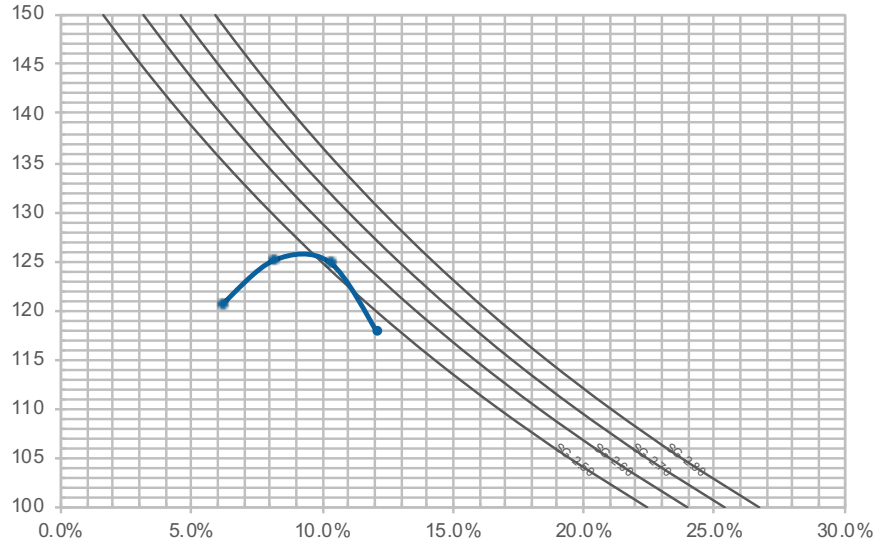
ASTM D1557, D2488

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Project Location:	El Mirage, CA
Client:	Parkway Construction

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DSA Application No.:
DSA LEA No.:

Sample ID: JDA02202510 **Maximum Dry Unit Weight** (lbf/ft^3): 125.8 **Optimum Moisture Content** (%): 9.6

Classification, ASTM D2488: (SM) Silty sand
Sample Origin: Boring Two at 0' to 5'
Laboratory Remarks:



Tested By:	EJM
Received Moisture:	6.2%
Preparation:	Wet
Specific Gravity:	
SG Method:	
Start Weight (lb):	35.2
Retained on 3/4" (lb):	0.0
Retained on 3/8" (lb):	0.2
Retained on No. 4 (lb):	1.0
Retained on 3/4" (%):	
Retained on 3/8" (%):	0.6%
Retained on No. 4 (%):	2.8%
Oversize Correction:	
Mold Volume Factor:	30.01
Tare Weight (lb):	4.32
Rammer Used:	Mechanical
Method Used:	☐ A ☑ B ☐ C

Weight of Soil and Tare (lb):	8.59	8.83	8.91	8.72
Wet Weight (g):	308.8	304.5	313.4	314.9
Dry Weight (g):	290.8	281.5	284.2	280.9
Moisture Content (%):	6.2%	8.2%	10.3%	12.1%
Dry Unit Weight (flb/ft^3):	120.7	125.1	124.9	117.8

The Material ☐ Was ☐ Was Not Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested ☐ Met ☐ Did Not Meet The requirements of the DSA approved documents.
cc: Project Architect, Structural Engineer, Project Inspector, DSA Regional Office, School District

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Laboratory Compaction Characteristics

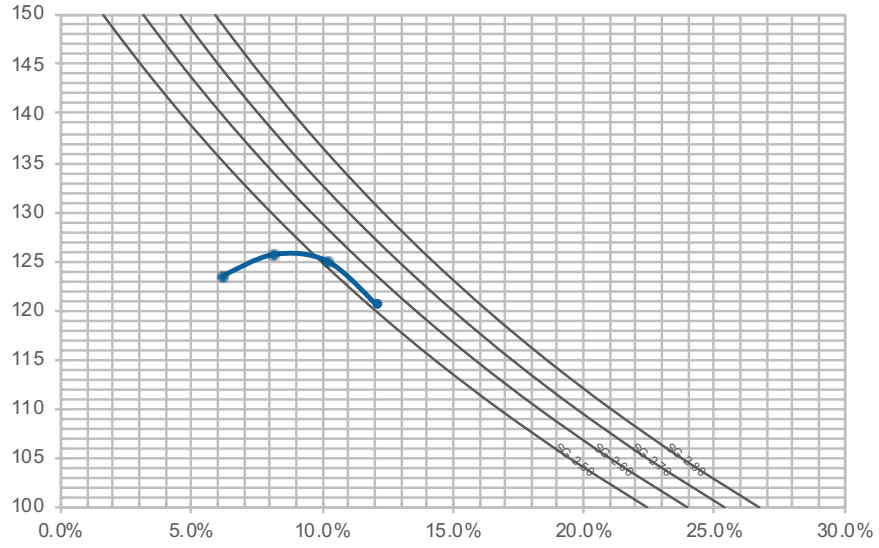
ASTM D1557, D2488

Project Number:	24185P1
Project Title:	Desert Horizons II, General Atomics
Project Location:	El Mirage, CA
Client:	Parkway Construction

Report Date:
Sheet: 1 *of* 1
Attachment:
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Client Project No.:
Other:
DSA File No.:
DSA Application No.:
DSA LEA No.:

Sample ID: JDA02202522 **Maximum Dry Unit Weight** (lbf/ft^3): 125.9 **Optimum Moisture Content** (%): 8.5

Classification, ASTM D2488: (SM) Silty sand
Sample Origin: Boring Five at 0' to 5'
Laboratory Remarks:



Tested By:	EJM
Received Moisture:	2.2%
Preparation:	Wet
Specific Gravity:	
SG Method:	
Start Weight (lb):	40.0
Retained on 3/4" (lb):	0.0
Retained on 3/8" (lb):	0.0
Retained on No. 4 (lb):	0.5
Retained on 3/4" (%):	
Retained on 3/8" (%):	
Retained on No. 4 (%):	1.3%
Oversize Correction:	
Mold Volume Factor:	30.01
Tare Weight (lb):	4.32
Rammer Used:	Mechanical
Method Used:	☐ A ☑ B ☐ C

Weight of Soil and Tare (lb):	8.69	8.85	8.91	8.82
Wet Weight (g):	312.8	317.0	312.3	309.7
Dry Weight (g):	294.6	293.1	283.4	276.2
Moisture Content (%):	6.2%	8.2%	10.2%	12.1%
Dry Unit Weight (flb/ft^3):	123.5	125.7	125.0	120.4

The Material ☐ Was ☐ Was Not Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested ☐ Met ☐ Did Not Meet The requirements of the DSA approved documents.
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Expansion Index

ASTM D4829

Project Number:	24185P1
Project Title:	Desert Horizons II, General Atomics
Project Location:	El Mirage, CA
Client:	Parkway Construction

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Sheet: 1 *of* 1
Attachment:
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Client Project No.:
Other:
DSA File No.:
DSA Application No.:
DSA LEA No.:

Sample ID: JDA02202501 ☐ **General Compliance** ☐ **Non-Compliance** ☐ **Not Specified**

Classification, ASTM D2487:	(SM) Silty sand
Sample Origin:	Boring One at 0' to 5'
Laboratory Remarks:	
Tested By:	EJM
Method/Procedure:	ASTM D4829

Expansion Index

Value: 21

Expansion Index	Potention Expansion
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
> 130	Very High

The Material ☐ Was ☐ Was Not Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested ☐ Met ☐ Did Not Meet The requirements of the DSA approved documents.
cc: Project Architect, Structural Engineer, Project Inspector, DSA Regional Office, School District

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Expansion Index

ASTM D4829

Project Number:	24185P1
Project Title:	Desert Horizons II, General Atomics
Project Location:	El Mirage, CA
Client:	Parkway Construction

Report Date:
Sheet: 1 *of* 1
Attachment:
Permit No.:
Client Project No.:
Other:
DSA File No.:
DSA Application No.:
DSA LEA No.:

Sample ID: JDA02202517 ☐ **General Compliance** ☐ **Non-Compliance** ☐ **Not Specified**

Classification, ASTM D2487:	(SM) Silty sand
Sample Origin:	Boring Four at 0' to 5'
Laboratory Remarks:	
Tested By:	EJM
Method/Procedure:	ASTM D4829

Expansion Index

Value: 30

Expansion Index	Potention Expansion
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
> 130	Very High

The Material ☐ Was ☐ Was Not Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested ☐ Met ☐ Did Not Meet The requirements of the DSA approved documents.
cc: Project Architect, Structural Engineer, Project Inspector, DSA Regional Office, School District

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Name / Title

Sand Equivalent of Soils and Fine Aggregate

ASTM D2419

Project Number:	24185P1
Project Title:	Desert Horizons II, General Atomics
Project Location:	El Mirage, CA
Client:	Parkway Construction

Report Date:	
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Attachment:	
Permit No.:	
Client Project No.:	
Other:	
DSA File No.:	
DSA Application No.:	
DSA LEA No.:	

Sample ID: JDA02202533 ☐ **General Compliance** ☐ **Non-Compliance** ☐ **Not Specified**

Desription:	(SM) Silty sand
Sample Origin:	Boring Seven at 0' to 5'
Laboratory Remarks:	
Tested By:	EJM
Mechanical/Manual Shaker:	Mechanical

Sand Equivalent Value	**Minimum Value Allowable**
7	**-**

Ammount/Value Allowable Based On:

The Material	☐ Was	☐ Was Not	Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested	☐ Met	☐ Did Not Meet	The requirements of the DSA approved documents.

cc: Project Architect, Structural Engineer, Project Inspector, DSA Regional Office, School District

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Jeremy Beissner/ Laboratory Manager

Name / Title

Sand Equivalent of Soils and Fine Aggregate

ASTM D2419

Project Number:	24185P1
Project Title:	Desert Horizons II, General Atomics
Project Location:	El Mirage, CA
Client:	Parkway Construction

Report Date:	
Sheet:	1 *of* 1
Attachment:	
Permit No.:	
Client Project No.:	
Other:	
DSA File No.:	
DSA Application No.:	
DSA LEA No.:	

Sample ID: JDA02202534 ☑ **General Compliance** ☐ **Non-Compliance** ☐ **Not Specified**

Desription:	(SM) Silty sand
Sample Origin:	Boring Eight at 0' to 5'
Laboratory Remarks:	
Tested By:	EJM
Mechanical/Manual Shaker:	Mechanical

Sand Equivalent Value	**Minimum Value Allowable**
31	**-**

Ammount/Value Allowable Based On:

The Material	☐ Was	☐ Was Not	Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested	☐ Met	☐ Did Not Meet	The requirements of the DSA approved documents.

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R-Value and Expansion Pressure of Compacted Soils

ASTM D2844

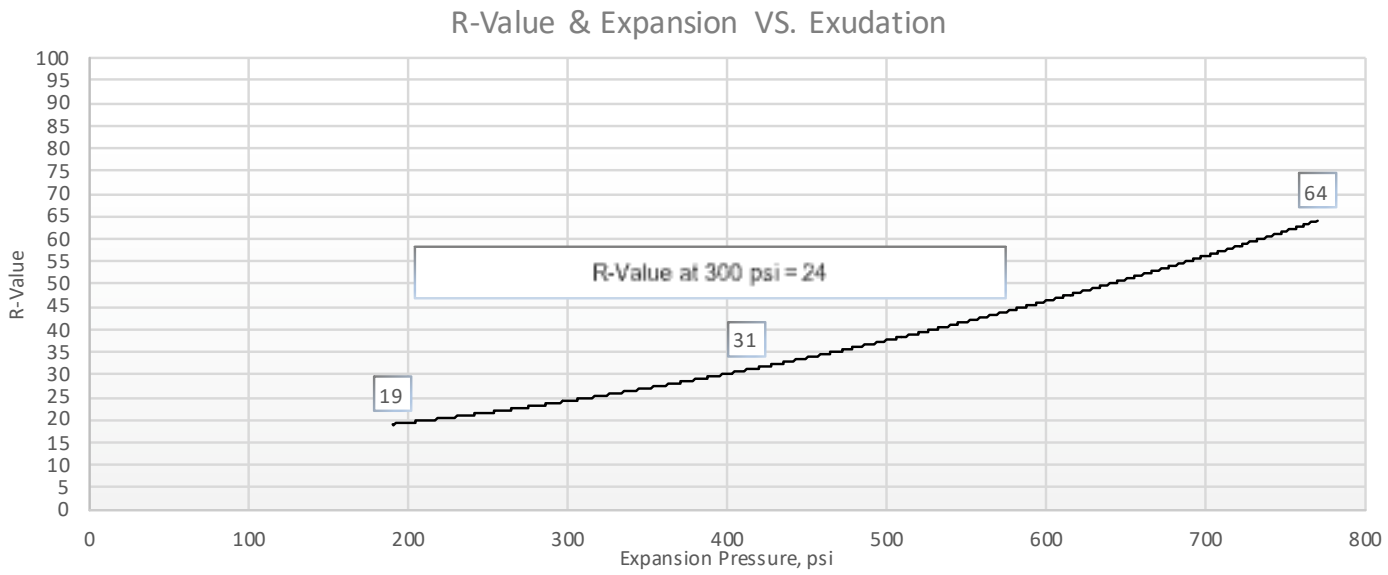
Project Number:	24185P1
Project Title:	Desert Horizons II, General Atomics
Project Location:	El Mirage, CA
Client:	Parkway Construction

Report Date:
Sheet: 1 *of* 1
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Permit No.:
Client Project No.:
Other:
DSA File No.:
DSA Application No.:
DSA LEA No.:

Sample ID: JDA02202533 ☐ **General Compliance** ☐ **Non-Compliance** ☐ **Not Specified**

Desription, D2847:	(ML) Sandy silt
Sample Origin:	Boring Seven at 0' to 5'
Tested By:	EJM
Value Allowable Based On:	

Briguette Number:	1	2	3
Moisture Content (%):	10.8	12.4	14.7
Dry Density (pcf):	127.0	124.9	124.0
Exudation Pressure (psi):	770	412	190
Expansion Pressure (psf):	0.0206	0.0015	0.0025
R-Value:	64	31	19



The Material ☐ Was ☐ Was Not Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested ☐ Met ☐ Did Not Meet The requirements of the DSA approved documents.

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R-Value and Expansion Pressure of Compacted Soils

ASTM D2844

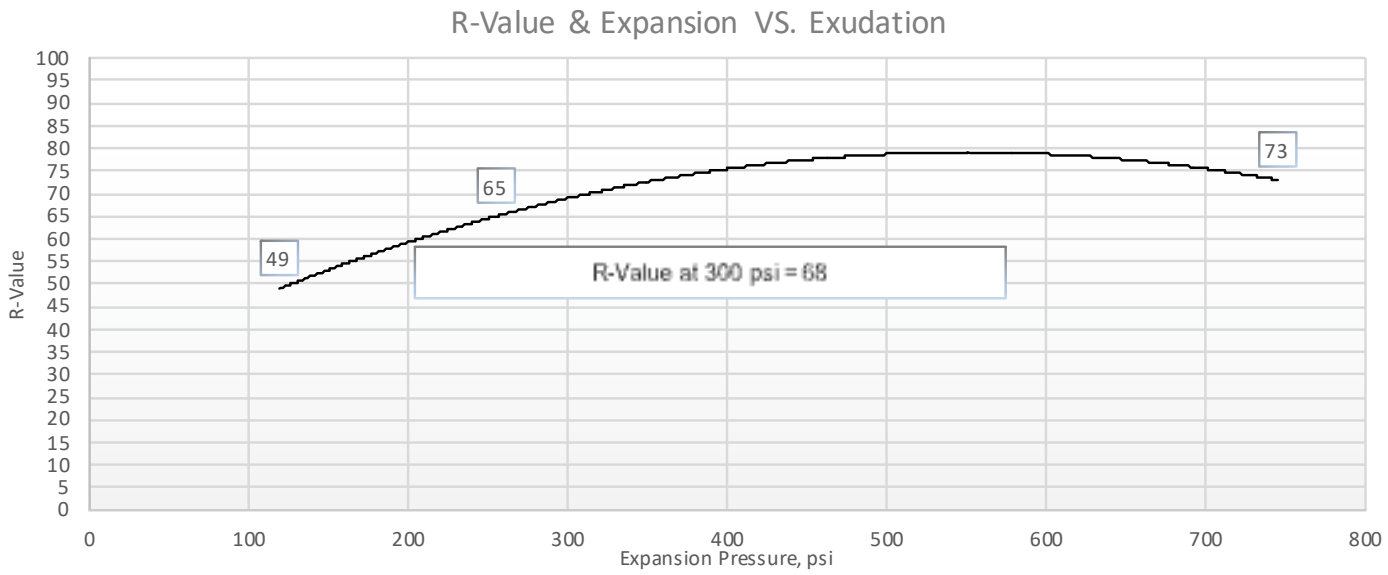
Project Number:	24185P1
Project Title:	Desert Horizons II, General Atomics
Project Location:	El Mirage, CA
Client:	Parkway Construction

Report Date:
Sheet: 1 *of* 1
Appendix:
Permit No.:
Client Project No.:
Other:
DSA File No.:
DSA Application No.:
DSA LEA No.:

Sample ID: JDA02202534 ☐ **General Compliance** ☐ **Non-Compliance** ☐ **Not Specified**

Desription, D2847:	(SM) Silty sand
Sample Origin:	Boring Eight at 0' to 5'
Tested By:	EJM
Value Allowable Based On:	

Briguette Number:	1	2	3
Moisture Content (%):	8.8	9.3	11.4
Dry Density (pcf):	130.0	128.6	126.5
Exudation Pressure (psi):	745	255	119
Expansion Pressure (psf):	0.0031	-0.0002	-0.0010
R-Value:	73	65	49



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Direct Shear Test of Soils

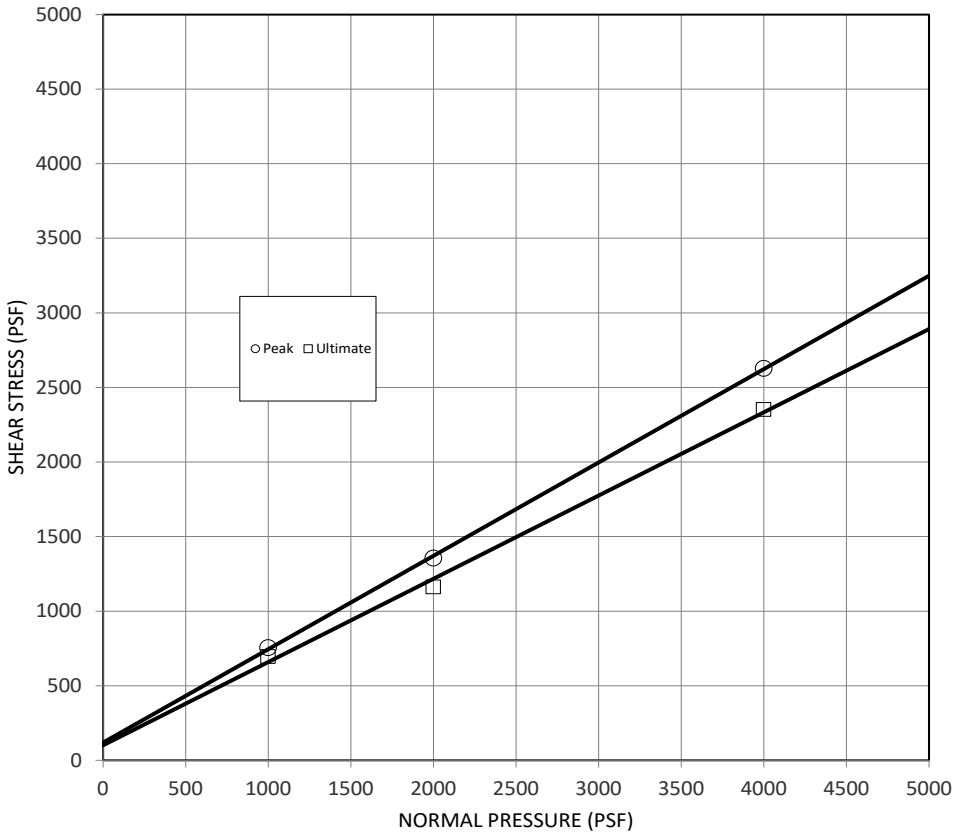
ASTM D3080

Project Number:	24185P1
Project Title:	Desert Horizons II, General Atomics
Project Location:	El Mirage, CA
Client:	Parkway Construction

Report Date:	
Sheet:	1 of 1
Appendix:	C
Permit No:	
Client Project No:	
Other:	
DSA File No:	
DSA Application No:	
DSA LEA No:	

Sample ID: JDA02202514 **Angle of Internal Friction** (°)**: 32 / 29** **Peak Cohesion** (psf)**: 120** **Ultimate Cohesion** (psf)**: 101**

Classification, ASTM D2488: (CLML) Silty clay
Sample Origin: Boring Two at 10'
Laboratory Remarks:



The Material ☐ Was ☐ Was Not Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested ☐ Met ☐ Did Not Meet The requirements of the DSA approved documents.

cc: Project Architect, Structural Engineer, Project Inspector, DSA Regional Office, School District

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Direct Shear Test of Soils

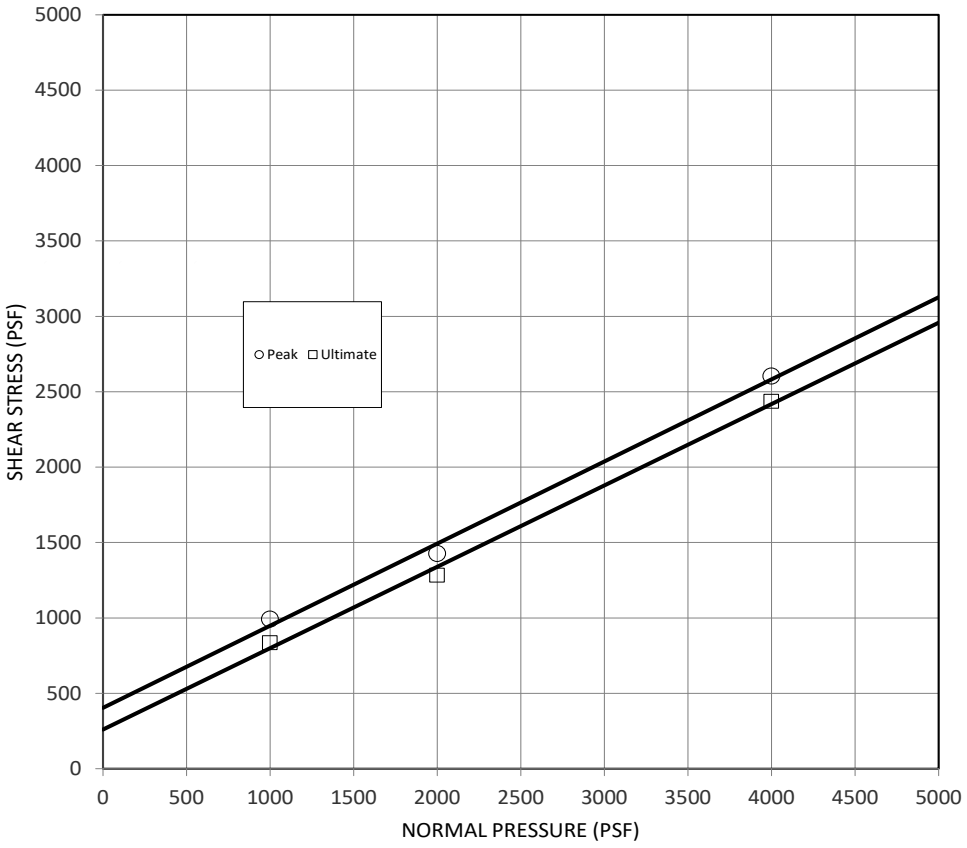
ASTM D3080

Project Number:	24185P1
Project Title:	Desert Horizons II, General Atomics
Project Location:	El Mirage, CA
Client:	Parkway Construction

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Appendix:	C
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Client Project No:	
Other:	
DSA File No:	
DSA Application No:	
DSA LEA No:	

Sample ID: JDA022025149 **Angle of Internal Friction** (°)**:** 29 / 28 **Peak Cohesion** (psf)**:** 404 **Ultimate Cohesion** (psf)**:** 260

Classification, ASTM D2488: (CLML) Silty clay
Sample Origin: Boring Four at 5'
Laboratory Remarks:



The Material ☐ Was ☐ Was Not Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested ☐ Met ☐ Did Not Meet The requirements of the DSA approved documents.
cc: Project Architect, Structural Engineer, Project Inspector, DSA Regional Office, School District

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Direct Shear Test of Soils

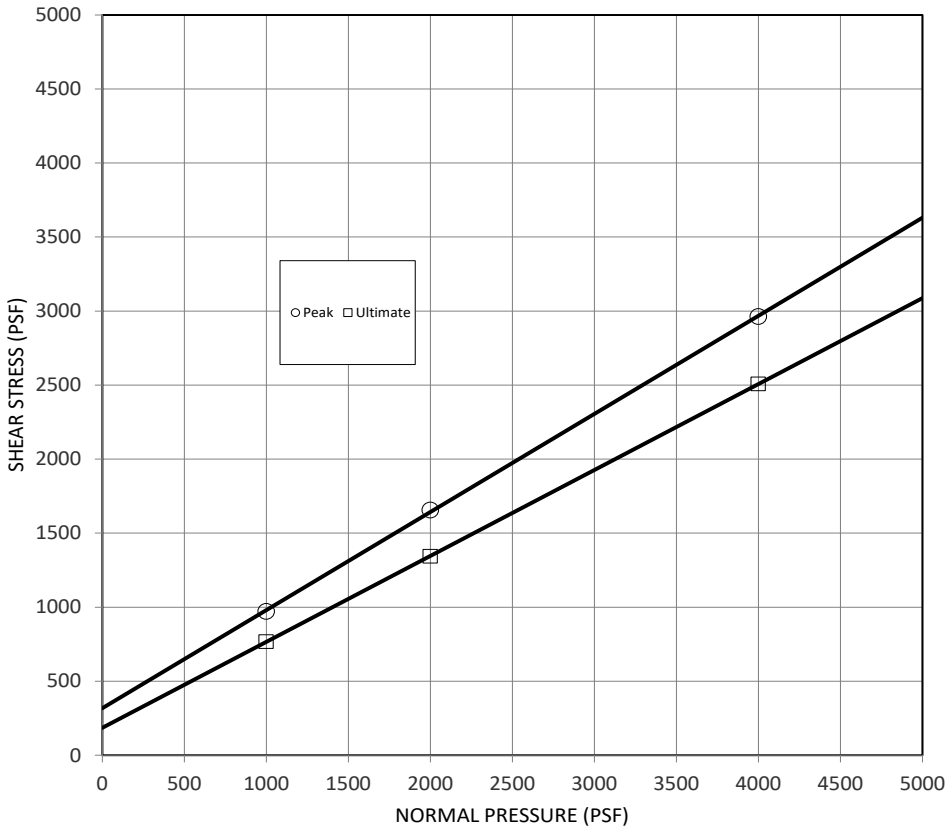
ASTM D3080

Project Number:	24185P1
Project Title:	Desert Horizons II, General Atomics
Project Location:	El Mirage, CA
Client:	Parkway Construction

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Appendix:	C
Permit No:	
Client Project No:	
Other:	
DSA File No:	
DSA Application No:	
DSA LEA No:	

Sample ID: JDA02202530 **Angle of Internal Friction** (°)**: 34 / 30** **Peak Cohesion** (psf)**: 318** **Ultimate Cohesion** (psf)**: 186**

Classification, ASTM D2488: (CLML) Silty clay
Sample Origin: Boring Six at 5'
Laboratory Remarks:



The Material ☐ Was ☐ Was Not Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested ☐ Met ☐ Did Not Meet The requirements of the DSA approved documents.

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Consolidation Properties of Soils

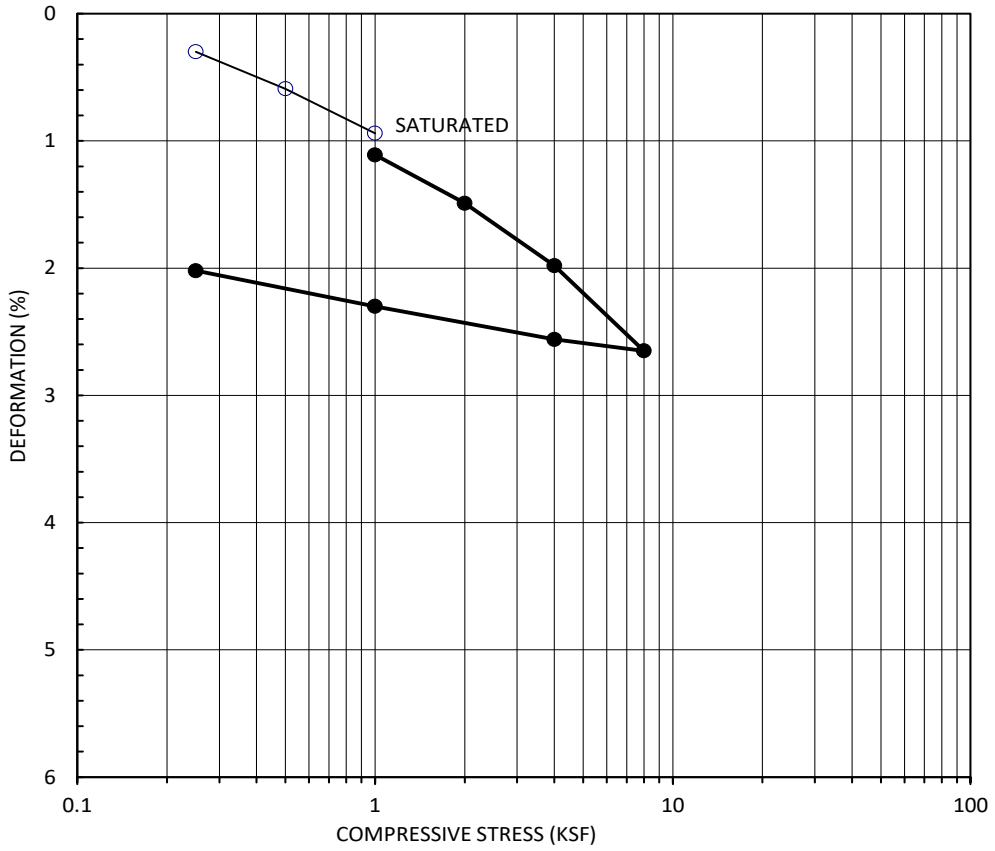
ASTM D2435

Project Number:	24185P1
Project Title:	Desert Horizons II, General Atomics
Project Location:	El Mirage, CA
Client:	Parkway Construction

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Appendix:	C
Permit No:	
Client Project No:	
Other:	
DSA File No:	
DSA Application No:	
DSA LEA No:	

Sample ID: JDA02202506 **Initial Moisture Content** (%)**:** 3.5 **Initial Dry Density** (pcf)**:** 110.7 **Initial Void Ratio:** 0.522

Classification, ASTM D2488: (CLML) Silty clay
Sample Origin: Boring One at 15'
Laboratory Remarks:



The Material ☐ Was ☐ Was Not Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested ☐ Met ☐ Did Not Meet The requirements of the DSA approved documents.

cc: Project Architect, Structural Engineer, Project Inspector, DSA Regional Office, School District

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Consolidation Properties of Soils

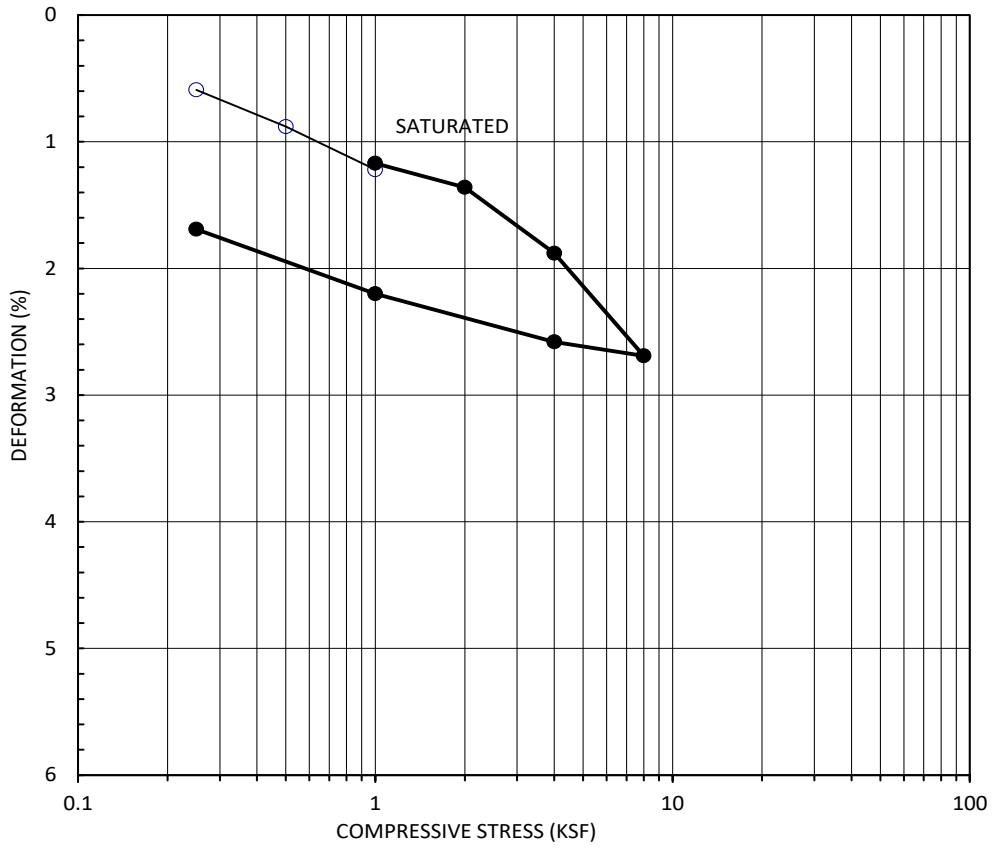
ASTM D2435

Project Number:	24185P1
Project Title:	Desert Horizons II, General Atomics
Project Location:	El Mirage, CA
Client:	Parkway Construction

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Appendix:	C
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Other:	
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DSA Application No:	
DSA LEA No:	

Sample ID: JDA02202515 **Initial Moisture Content** (%)**:** 11 **Initial Dry Density** (pcf)**:** 125.4 **Initial Void Ratio:** 0.343

Classification, ASTM D2488: (SM) Silty sand
Sample Origin: Boring Two at 15'
Laboratory Remarks:



The Material ☐ Was ☐ Was Not Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested ☐ Met ☐ Did Not Meet The requirements of the DSA approved documents.

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Consolidation Properties of Soils

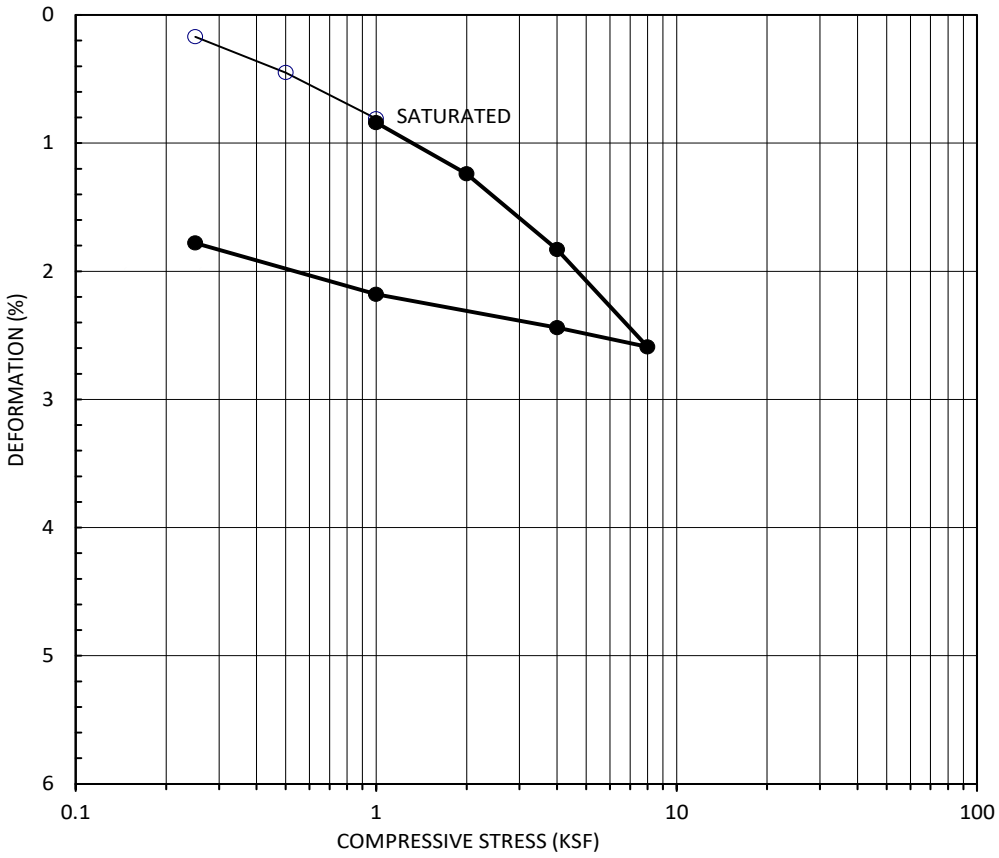
ASTM D2435

Project Number:	24185P1
Project Title:	Desert Horizons II, General Atomics
Project Location:	El Mirage, CA
Client:	Parkway Construction

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Appendix:	C
Permit No:	
Client Project No:	
Other:	
DSA File No:	
DSA Application No:	
DSA LEA No:	

Sample ID: JDA02202526 **Initial Moisture Content** (%)**:** 7.4 **Initial Dry Density** (pcf)**:** 119.1 **Initial Void Ratio:** 0.414

Classification, ASTM D2488: (CLML) Silty clay
Sample Origin: Boring Five at 15'
Laboratory Remarks:



The Material ☐ Was ☐ Was Not Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested ☐ Met ☐ Did Not Meet The requirements of the DSA approved documents.

cc: Project Architect, Structural Engineer, Project Inspector, DSA Regional Office, School District

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Corrosion Potential

CT 643, 422, 417, 643

Report Date:
Sheet: 1 of 1
Appendix: C
Permit No:
Client Project No:
Other:
DSA File No:
DSA Application No:
DSA LEA No:

Project Number: 24185P1
Project Title: Desert Horizons II, General Atomics
Project Location: El Mirage, CA
Client: Parkway Construction

Sample ID: JDA02202501

Classification, ASTM D2487: (SM) Silty sand
Sample Origin: Boring One at 0' to 5'
Laboratory Remarks:

Analysis	Result	Units	Test Method
Minimum Resistivity	185	ohm-cm	CT 643
Chloride Content	640	ppm	CT 422
Sulfate Content	0.523	%	CT 417
pH	8.48	pH units	CT 643

The Material ☐ Was ☐ Was Not Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested ☐ Met ☐ Did Not Meet The requirements of the DSA approved documents.
cc: Project Architect, Structural Engineer, Project Inspector, DSA Regional Office, School District

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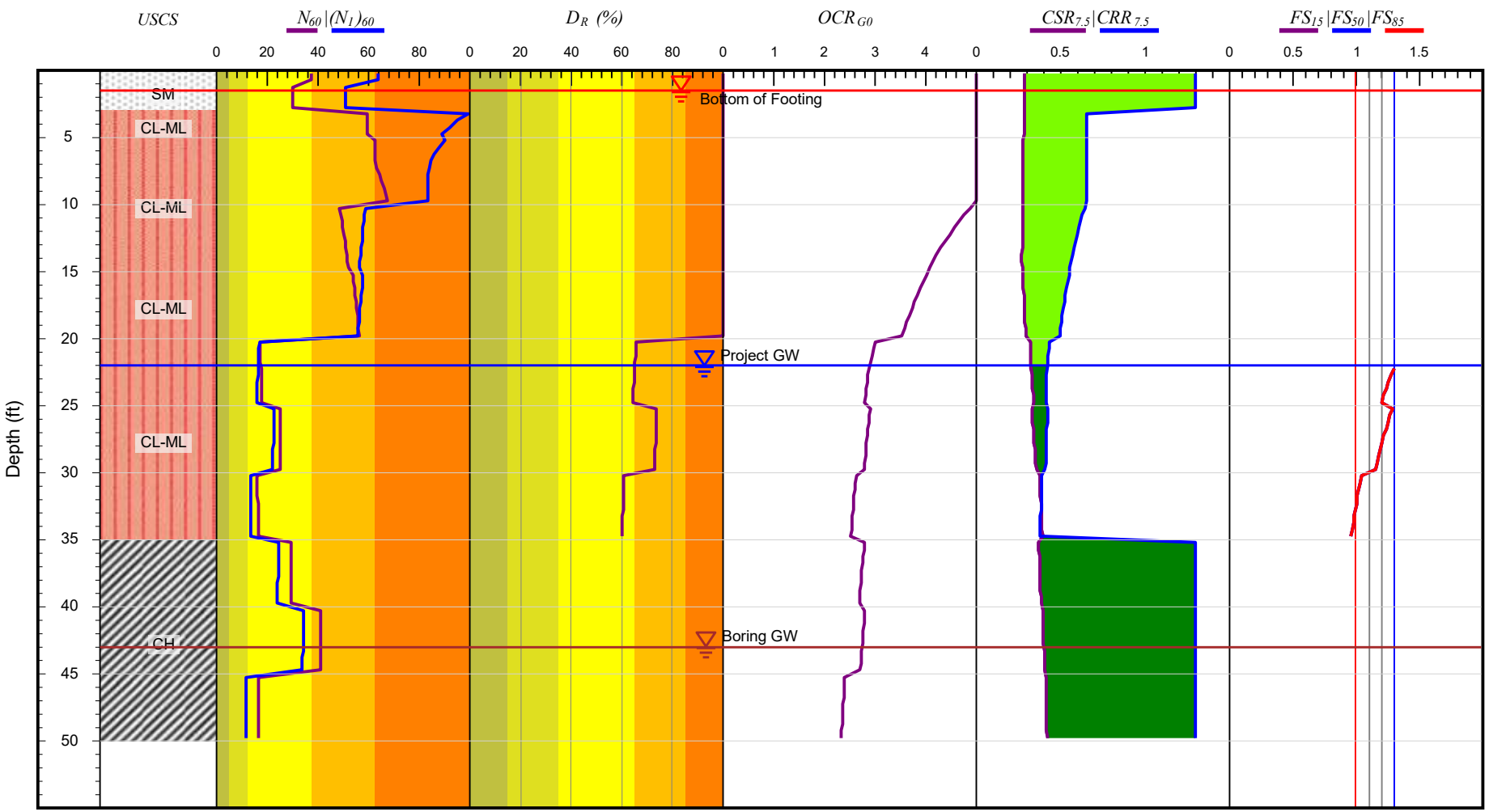
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APPENDIX D

Liquefaction Potential – SPT Data



SM

CH

CL-ML

Silt Correction:
UCLA method

Earthquake & Groundwater Information:
Magnitude = 7
Max. Acceleration = 0.583 g
Project GW = 22 ft
Max. Seismic Settlement = 0.00 in
Settl. @ Bottom of Footing = 0.00 in

Liquefaction: Boulanger & Idriss (2010-16)
Settl.: [dry] Yi (2022)[CPT]; [sat] Idriss & Boulanger (2008)
Lateral spreading: Idriss & Boulanger (2008)
M correction: [Sand; Clay] Boulanger & Idriss(2004)
σv correction: Idriss & Boulanger (2008)
Stress reduction: Idriss & Boulanger (2008)

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Liquefaction Potential - SPT Data

Project:	Desert Horizons II, General Atomics				
Location:	Adelanto, CA				
Project No.:	24185P1	Boring No.:	1	Figure:	-1

C:\Users\JD\Documents\24185P1 GeoAdv\GeoSuite_24185P1_1.csv

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Prepared at 3/21/2025 9:17:32 PM

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Appendix H – Reference Documents

PRELIMINARY DRAINAGE REPORT

El Mirage Facility Expansion and Shipping & Receiving Building

APN: 0457-052-14-000

San Bernardino County, California

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PREPARED FOR

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1 INTRODUCTION (HANGAR 80 EXPANSION)

1.1 PROJECT BACKGROUND

Kimley-Horn was retained by General Atomics Aeronautics to conduct a hydrologic analysis for the proposed El Mirage Facility Expansion, located in unincorporated San Bernardino County (SBC), California (Figure 1, Appendix A). The site is located just outside the El Mirage dry lake bed (Figure 2, Appendix A). The existing airport area is approximately 644 acres, and the expansion facility spans an additional 41.6 acres. The site is at the toe of an alluvial fan supplied by Sheep Creek in the San Gabriel Mountains (Figure 3).

The purpose of this report is to provide the results of the on-site and off-site drainage analysis to evaluate the potential impacts to the site, and provide recommendations, as necessary, associated with storm water runoff for the 100-year design storm event.

1.2 SITE DESCRIPTION

The site is located in an undeveloped area of California, located approximately 24 miles north of Mount San Antonio, 16.5 miles west of Victorville, at Latitude 34°37'23" N and Longitude 117°35'24" W. The site resides within an unincorporated area of San Bernardino County. The proposed expansion facility spans approximately 41.6 acres, located in Section 11 of Township 6N, Range 7W. The site resides near the El Mirage Lake Bed, and is generally flat.

The entire site lies within a Federal Emergency Management Agency (FEMA) Special Hazard Flood Zone D as depicted on Flood Insurance Rate Map (FIRM) panel 06071C5775H (Appendix D). FEMA Flood Zone D is defined as areas with possible but undetermined flood hazards; therefore, a FEMA flood analysis has not been conducted for the project area.

2 HYDROLOGY (HANGAR 80 EXPANSION)

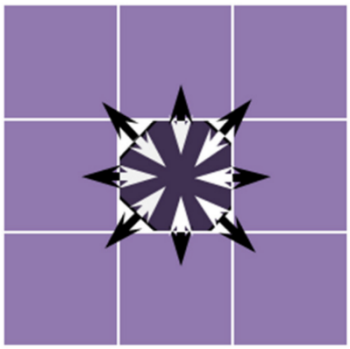
2.1 OFF-SITE DRAINAGE AREA

2.1.1 METHODOLOGY

As illustrated in Figure 1 and 3 in Appendix A, the project is located just outside the El Mirage dry lake bed, within the Sheep Creek alluvial fan floodplain. An alluvial fan is a triangle-shaped deposit of alluvium, which consists of gravel, sand, and smaller materials deposited by flowing water. Flooding occurring on the surface of an alluvial fan or similar landform are characterized by high-velocity flows, erosion, active sediment transport, and unpredictable flow paths. Due to the lack of the defined channels, unpredictable flow paths, and relatively flat plain, a two-dimensional hydrologic model was created to complete the off-site hydrology.

The hydrology for off-site areas were modeled using FLO-2D Pro (FLO-2D Software, Inc). FLO-2D is a finite difference, finite element model using uniform square grid elements. FLO-2D is essentially a finite volume model that tracks the volume distribution to represent the floodwave movement. USGS Digital Elevation Model (DEM) topography data and the Grid Developer System (GDS) was used to create a gridded network of the floodplain, streets, and other obstruction data, as well as interpolate ground elevation values for each grid. The DEM consists of a 1/3 arc second ASCII Grid format with 10-meter grid spacing. The model computes the discharge flux and velocity

in eight (8) directions for each cell; the model was comprised of 100-ft x 100-ft grid elements (146,178 total grid elements). An illustration of the FLO-2D grid is shown below.



FLO-2D Grid Elements

The FLO-2D model computational limits are shown on Figure 1, Appendix A. The model includes the alluvial fan portion of Sheep Creek, as well as the tributary watershed within the San Gabriel Mountains. The model extents within the alluvial fan were drawn such that all areas of the alluvial fan that could potentially contribute run-off towards the project site were included. Review of aerial photos and topographic data showed that not all areas within the fan will concentrate onto the site. The FLO-2D model will allow runoff to leave the model computational domain if existing topography dictates that the runoff will flow away from the site.

FLO-2D calculates runoff for each grid element, based on a given rainfall depth and rainfall distribution. The flow direction, depth, and velocity are based on several factors, including topography, surface roughness (Manning's "n"), and infiltration characteristics (SCS Runoff Curve Numbers). There were a few key features within the watershed that influence the floodplain limits. These features included Sheep Creek Bridge (Bridge No. 54-0810) and concrete dikes at State Route 138 (SR 138), and the California Aqueduct passing east-west through the center of the model boundary extents.

The dikes at SR 138 were modeled in FLO-2D as levees. The dikes and bridge concentrated flood flows along the west side of the alluvial fan. The bridge and dikes are located near the apex of the fan, and as a result flooding within the fan no longer has an unpredictable nature. This can be seen in our flood analysis (Figure 7, Appendix A), as well as in a visual inspection of the geology as defined by color variance in soil along the concentrated flow path. As a result, runoff from the mountain watershed will circumvent the proposed expansion facility, resulting in lower flows than might otherwise exist.

The California Aqueduct passing east to west across our watershed was not modelled in our analysis. Our model assumes any flows within the alluvial fan will pass through the aqueduct without interception, resulting in more conservative flood depths.

2.1.2 RAINFALL

The off-site hydrologic analysis was conducted for the 100-year, 24-hour design storm event. Rainfall depths for the design storm were obtained using NOAA Atlas 14 grids within ArcGIS (Refer to Figure 12, Appendix A). Rainfall depths were applied through the FLO-2D model across the

watershed to each FLO-2D grid element, on a spatially variable basis. Rainfall depths varied from approximately 3.4-inches within the flat plains to 16.2-inches within the mountain range. The use of NOAA Atlas 14 rainfall was in accordance with the 2010 *County of San Bernardino Hydrology Addendum for Arid Regions* (SBCDPW, April 2010). The off-site hydrology analysis was summarized in Appendix A. Supporting hydrologic data from the FLO-2D model is provided in Appendix D.

2.1.3 EXISTING CONDITIONS AND MODEL LOSSES

Watershed losses were calculated using the SCS Runoff Curve Number (CN) method per San Bernardino County curve number values. Soils data was obtained from the NRCS Web Soil Survey to assign hydrologic soil groupings (Figure 4, Appendix A) in accordance with the 2010 Hydrology Manual Addendum. Where soil data was incomplete or missing, a conservative Hydrologic Soil group of "D" was assigned. Runoff curve numbers were determined using the San Bernardino County Hydrology Manual. Curve numbers were scaled up from values in Hydrology Manual Figure C-3 from Antecedent Moisture Condition (AMC) of II to AMC III. This assumption accounts for the potential loss of infiltration capacity within the alluvial fan due to the large storm event. The AMC map from the 2010 Addendum shows the watershed is within areas of AMC I, II, and III; however, only AMC III values were used for the current study. Curve numbers across the watershed are depicted on Figure 6 in Appendix A.

Surface roughness is based on Manning's "n" values. Manning's "n" values were determined based on land cover data (Figure 5) from National Land Cover Database (NLCD), using Manning's "n" tables from "Open-Channel Hydraulics" (Chow, 1959).

2.2 ON-SITE DRAINAGE AREA

2.2.1 METHODOLOGY

A Rational Method analysis in accordance with the San Bernardino County Hydrology Manual was completed to calculate the peak discharges for both the existing condition and project conditions for the expansion area. Development types were chosen based on the corresponding recommended impervious values from Hydrology Manual Figure C-4. In addition, hydrologic soil type A and AMC of III was used to calculate the 100-year peak flow. The Advance Engineering Software (AES) Hydrosoft package was used to complete the rational method analysis.

2.2.2 RAINFALL

The local climate is characterized as a desert climate. Although annual rainfall is typically quite low, there is a precedent for flash flooding in the area. The National Oceanic and Atmospheric Association (NOAA) Atlas 14 database was used to find the 100-year 24-hour storm, which had a depth of 3.45 inches.

2.2.3 EXISTING CONDITIONS

On-site drainage areas were delineated using existing available topographic mapping and aerial images. Soil types were determined using the United States Department of Agriculture (USDA) Web Soil Survey. The project site consists of soil type A, which have low runoff potential. Type A soils having high infiltration rates even when thoroughly wetted and consisting chiefly of deep, well-drained sands or gravels. These soils have a high rate of water transmission.

The natural cover was determined to be narrowleaf chaparral in fair condition, meaning that 50-75% of the ground surface is protected by vegetation. The determination of vegetation coverage was made using satellite imagery.

2.2.4 PROJECT CONDITIONS

The project site will be developed to include new support buildings, hangar buildings, asphalt roads, and parking lots. In general, the site grading divided the site into two major subareas. The west subarea (Area A as shown in Appendix B) maintains existing overland flows into an existing drainage channel. The east subarea (Area B as shown in Appendix B) drains toward a proposed detention basin along the eastern project boundary. The detention basin has been designed such that the attenuated peak flow does not exceed existing peak flow conditions. Exact sizing and calculations is further discussed in the following section. The earthen perimeter channel that runs along the north and eastern boundaries redirects offsite flows around the proposed development.

3 HYDRAULICS (HANGAR 80 EXPANSION)

3.1 OPEN CHANNEL AND DETENTION BASIN HYDRAULIC ANALYSIS

Hydraulic calculations for the perimeter channel was completed using Manning's equation. The preliminary hydraulic results showed that a trapezoidal channel with a 10-ft (bottom width) by 1-ft deep with 3% to 5% left and right side slopes, would be able to convey the 100-year offsite peak flow. Refer to Appendix C for perimeter channel calculations and cross-section.

Routing analysis results for the detention basin showed that the maximum storage during the 100-year storm event was 1.404 acre-feet, and peak outflow of 8.82 cfs. The basin routing analysis was completed with Bentley PondPack, which uses the Modified-Puls method for flow-through basin analysis in accordance with the SBC Hydrology Manual. The San Bernardino County Small Area Unit Hydrograph Method was used to develop the unit hydrograph for Area A. Unit Hydrograph calculations were completed using Advanced Engineering Software (AES) Floodx (Appendix C).

The conditions of approval required the detention of the 100-year storm. Results are as follows:

For Area A (Appendix C), the proposed condition maintains existing flow patterns to an existing earthen drainage channel. Based on NOAA Atlas 14, the precipitation depth for a 100-year, 24-hr storm is 3.45 inches. The proposed hangar expansion will add 1.05 acres of impervious area within Area A, resulting in 13,149 cf, or 0.30 ac-ft, of runoff into the existing drainage basin during the 100-year storm event. Assuming a conservative runoff coefficient of 0.5 for the proposed pervious area in area A, the total proposed discharge to the existing basin is expected to be 2.62 ac-ft. This is 0.16 ac-ft more than the existing 2.46 ac-ft that discharges into the basin. According to a study performed by Epic Engineering, the existing drainage system was oversized by 1.38 acre-ft, (Appendix E). Therefore, it was concluded that the additional 0.16 acre-ft produced by the expansion in Area A is suitable to discharge into the existing drainage channel.

For Area B (Appendix C), existing conditions Rational Method analysis results showed a peak flow of 12.56 cfs. The proposed peak flow from Area B was determined to be 25.46 cfs, which was reduced to 8.83 cfs after detention basin routing, as discussed earlier in this section.

4 RESULTS AND DISCUSSION OF POTENTIAL IMPACTS (HANGAR 80 EXPANSION)

The inundation area, for the 100-year, 24-hour events are summarized in Figures 7 and 8 in Appendix A. The 100-year flow depths through the project site range between approximately 0.16-ft and 2.0-ft. Total flow entering the site is summarized by cross-sections on Figure 11. Maximum expected runoff onto the expansion site is 87 cfs according to Flo-2D modeling show in Appendix B. A trapezoidal channel is recommended to divert off-site flows around the perimeter of the project site.

Velocities on-site are not expected to exceed 1.0 ft/s with regards to flows entering the site from our off-site analysis (Figure 9, Appendix A). Due to hydrologic conditions upstream caused by the Sheep Creek Dike, much of the flow from the creek, will be diverted west and then around our site. In addition, the high infiltration capacity of the Type A soil (Figure 4, Appendix A) within the alluvial fan should be expected to reduce runoff potential. It is therefore expected and reasonable that our on-site analysis shows relatively low flood inundation levels of a couple inches (Figure 8, Appendix A) throughout the site and velocities below 1.0-ft/s (Figure 9, Appendix A). Building finished floor elevations should be set at 1-foot above the 100-year water surface elevation.

A Rational Method Analysis was completed for the on-site existing and project conditions. Initial results showed that a detention basin would be required to reduce project conditions peak flows (25.46 cfs) to existing conditions (12.56 cfs). A detention basin was sized to reduce the peak outflow for project conditions to 8.82 cfs. The size of the basin is 230-ft by 41-ft with 2:1 side slopes.

Per the soils engineer's recommendation, the basin is 7-ft deep in order to reach optimal infiltration rates. At this depth the infiltration rate was found to be 9.09 ft/hr. Conservatively a factor of safety of 0.5 was applied, to obtain a factored infiltration rate of 4.55 ft/hr. From this, it was determined that the basin will completely draw down in 7.58 hours, which satisfies the jurisdiction's criteria for drawdown time and vector control. Refer to summary of calculations below:

Infiltration Rate (ft/hr)	9.09
Factor of Safety	0.5
Factored Infiltration Rate (ft/hr)	4.55

Infiltration Area (SF)	575
Infiltration Volume (CF)	19820

Drawdown Time (hrs)	7.58

5 INTRODUCTION (SHIPPING & RECEIVING BUILDING)

5.1 PROJECT BACKGROUND

Kimley-Horn was retained by General Atomics Aeronautics to conduct a hydrologic analysis for the proposed El Mirage Facility Expansion, located in unincorporated San Bernardino County (SBC), California (Figure 1, Appendix A). The site is located just outside the El Mirage dry lake bed (Figure 2, Appendix C). The existing airport area is approximately 644 acres, of which the Shipping and Receiving Building facility is 1.93 acres.

The purpose of this report is to provide the results of the on-site drainage analysis for the proposed shipping and receiving facility in order to evaluate the potential impacts to the site, and provide recommendations, as necessary, associated with storm water runoff for the 100-year design storm event.

5.2 SITE DESCRIPTION

The site is located in an undeveloped area of California, located approximately 24 miles north of Mount San Antonio, 16.5 miles west of Victorville, at Latitude 34°37'23" N and Longitude 117°35'24" W. The site resides within an unincorporated area of San Bernardino County. The proposed shipping and receiving facility is located in Section 11 of Township 6N, Range 7W. The site resides near the El Mirage Lake Bed and is generally flat.

The entire site lies within a Federal Emergency Management Agency (FEMA) Special Hazard Flood Zone D as depicted on Flood Insurance Rate Map (FIRM) panel 06071C5775H (Appendix D). FEMA Flood Zone D is defined as areas with possible but undetermined flood hazards; therefore, a FEMA flood analysis has not been conducted for the project area.

6 HYDROLOGY (SHIPPING & RECEIVING BUILDING)

6.1 ON-SITE DRAINAGE AREA

6.1.1 RAINFALL

The local climate is characterized as a desert climate. Although annual rainfall is typically quite low, there is a precedent for flash flooding in the area. The National Oceanic and Atmospheric Association (NOAA) Atlas 14 database was used to find the 100-year 24-hour storm, which had a depth of 3.45 inches.

6.1.2 EXISTING CONDITIONS

On-site drainage areas were delineated using existing available topographic mapping and aerial images. Soil types were determined using the United States Department of Agriculture (USDA) Web Soil Survey. The project site consists of soil type A, which have low runoff potential. Type A soils having high infiltration rates even when thoroughly wetted and consisting chiefly of deep, well-drained sands or gravels. These soils have a high rate of water transmission.

The natural cover was determined to be narrowleaf chaparral in fair condition, meaning that 50-75% of the ground surface is protected by vegetation. The determination of vegetation coverage was made using satellite imagery.

6.1.3 PROJECT CONDITIONS

The project site will be developed to include a new shipping and receiving building, asphalt drive isles, and parking lots. The site consists of one drainage area producing overland flows into an existing drainage channel. Generally, runoff flows to from south to north flowing into an existing drainage channel and ultimately flowing to an existing detention basin for infiltration. The proposed site aims to raise the building finished floor 1 foot above potential flood elevation while maintaining overall existing drainage patterns.

6.2 OFF-SITE DRAINAGE AREA

6.2.1 METHODOLOGY

As illustrated in Figures 1 and 3 in Appendix A, the proposed site lies within the Sheep Creek alluvial fan floodplain. As previously described in Section 2.1 of this report, Flow2D modeling software was used to analyze the offsite peak flow volumes.

6.2.2 RAINFALL

Rainfall depths for the design storm were obtained using NOAA Atlas 14 grids within ArcGIS (Refer to Figure 12, Appendix A). Rainfall depths were applied through the FLO-2D model across the watershed to each FLO-2D grid element, on a spatially variable basis. Rainfall depths varied from approximately 3.4-inches within the flat plains to 16.2-inches within the mountain range. The use of NOAA Atlas 14 rainfall was in accordance with the 2010 *County of San Bernardino Hydrology Addendum for Arid Regions* (SBCDPW, April 2010). The off-site hydrology analysis was summarized in Appendix A. Supporting hydrologic data from the FLO-2D model is provided in Appendix D.

7 HYRUALICS (SHIPPING & RECEIVING BUILDING)

7.1 OPEN CHANNEL HYDRAULICS

All offsite flows will be intercepted and diverted around the shipping and receiving building via a drainage channel designed by Merrell Johnson. Refer to Appendix H for proposed access road and drainage channel design by Merrell Johnson. Hydraulic calculations were completed using Manning's equation and it was determined that the proposed channel is sufficient to divert 154 cfs of flow around the proposed shipping and receiving site. Based on the Flow2D Modeling, the 100-year offsite peak flow is 87 cfs, thus the proposed drainage channel is sufficient. Refer to Appendix G for full calculations and cross-section.

8 RESULTS AND DISCUSSION OF POTENTIAL IMPACTS (SHIPPING & RECEIVING BUILDING)

Based on the 100-yr, 24-hr storm depth of 3.45 inches (NOAA Atlas 14), the following calculations were performed to determine that the proposed development does not have any negative impacts on the existing storm water infrastructure.

	Existing	Proposed
Pervious (SF)	83961	26902
Impervious (SF)	0	57059
Total (SF)	83961	83961
Total (Acres)	1.93	1.93
100-yr, 24-hr Depth (in)	3.45	3.45
Runoff Factor	0.5	0.9
Runoff Volume (CF)	12069	21725
Increase in Runoff (CF)	9656	

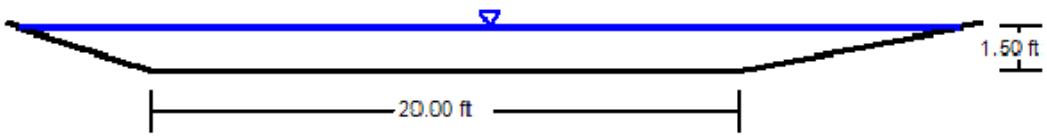
Due to the increase in impervious area in the proposed condition, the runoff to the existing drainage channel and basin will increase by 9,656-cf. Based on a previous design report performed by Epic Engineering (See Appendix G), this channel and basin system is oversized by a volume of 1.38 acre-ft. Since the proposed shipping and receiving building has been found to only discharge an additional 9,656-cf (0.22 acre-ft), the existing storm water infrastructure is adequately designed to mitigate the discharge effects of the proposed shipping and receiving building.

It was also determined that 87-cfs of offsite runoff will flow to the shipping and receiving building site during the 100-year storm event. This flow is adequately diverted around the proposed shipping and receiving building via a proposed drainage channel designed by Merrell Johnson. See cross-section and calculation summary below. Refer to Appendix G for detailed channel design by others.

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00500	ft/ft
Normal Depth	1.50	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	20.00	ft
Discharge	154.59	ft³/s

Cross Section Image



9 REFERENCES

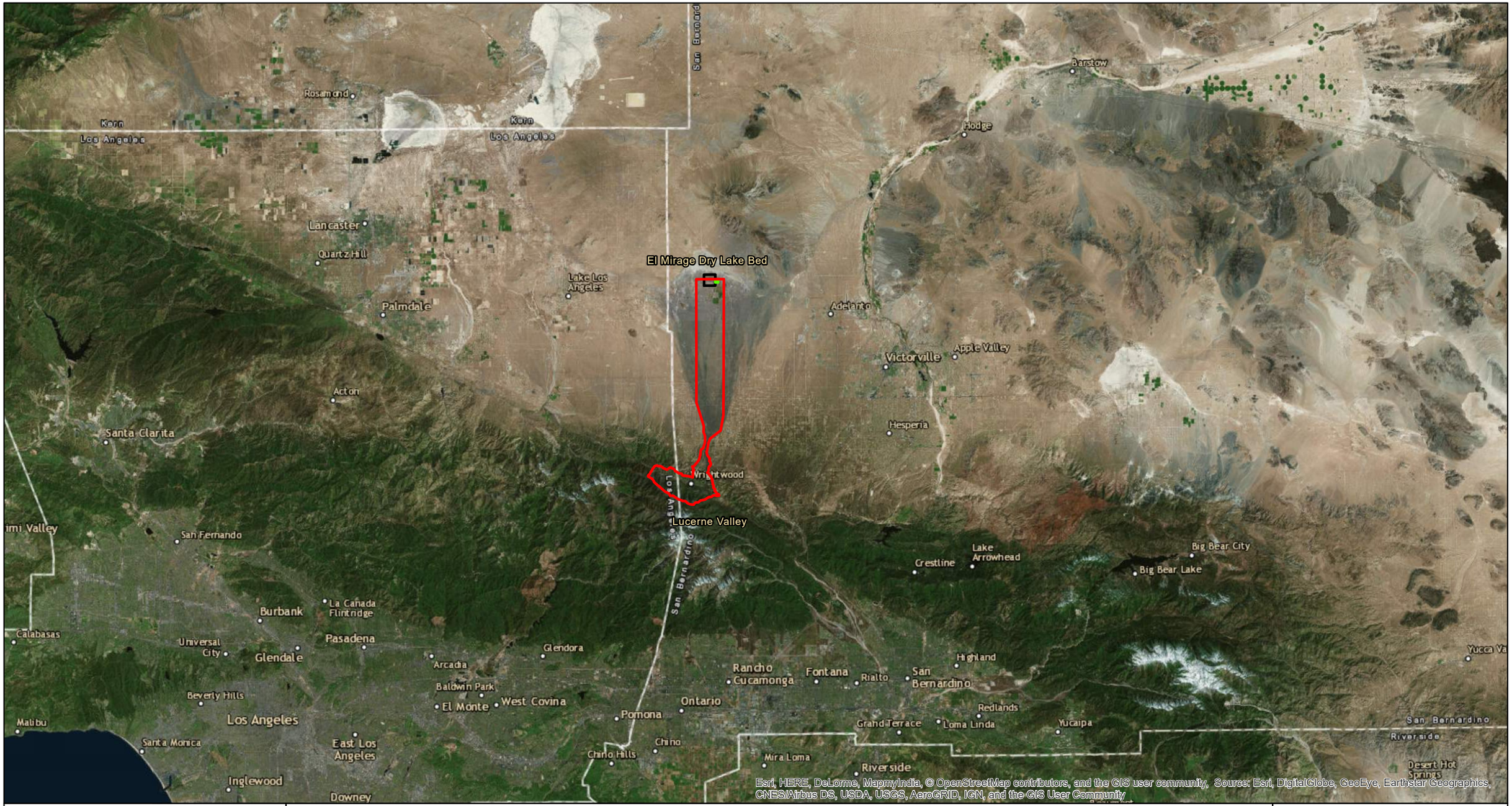
1. U.S. Department of Agriculture, Urban Hydrology for Small Watersheds, TR-55. June 1986.

2. San Bernardino County Department of Public Works (SBCDPW), *Hydrology Manual* , August, 1986.

3. San Bernardino County Department of Public Works (SBCDPW), *County of San Bernardino Hydrology Addendum for Arid Regions*, April, 2010.

4. Chow, V. T. (1959). *Open-Channel Hydraulics.* New York: McGraw-Hill.

Appendix A – Off-Site Hydrology Analysis



0 2.5 5 10 15 20 Miles

N

Kimley»Horn

Legend

- FLO-2D Model Boundary
- Site Expansion Area
- Site Existing Area

Figure 1

El Mirage Facility Expansion Location Map

San Bernardino County, California



0 290 580 870 1,160 Feet

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Legend

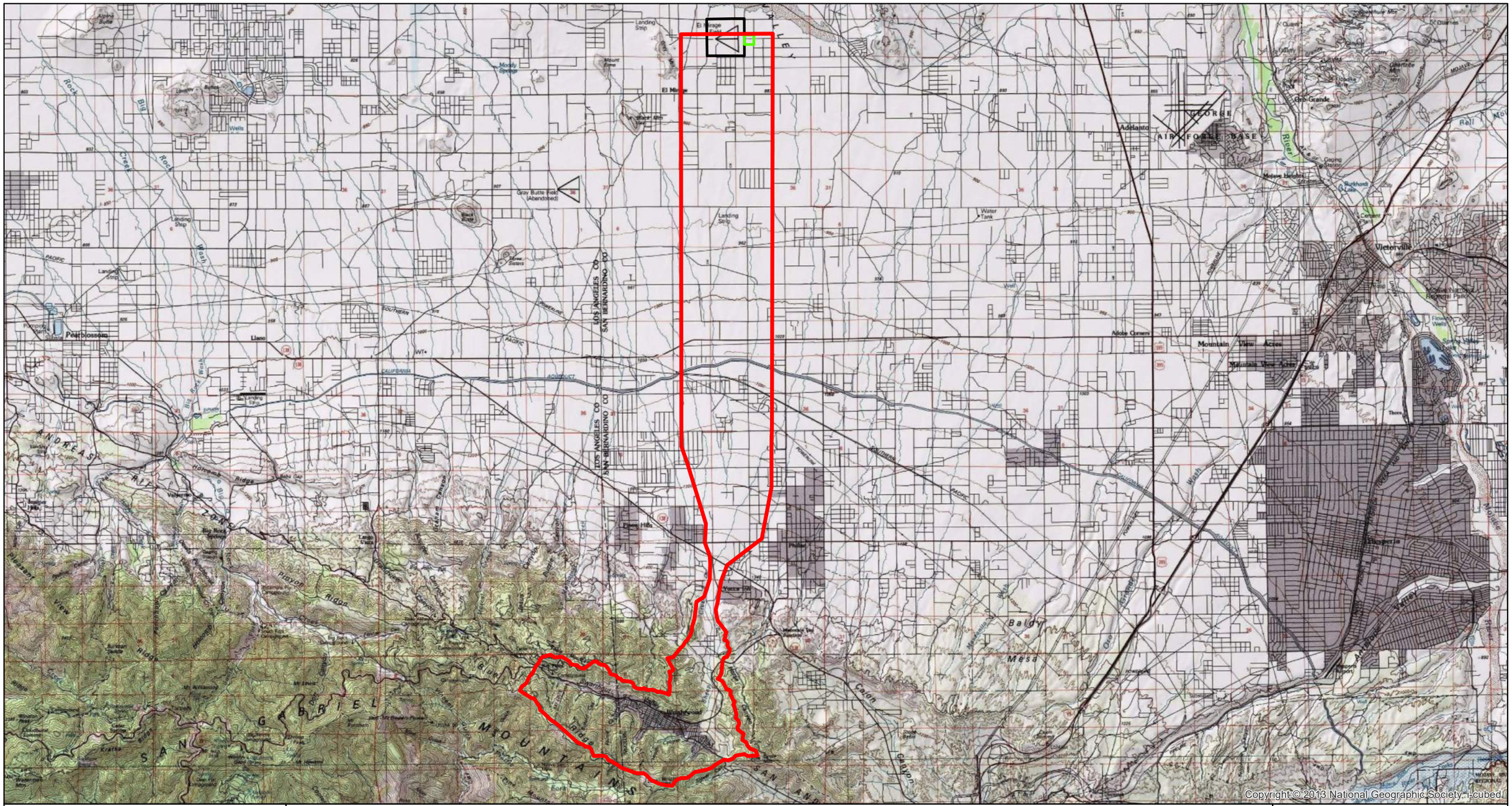
Site Expansion Area

Site Existing Area

Figure 2

El Mirage Facility Expansion Site Map

San Bernardino County, California



0 0.75 1.5 3 4.5 6 Miles

N

Kimley»Horn

Legend

- FLO-2D Model Boundary
- Site Expansion Area
- Site Existing Area

Figure 3

El Mirage Facility Expansion
Topographic Map
San Bernardino County, California

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Source: NRCS Web Soil Survey

0 0.751.5 3 4.5 6 Miles

N

Kimley»Horn

Legend

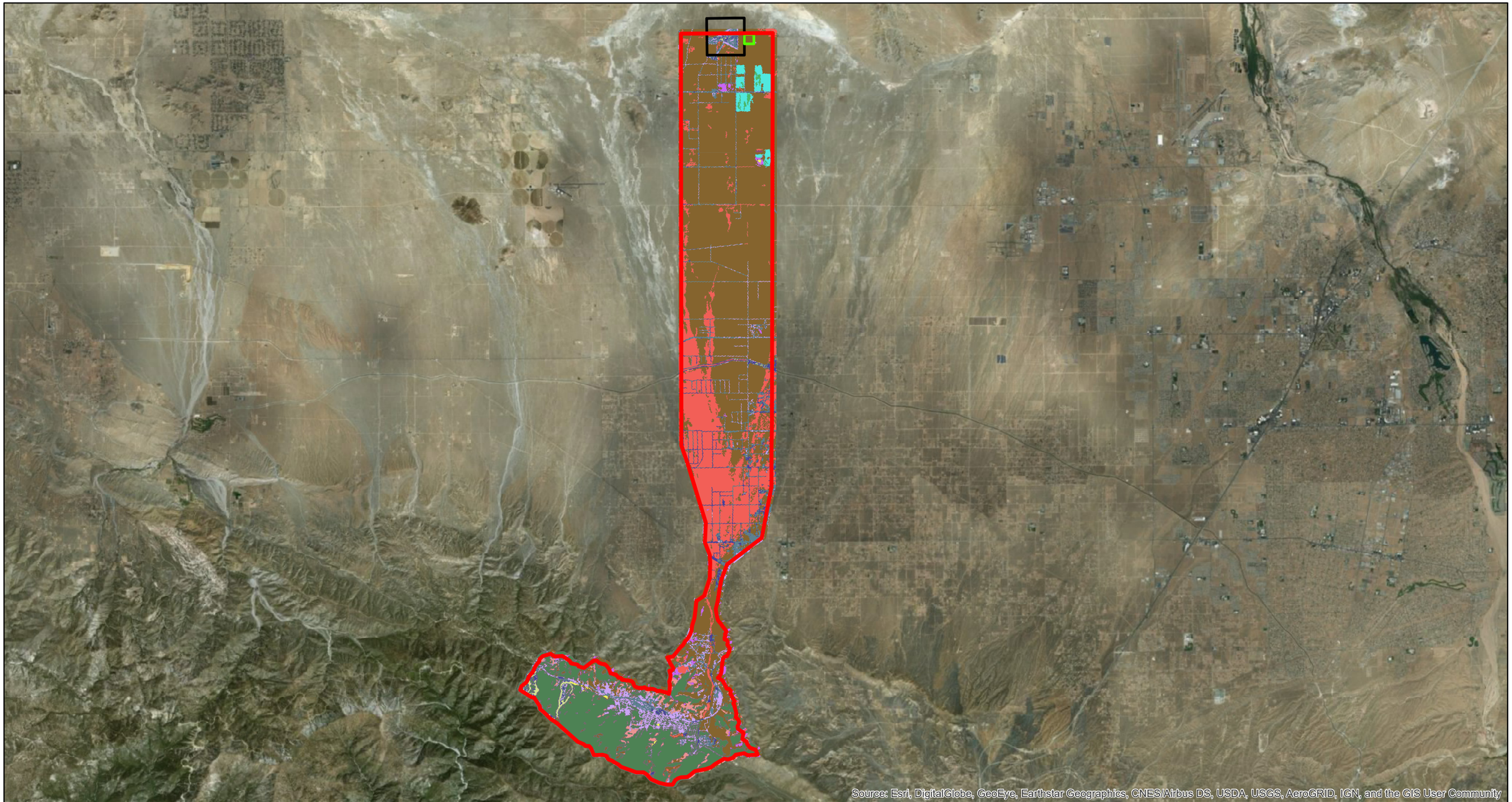
- FLO-2D Model Boundary
- Site Expansion Area
- Site Existing Area

Hydrologic Soil Group

- A
- B
- C
- D

Figure 4

El Mirage Facility Expansion
Hydrologic Soil Group
San Bernardino County, California



Source: National Land Cover Database (NLCD)

0 0.751.5 3 4.5 6 Miles

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Kimley»Horn

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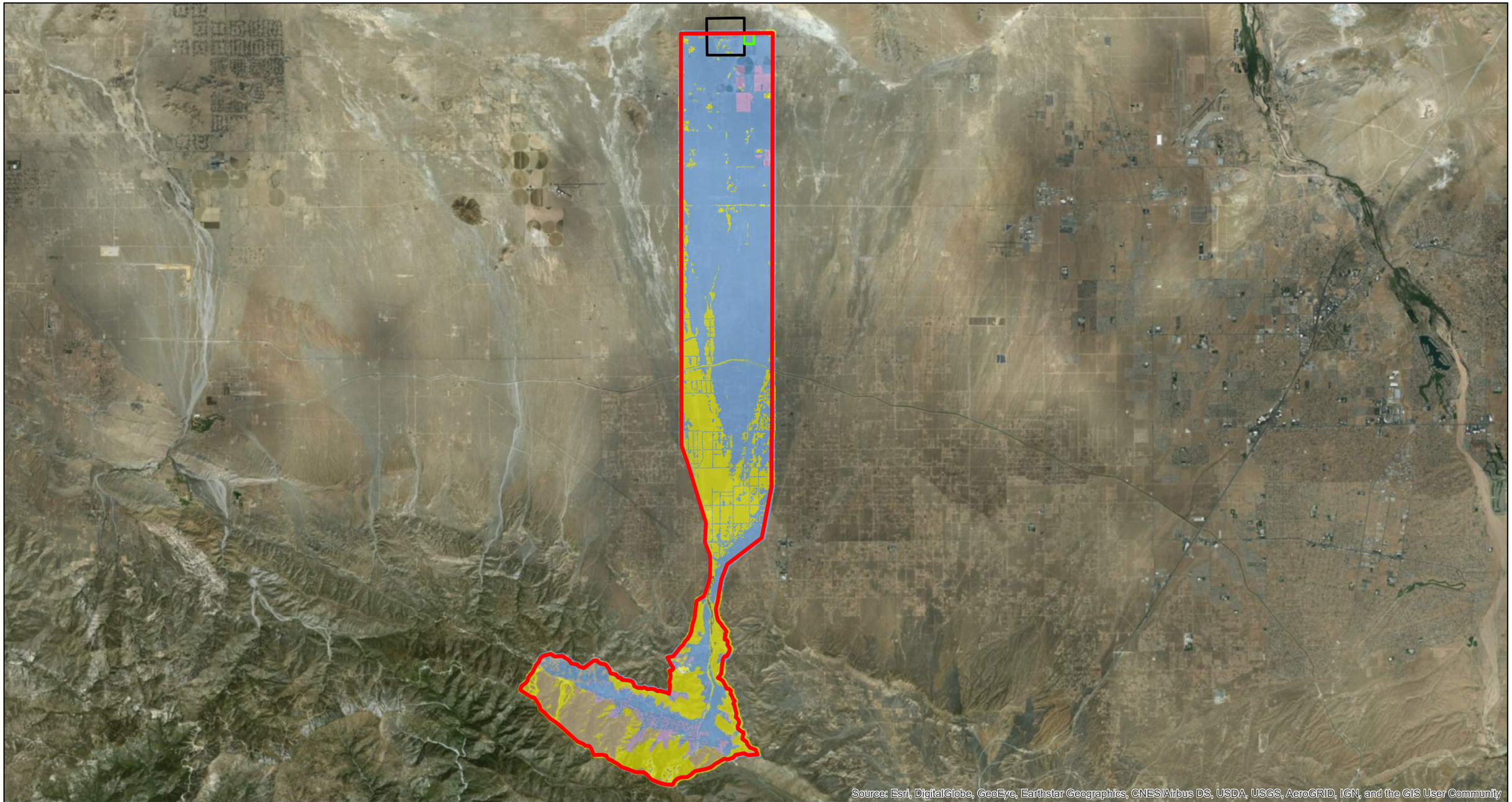
- FLO-2D Model Boundary
- Site Expansion Area
- Site Existing Area

Land Cover Type

- Barren Land
- Cultivated Crops
- Developed, High Intensity
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed, Open Space
- Evergreen Forest
- Grassland / Herbaceous
- Mixed Forest
- Open Water
- Pasture / Hay
- Shrub / Scrub
- Woody Wetlands

Figure 5

El Mirage Facility Expansion
Land Cover Map
San Bernardino County, California



Source:NRCS Web Soil Survey, SBC Hydrology Manual

0 0.75 1.5 3 4.5 6 Miles

N

Kimley»Horn

Legend

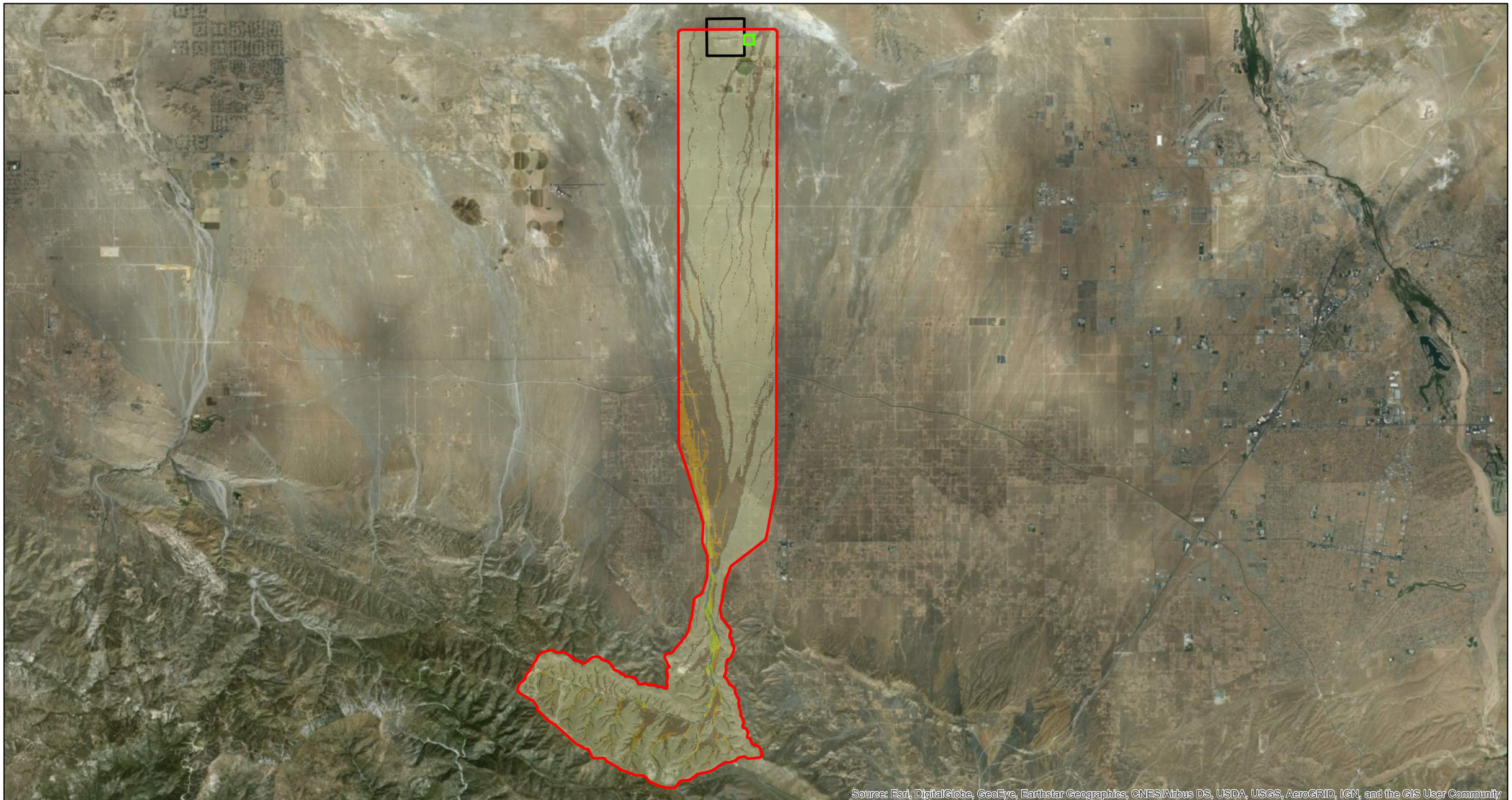
- FLO-2D Model Boundary
- Site Expansion Area
- Site Existing Area

Curve Number

- 36 - 50
- 51 - 65
- 66 - 80
- 81 - 91
- 92 - 98

Figure 6

El Mirage Facility Expansion
Curve Number Map
San Bernardino County, California



0 0.751.5 3 4.5 6 Miles

N

Kimley»Horn

Legend

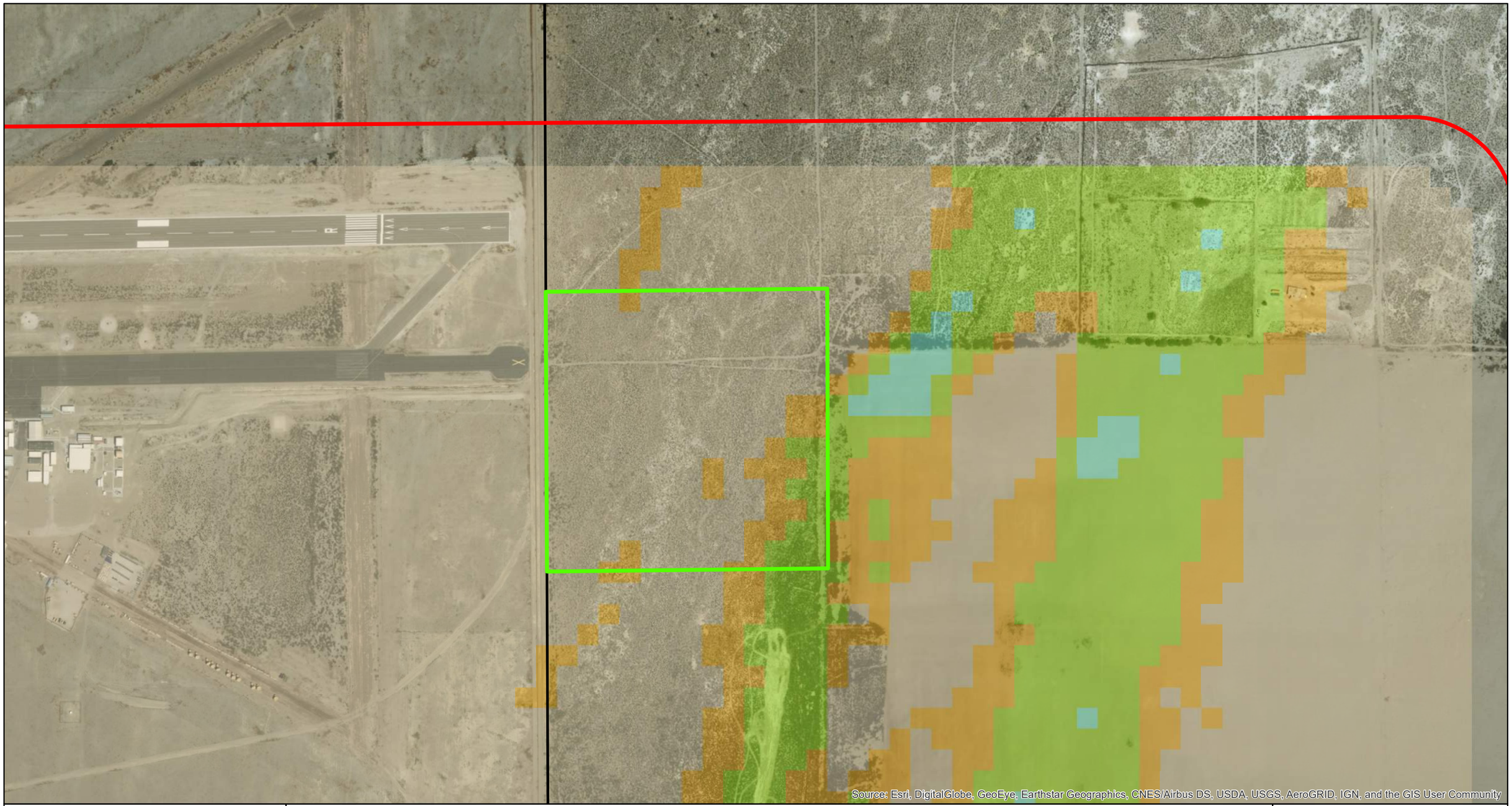
- FLO-2D Model Boundary
- Site Expansion Area
- Site Existing Area

Max Flow Depth (Ft)

- 0.0 - 0.25
- 0.25 - 1.0
- 1.0 - 2.0
- 2.0 - 3.0
- 3.0 - 4.0
- 4.0 - 5.0
- 5.0 - 6.0
- 6.0 - 7.0

Figure 7

El Mirage Facility Expansion
Off-Site Max Flood Depth Map
100-Year, 24-Hour Flood
San Bernardino County, California



0 290 580 870 1,160 Feet

N

Kimley»Horn

Legend

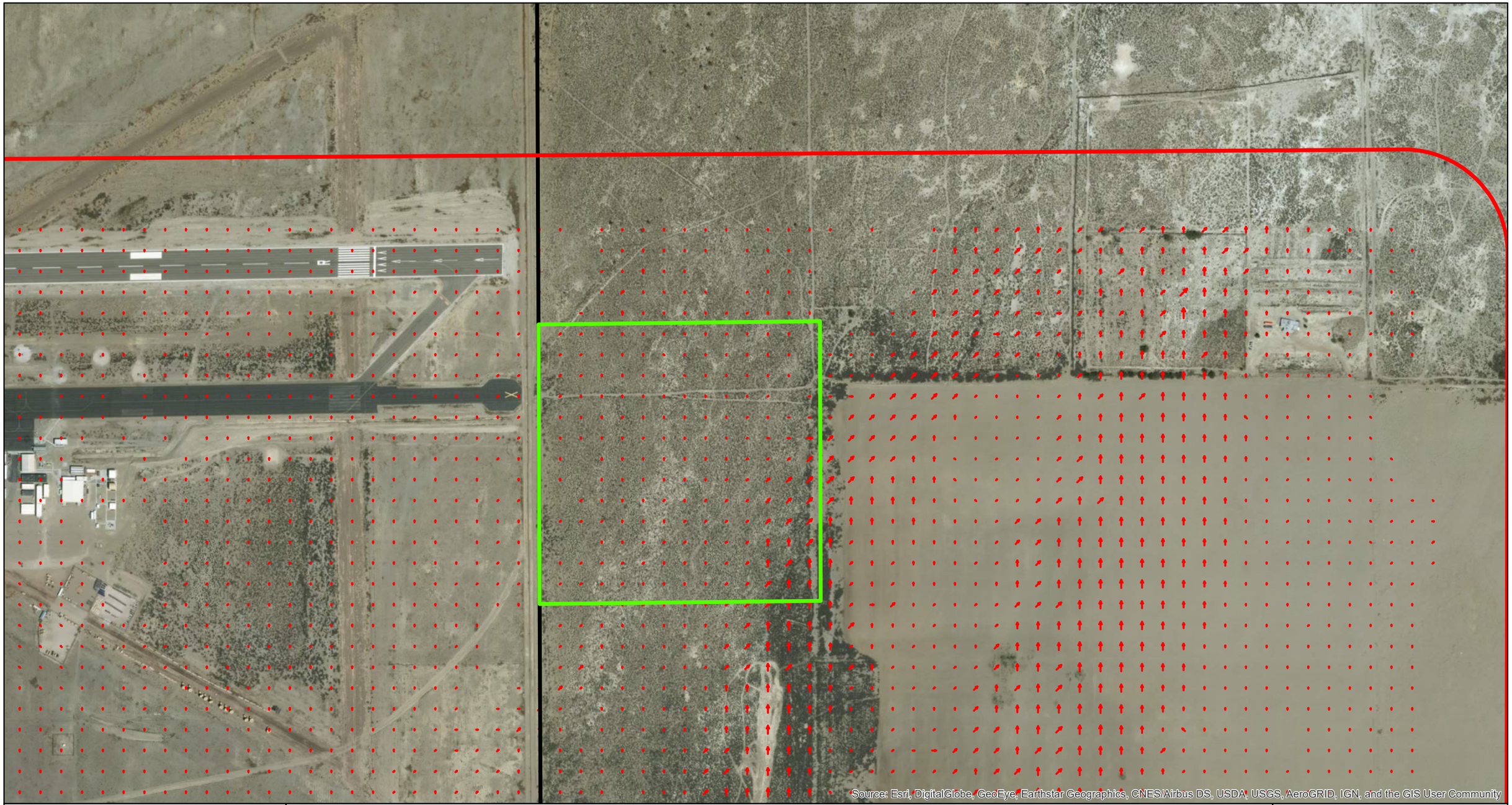
- FLO-2D Model Boundary
- Site Expansion Area
- Site Existing Area

Max Flow Depth (Ft)

- 0.0 - 0.16
- 0.16 - 0.25
- 0.25 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- 1.5 - 2.0

Figure 8

El Mirage Facility Expansion
On-Site Max Flood Depth Map
100-Year, 24-Hour Flood
San Bernardino County, California



0 290 580 870 1,160 Feet

N

Kimley»Horn

Legend

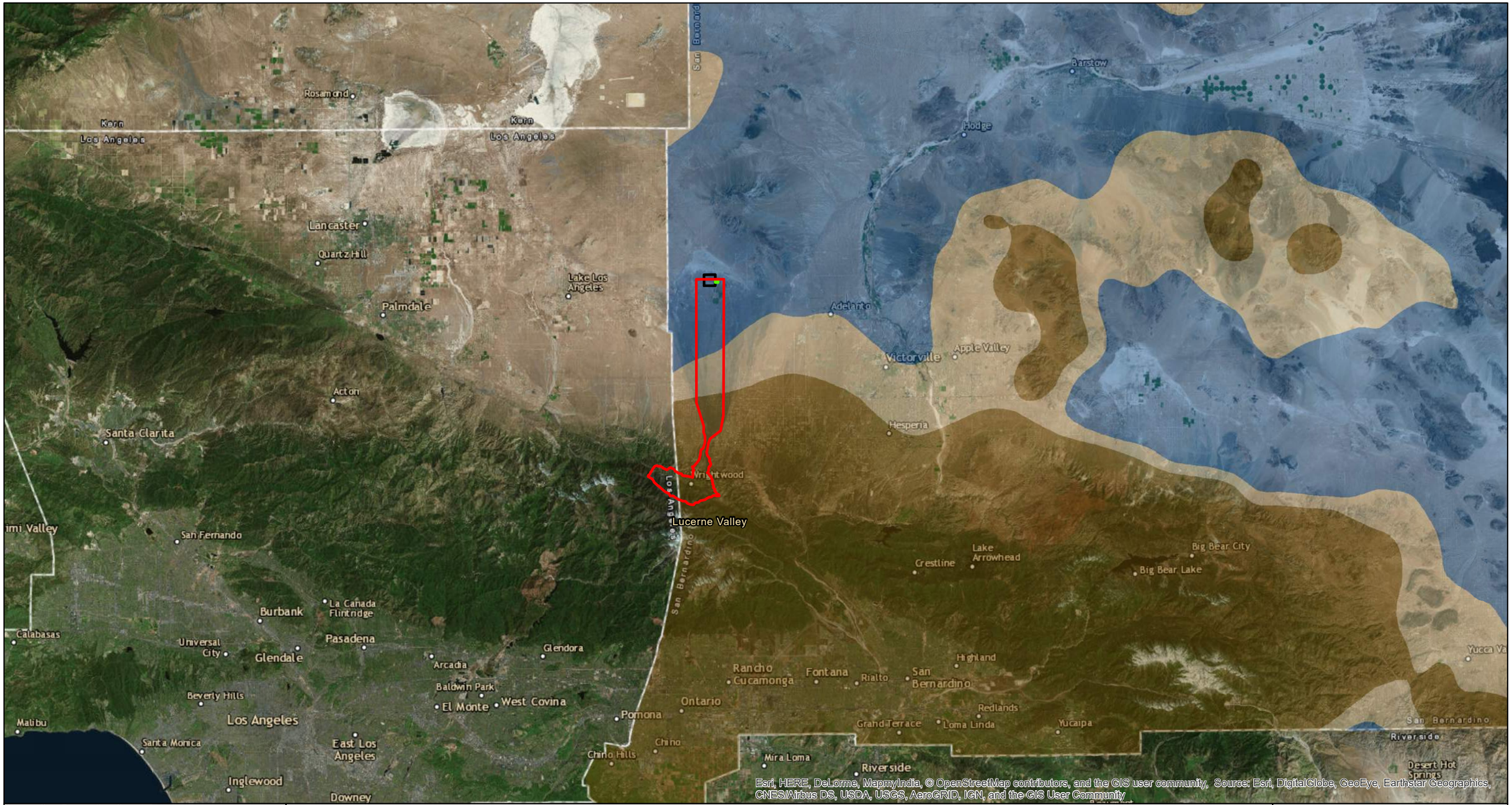
- FLO-2D Model Boundary
- Site Expansion Area
- Site Existing Area

Max Velocity (Ft/s)

- 0.0 - 1.0
- 1.0 - 2.0

Figure 9

El Mirage Facility Expansion
On-Site Max Velocity Map
100-Year, 24-Hour Flood
San Bernardino County, California



Source:San Bernardino County

0 2.5 5 10 15 20 Miles

N

Kimley»Horn

Legend

- FLO-2D Model Boundary
- Site Expansion Area
- Site Existing Area

Antecedent Moisture Condition (AMC)

- 1
- 2
- 3

Figure 10

El Mirage Facility Expansion
AMC Map
San Bernardino County, California

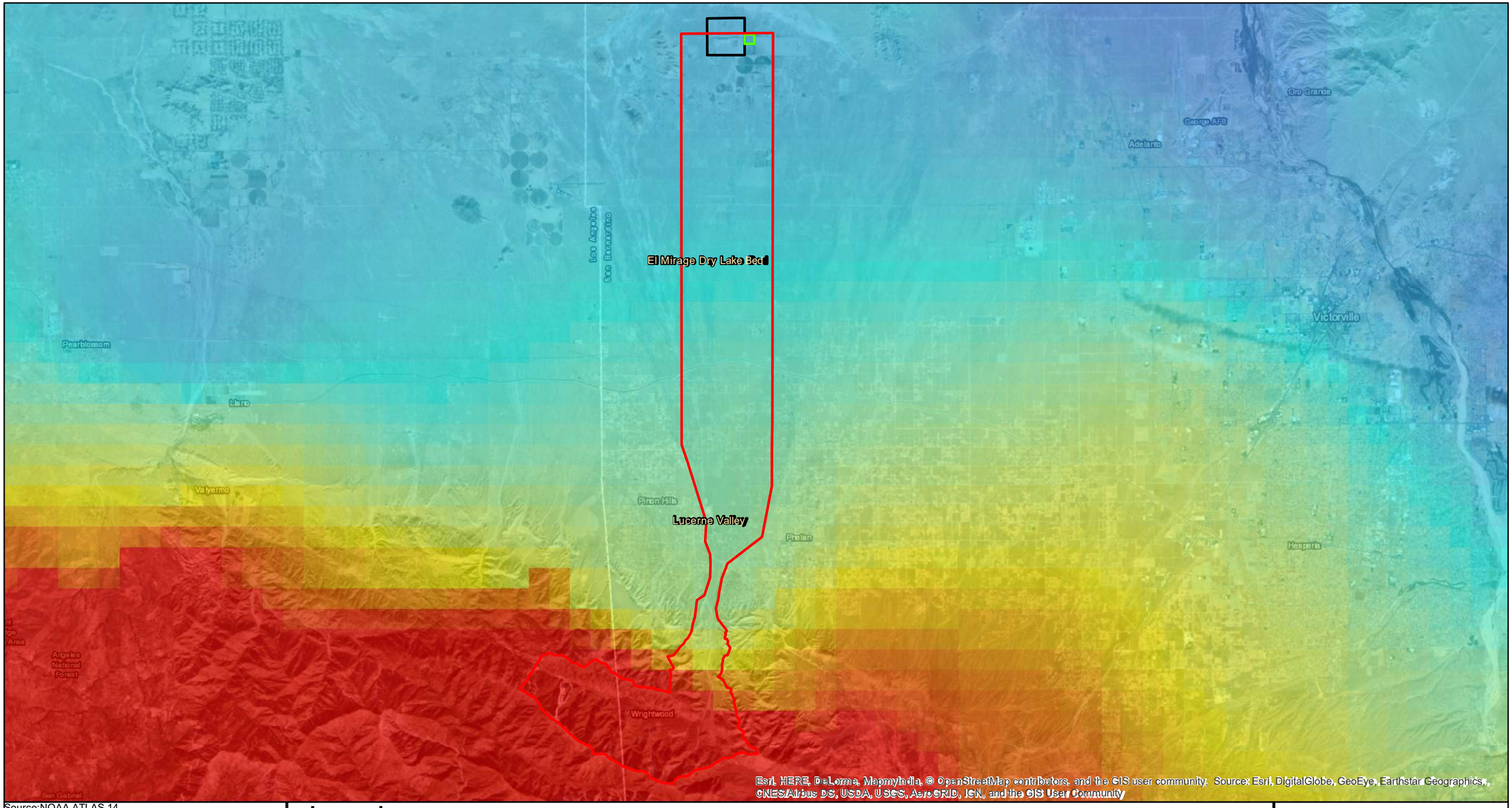


SECTION A

MAX FLOW: 87.0 CFS
TIME TO MAX: 29.2 HRS

FIGURE 11

CROSS–SECTIONS



Source:NOAA ATLAS 14

0 0.75 1.5 3 4.5 6 Miles

N

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Legend

- FLO-2D Model Boundary
- Site Expansion Area
- Site Existing Area

Rainfall_100yr24Hr_in

Value

High : 22.886

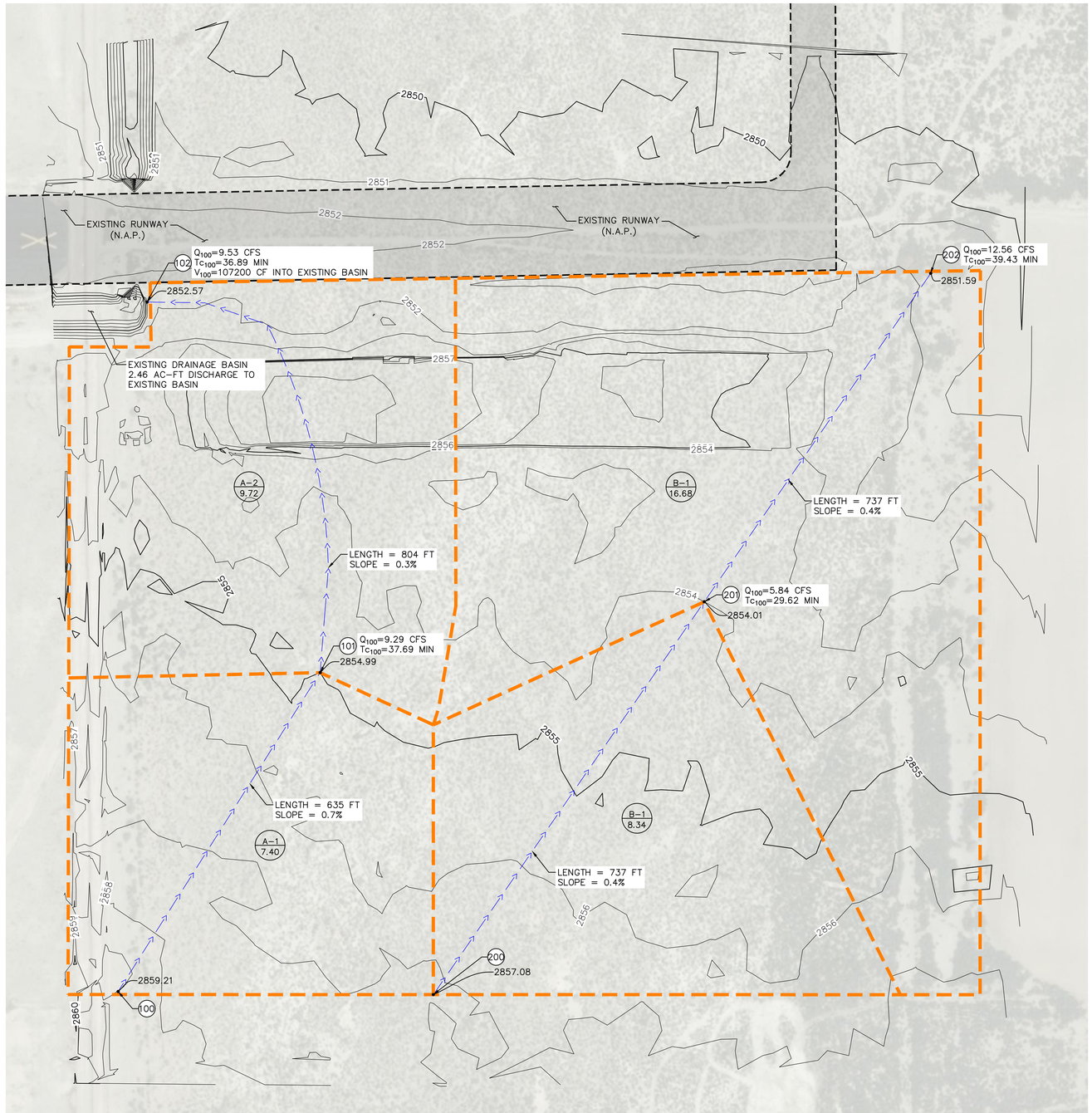
Low : 1.398

Figure 12

El Mirage Facility Expansion Precipitation Map

San Bernardino County, California

Appendix B – On-Site Hydrology Analysis (Hangar 80 Expansion)



LEGEND

- FLOW DIRECTION LINE
- SUBAREA BOUNDARY
- EXISTING TAXIWAY
- A-1 / 0.93 — SUBAREA ID / AREA (ACRES)
- 101 — HYDROLOGY NODE
- SURFACE FLOW DIRECTION

HYDROLOGIC SOIL TYPE: A

NORTH

GRAPHIC SCALE IN FEET
0 50 100 200
1" =100'
WHEN PRINTED AT FULL SIZE (24" X 36")

EL MIRAGE AIRPORT
EXISTING CONDITIONS
HYDROLOGY MAP
September 2018

Kimley»Horn

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765 THE CITY DRIVE, SUITE 200, ORANGE, CA 92868
PHONE: 714-939-1030 FAX: 714-938-9488

```
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            Ver. 18.0  Release Date: 07/01/2011  License ID 1499

                          Analysis prepared by:

                     Kimley-Horn and Associates, Inc.
                            765 The City Drive
                                Suite 200
                             Orange, CA 92868

 ************************* DESCRIPTION OF STUDY *************************
* General Atomics                                                       *
* El Mirage Airport                                                     *
* Existing Rational Method Area A                                       *
 *************************************************************************

  FILE NAME: GAEX-A.DAT
  TIME/DATE OF STUDY: 08:24 11/20/2018
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   3.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.01
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.7000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.7400

  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

```
 OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
 FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   635.00
 ELEVATION DATA: UPSTREAM(FEET) =   2859.21  DOWNSTREAM(FEET) =   2854.99

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   25.434
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.349
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "CHAPARRAL,NARROWLEAF"     A        6.96      0.44     1.000    75   25.43
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      5.73
 TOTAL AREA(ACRES) =      6.96   PEAK FLOW RATE(CFS) =      5.73

****************************************************************************
 FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  56
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   2854.99  DOWNSTREAM(FEET) =   2852.57
 CHANNEL LENGTH THRU SUBAREA(FEET) =   804.00   CHANNEL SLOPE =  0.0030
 GIVEN CHANNEL BASE(FEET) =   10.00   CHANNEL FREEBOARD(FEET) =  0.0
 "Z" FACTOR =  20.000   MANNING'S FACTOR = 0.030
 *ESTIMATED CHANNEL HEIGHT(FEET) =   0.44
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.040
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "CHAPARRAL,NARROWLEAF"     A       10.54      0.44     1.000    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.64
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.17
 AVERAGE FLOW DEPTH(FEET) =   0.41   TRAVEL TIME(MIN.) =  11.46
 Tc(MIN.) =   36.89
 SUBAREA AREA(ACRES) =    10.54       SUBAREA RUNOFF(CFS) =    5.74
```

```
  EFFECTIVE AREA(ACRES) =     17.50     AREA-AVERAGED Fm(INCH/HR) =   0.44
  AREA-AVERAGED Fp(INCH/HR) =   0.44  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       17.5         PEAK FLOW RATE(CFS) =       9.53
  GIVEN CHANNEL BASE(FEET) =   10.00   CHANNEL FREEBOARD(FEET) =  0.0
  "Z" FACTOR =  20.000   MANNING'S FACTOR = 0.030
  *ESTIMATED CHANNEL HEIGHT(FEET) =   0.43

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.43   FLOW VELOCITY(FEET/SEC.) =   1.19
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =    1439.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       17.5  TC(MIN.) =     36.89
  EFFECTIVE AREA(ACRES) =     17.50  AREA-AVERAGED Fm(INCH/HR)=  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =       9.53
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

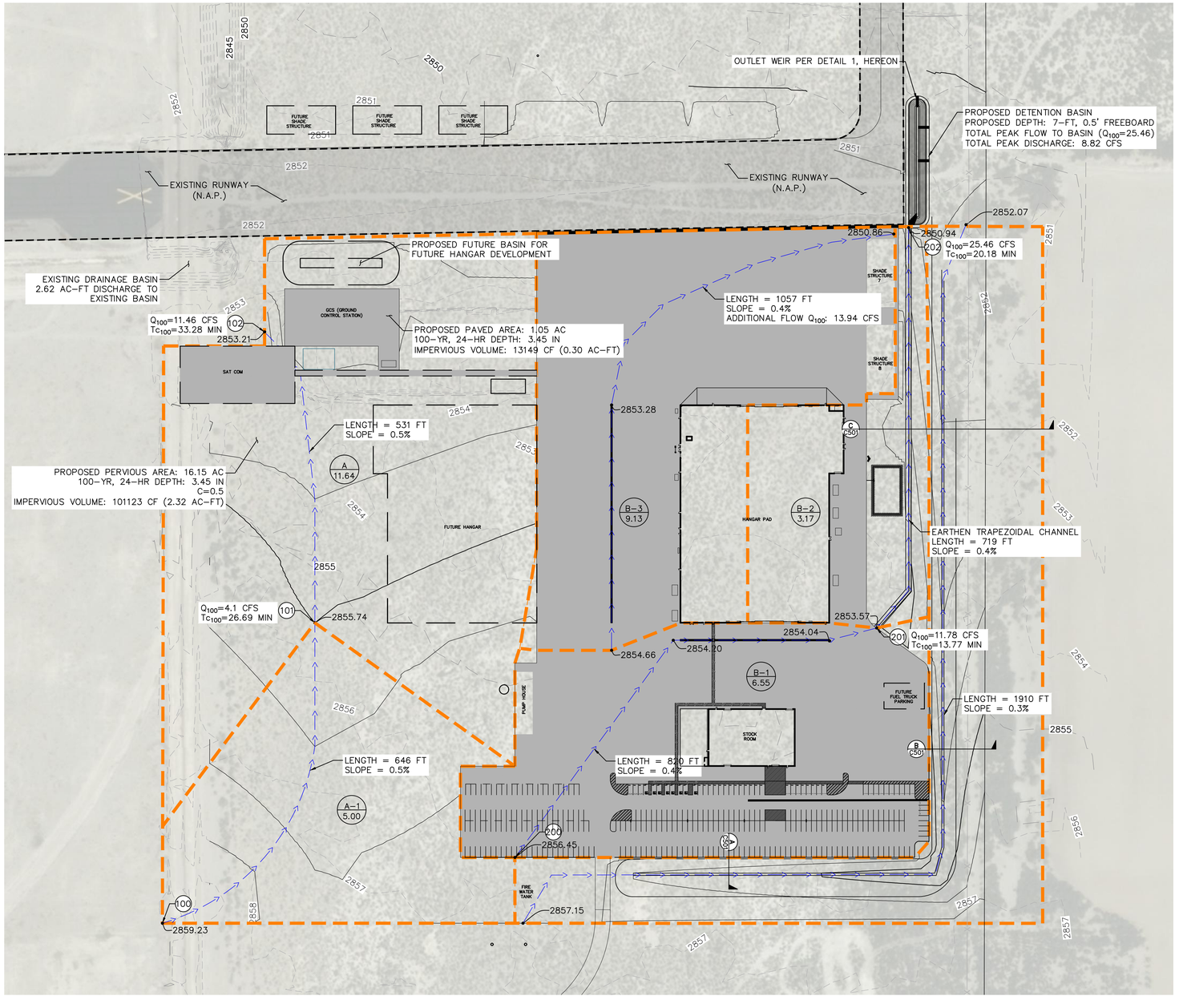
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 2  ************************************************************************
 3              RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
 4           (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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 6              Ver. 18.0  Release Date: 07/01/2011  License ID 1499
 7
 8                              Analysis prepared by:
 9
10
11
12
13
14
15   ************************* DESCRIPTION OF STUDY *************************
16  * General Atomics                                                       *
17  * El Mirage Airport                                                     *
18  * Existing Rational Method Area B                                       *
19   ************************************************************************
20
21    FILE NAME: GAEX-B.DAT
22    TIME/DATE OF STUDY: 16:34 09/13/2018
23  ========================================================================
24    USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
25  ========================================================================
26                       --*TIME-OF-CONCENTRATION MODEL*--
27
28    USER SPECIFIED STORM EVENT(YEAR) =  100.00
29    SPECIFIED MINIMUM PIPE SIZE(INCH) =   3.00
30    SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
31    *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
32
33    SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.7000
34    USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.7400
35
36    *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*
37
38    *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
39       HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
40       WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
41  NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
42  ===  =====  =========  =================  ======  ===== ====== ===== =======
43    1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
44
45    GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
46      1. Relative Flow-Depth =  0.00 FEET
47         as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
48      2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
49    *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
50     OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
51    *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED
52
53  ************************************************************************
54    FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
55  ------------------------------------------------------------------------
56    >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
57    >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
58  ========================================================================
59    INITIAL SUBAREA FLOW-LENGTH(FEET) =   737.00
60    ELEVATION DATA: UPSTREAM(FEET) =   2857.08  DOWNSTREAM(FEET) =   2854.00
61
62    Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
63    SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   29.619
64    * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.213
```

```
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "CHAPARRAL,NARROWLEAF"     A        8.34      0.44     1.000    75   29.62
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      5.84
  TOTAL AREA(ACRES) =      8.34   PEAK FLOW RATE(CFS) =      5.84

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  56
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2854.00  DOWNSTREAM(FEET) =   2851.59
  CHANNEL LENGTH THRU SUBAREA(FEET) =   737.00   CHANNEL SLOPE =  0.0033
  GIVEN CHANNEL BASE(FEET) =   10.00   CHANNEL FREEBOARD(FEET) =  0.0
  "Z" FACTOR =  20.000   MANNING'S FACTOR = 0.030
  *ESTIMATED CHANNEL HEIGHT(FEET) =   0.46
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  0.993
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "CHAPARRAL,NARROWLEAF"     A       16.68      0.44     1.000    75
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.09
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.25
  AVERAGE FLOW DEPTH(FEET) =   0.43   TRAVEL TIME(MIN.) =   9.81
  Tc(MIN.) =   39.43
  SUBAREA AREA(ACRES) =    16.68       SUBAREA RUNOFF(CFS) =    8.37
  EFFECTIVE AREA(ACRES) =     25.02     AREA-AVERAGED Fm(INCH/HR) =   0.44
  AREA-AVERAGED Fp(INCH/HR) =   0.44  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       25.0         PEAK FLOW RATE(CFS) =      12.56
  GIVEN CHANNEL BASE(FEET) =   10.00   CHANNEL FREEBOARD(FEET) =  0.0
  "Z" FACTOR =  20.000   MANNING'S FACTOR = 0.030
  *ESTIMATED CHANNEL HEIGHT(FEET) =   0.48

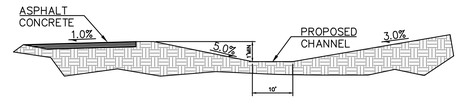
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.48   FLOW VELOCITY(FEET/SEC.) =   1.32
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =    1474.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       25.0  TC(MIN.) =     39.43
  EFFECTIVE AREA(ACRES) =     25.02  AREA-AVERAGED Fm(INCH/HR)=  0.44
  AREA-AVERAGED Fp(INCH/HR) =  0.44  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =      12.56
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS

FF
```

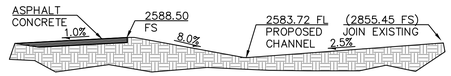


LEGEND

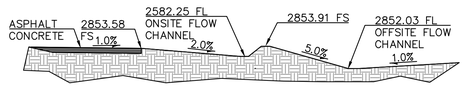
- FLOW DIRECTION LINE
- SUBAREA BOUNDARY
- PROPERTY LINE
- A-1 / 0.93 — SUBAREA ID AREA (ACRES)
- 101 — HYDROLOGY NODE
- SURFACE FLOW DIRECTION
- ASPHALTIC CONCRETE
- PROPOSED BUILDING
- FUTURE BUILDING
- EXISTING TAXIWAY



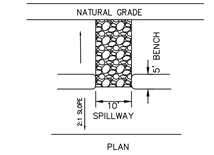
SECTION A



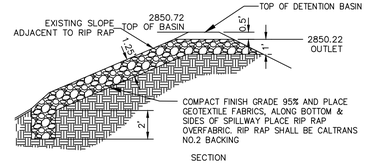
SECTION B



SECTION C



PLAN



SECTION

RIP RAP OUTLET DETAIL 1

N.T.S.

NORTH

GRAPHIC SCALE IN FEET
0 50 100 200
1" = 100'
WHEN PRINTED AT FULL SIZE (24" X 36")

EL MIRAGE AIRPORT
PROJECT CONDITIONS
HYDROLOGY MAP
December 2018

Kimley»Horn

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765 THE CITY DRIVE, SUITE 200, ORANGE, CA 92868
PHONE: 714-939-1030 FAX: 714-938-9488

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            Ver. 18.0  Release Date: 07/01/2011  License ID 1499

                          Analysis prepared by:

                     Kimley-Horn and Associates, Inc.
                            765 The City Drive
                                Suite 200
                             Orange, CA 92868

 ************************* DESCRIPTION OF STUDY *************************
* General Atomics                                                       *
* El Mirage Airport                                                     *
* Proposed Rational Method Area A                                       *
 ************************************************************************

  FILE NAME: GAPR-A.DAT
  TIME/DATE OF STUDY: 09:03 11/20/2018
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.7000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.7400

  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

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

```
 OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
 FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   646.00
 ELEVATION DATA: UPSTREAM(FEET) =   2859.23  DOWNSTREAM(FEET) =   2855.74

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   26.692
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.305
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "CHAPARRAL,NARROWLEAF"     A        5.00      0.44     1.000    75   26.69
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.44
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      3.91
 TOTAL AREA(ACRES) =      5.00   PEAK FLOW RATE(CFS) =      3.91

****************************************************************************
 FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  56
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   2855.74  DOWNSTREAM(FEET) =   2853.21
 CHANNEL LENGTH THRU SUBAREA(FEET) =   531.00   CHANNEL SLOPE =  0.0048
 GIVEN CHANNEL BASE(FEET) =   10.00   CHANNEL FREEBOARD(FEET) =  0.0
 "Z" FACTOR =  20.000   MANNING'S FACTOR = 0.030
 *ESTIMATED CHANNEL HEIGHT(FEET) =   0.36
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.118
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL(ARID)
 ".4 DWELLING/ACRE"         A       11.64      0.35     0.900    81
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.35
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.900
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.11
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.34
 AVERAGE FLOW DEPTH(FEET) =   0.35   TRAVEL TIME(MIN.) =   6.59
 Tc(MIN.) =   33.28
 SUBAREA AREA(ACRES) =    11.64       SUBAREA RUNOFF(CFS) =    8.38
```

```
  EFFECTIVE AREA(ACRES) =     16.64     AREA-AVERAGED Fm(INCH/HR) =   0.35
  AREA-AVERAGED Fp(INCH/HR) =   0.38  AREA-AVERAGED Ap =   0.93
  TOTAL AREA(ACRES) =       16.6         PEAK FLOW RATE(CFS) =      11.46
  GIVEN CHANNEL BASE(FEET) =   10.00   CHANNEL FREEBOARD(FEET) =  0.0
  "Z" FACTOR =  20.000   MANNING'S FACTOR = 0.030
  *ESTIMATED CHANNEL HEIGHT(FEET) =   0.42

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.42   FLOW VELOCITY(FEET/SEC.) =   1.50
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =    1177.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       16.6  TC(MIN.) =     33.28
  EFFECTIVE AREA(ACRES) =     16.64  AREA-AVERAGED Fm(INCH/HR)=  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap = 0.930
  PEAK FLOW RATE(CFS)   =      11.46
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

                          Analysis prepared by:

                     Kimley-Horn and Associates, Inc.
                            765 The City Drive
                                Suite 200
                             Orange, CA 92868

 ************************* DESCRIPTION OF STUDY *************************
* General Atomics                                                       *
* El Mirage Airport                                                     *
* Proposed Rational Method Area B                                       *
 ************************************************************************

  FILE NAME: GAPR-B.DAT
  TIME/DATE OF STUDY: 18:19 09/17/2018
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.7000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.7400

  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

```
 OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
 FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   820.00
 ELEVATION DATA: UPSTREAM(FEET) =   2856.45  DOWNSTREAM(FEET) =   2853.56

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.772
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.073
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 A        6.55      0.74     0.100    52   13.77
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =     11.78
 TOTAL AREA(ACRES) =      6.55   PEAK FLOW RATE(CFS) =     11.78

****************************************************************************
 FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  56
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   2853.56  DOWNSTREAM(FEET) =   2850.94
 CHANNEL LENGTH THRU SUBAREA(FEET) =   719.00   CHANNEL SLOPE =  0.0036
 GIVEN CHANNEL BASE(FEET) =   10.00   CHANNEL FREEBOARD(FEET) =  0.0
 "Z" FACTOR =   4.000   MANNING'S FACTOR = 0.030
 *ESTIMATED CHANNEL HEIGHT(FEET) =   0.62
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.587
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                 A        3.18      0.74     0.200    52
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.85
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.87
 AVERAGE FLOW DEPTH(FEET) =   0.60   TRAVEL TIME(MIN.) =   6.41
 Tc(MIN.) =   20.18
 SUBAREA AREA(ACRES) =     3.18       SUBAREA RUNOFF(CFS) =    4.12
 EFFECTIVE AREA(ACRES) =      9.73     AREA-AVERAGED Fm(INCH/HR) =   0.10
 AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.13
```

```
  TOTAL AREA(ACRES) =        9.7         PEAK FLOW RATE(CFS) =      13.03
  GIVEN CHANNEL BASE(FEET) =   10.00   CHANNEL FREEBOARD(FEET) =  0.0
  "Z" FACTOR =   4.000   MANNING'S FACTOR = 0.030
  *ESTIMATED CHANNEL HEIGHT(FEET) =   0.58

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.58   FLOW VELOCITY(FEET/SEC.) =   1.84
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =    1539.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.18
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.587
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        9.13      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    9.13      SUBAREA RUNOFF(CFS) =   12.43
  EFFECTIVE AREA(ACRES) =     18.86   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.12
  TOTAL AREA(ACRES) =       18.9       PEAK FLOW RATE(CFS) =      25.46
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       18.9  TC(MIN.) =     20.18
  EFFECTIVE AREA(ACRES) =     18.86  AREA-AVERAGED Fm(INCH/HR)=  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap = 0.117
  PEAK FLOW RATE(CFS)   =      25.46
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

Appendix C – On-Site Hydraulic Analysis (Hangar 80 Expansion)

Worksheet for Copy of Trapezoidal Channel - 1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00500	ft/ft
Left Side Slope	5.00	%
Right Side Slope	3.00	%
Bottom Width	10.00	ft
Discharge	87.00	ft^3/s ← See Figure 11, Appendix A for FLOW2D cross-section discharge

Results

Normal Depth	0.99	ft
Flow Area	36.01	ft^2
Wetted Perimeter	62.82	ft
Hydraulic Radius	0.57	ft
Top Width	62.78	ft
Critical Depth	0.76	ft
Critical Slope	0.01709	ft/ft
Velocity	2.42	ft/s
Velocity Head	0.09	ft
Specific Energy	1.08	ft
Froude Number	0.56	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.99	ft
Critical Depth	0.76	ft
Channel Slope	0.00500	ft/ft

Cross Section for Copy of Trapezoidal Channel - 1

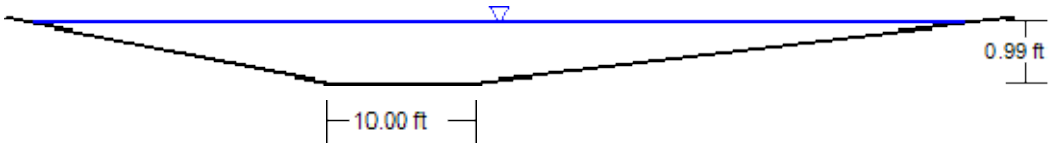
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00500	ft/ft
Normal Depth	0.99	ft
Left Side Slope	5.00	%
Right Side Slope	3.00	%
Bottom Width	10.00	ft
Discharge	87.00	ft³/s

Cross Section Image



V: 4
H: 1

Detention Basin Calculations

Project Summary	
Title	General Atomics Drainage
Engineer	Jimmy Medellin, P.E.
Company	Kimley-Horn and Associates, Inc.
Date	9/14/2018

Notes	Basin routing for project conditions (Area A).

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Detention Basin Calculations

Subsection: User Notifications

User Notifications

Message Id	-1
Scenario	Area A 100 year
Element Type	Scenario
Element Id	1
Label	Area A 100 year
Time	(N/A)
Message	The output increment (0.486 hours) is not an equal interval of the simulation duration (24.786 hours). The actual simulation duration is 24.306 hours.
Source	Precalculation

Detention Basin Calculations

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)
Area B	Area A 100 year	0	1.532	16.250	20.34

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)
Outfall	Area A 100 year	0	1.077	16.528	8.82

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft^3/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
Detention Pond (IN)	Area A 100 year	0	1.404	16.042	8.97	(N/A)	(N/A)
Detention Pond (OUT)	Area A 100 year	0	1.078	16.528	8.82	2,850.64	0.383

Detention Basin Calculations

Subsection: Read Hydrograph

Label: Area B

Peak Discharge	20.34 ft³/s
Time to Peak	16.250 hours
Hydrograph Volume	1.532 ac-ft

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.083 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.000	0.00	0.00	0.00	0.01	0.01
0.417	0.01	0.01	0.01	0.01	0.01
0.833	0.02	0.02	0.02	0.02	0.02
1.250	0.02	0.02	0.02	0.02	0.02
1.667	0.02	0.02	0.02	0.02	0.02
2.083	0.02	0.02	0.02	0.02	0.02
2.500	0.02	0.02	0.02	0.02	0.02
2.917	0.02	0.02	0.02	0.02	0.02
3.333	0.02	0.02	0.02	0.02	0.02
3.750	0.02	0.02	0.02	0.02	0.02
4.167	0.02	0.02	0.02	0.02	0.02
4.583	0.02	0.02	0.02	0.02	0.02
5.000	0.02	0.02	0.02	0.02	0.02
5.417	0.02	0.02	0.02	0.02	0.02
5.833	0.02	0.02	0.02	0.02	0.02
6.250	0.02	0.02	0.02	0.02	0.02
6.667	0.02	0.02	0.02	0.02	0.02
7.083	0.02	0.02	0.02	0.02	0.02
7.500	0.02	0.02	0.02	0.02	0.02
7.917	0.02	0.02	0.02	0.02	0.02
8.333	0.02	0.02	0.02	0.02	0.02
8.750	0.02	0.02	0.02	0.02	0.02
9.167	0.03	0.03	0.03	0.03	0.03
9.583	0.03	0.03	0.03	0.03	0.03
10.000	0.03	0.03	0.03	0.03	0.03
10.417	0.03	0.03	0.03	0.03	0.03
10.833	0.03	0.03	0.03	0.03	0.03
11.250	0.03	0.03	0.03	0.03	0.03
11.667	0.03	0.03	0.03	0.03	0.03
12.083	0.04	0.05	0.09	0.13	0.16
12.500	0.19	0.22	0.25	0.29	0.32
12.917	0.36	0.39	0.43	0.47	0.51
13.333	0.56	0.60	0.65	0.70	0.75
13.750	0.81	0.86	0.92	0.98	1.06
14.167	1.16	1.31	1.43	1.55	1.65
14.583	1.76	1.87	1.99	2.11	2.25
15.000	2.39	2.55	2.72	2.92	3.13

Detention Basin Calculations

Subsection: Read Hydrograph

Label: Area B

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.083 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
15.417	3.37	3.56	3.69	3.95	4.40
15.833	5.05	6.11	7.55	10.39	15.32
16.250	20.34	15.88	11.49	9.10	7.61
16.667	6.53	5.62	4.85	4.28	3.77
17.083	3.32	2.90	2.47	2.12	1.83
17.500	1.65	1.48	1.30	1.11	0.83
17.917	0.69	0.58	0.49	0.39	0.29
18.333	0.22	0.18	0.14	0.12	0.10
18.750	0.08	0.07	0.06	0.05	0.05
19.167	0.04	0.04	0.03	0.03	0.03
19.583	0.03	0.03	0.03	0.03	0.03
20.000	0.03	0.02	0.02	0.02	0.02
20.417	0.02	0.02	0.02	0.02	0.02
20.833	0.02	0.02	0.02	0.02	0.02
21.250	0.02	0.02	0.02	0.02	0.02
21.667	0.02	0.02	0.02	0.02	0.02
22.083	0.02	0.02	0.02	0.02	0.02
22.500	0.02	0.02	0.02	0.02	0.02
22.917	0.02	0.02	0.02	0.02	0.02
23.333	0.02	0.02	0.02	0.02	0.02
23.750	0.02	0.02	0.02	0.02	0.02
24.167	0.01	0.01	(N/A)	(N/A)	(N/A)

Detention Basin Calculations

Subsection: Addition Summary
Label: Outfall

Summary for Hydrograph Addition at 'Outfall'

Upstream Link	Upstream Node
Outlet-1	Detention Pond

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	Outlet-1	1.077	16.528	8.82
Flow (In)	Outfall	1.077	16.528	8.82

Detention Basin Calculations

Subsection: Time vs. Elevation
Label: Detention Pond (OUT)

Time vs. Elevation (ft)

Output Time increment = 0.486 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
0.000	2,843.72	2,843.76	2,843.90	2,844.07	2,844.24
2.431	2,844.33	2,844.43	2,844.53	2,844.63	2,844.72
4.861	2,844.78	2,844.85	2,844.91	2,844.97	2,845.03
7.292	2,845.09	2,845.16	2,845.22	2,845.26	2,845.32
9.722	2,845.38	2,845.44	2,845.51	2,845.57	2,845.64
12.153	2,845.72	2,845.95	2,846.42	2,847.04	2,847.75
14.583	2,848.57	2,849.51	2,850.30	2,850.64	2,850.64
17.014	2,850.45	2,850.30	2,850.26	2,850.23	2,850.22
19.444	2,850.22	2,850.22	2,850.22	2,850.22	2,850.22
21.875	2,850.22	2,850.22	2,850.22	2,850.22	2,850.22
24.306	2,850.22	(N/A)	(N/A)	(N/A)	(N/A)

Detention Basin Calculations

Subsection: Time vs. Volume
Label: Detention Pond

Time vs. Volume (ac-ft)

Output Time increment = 0.486 hours
Time on left represents time for first value in each row.

Time (hours)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)	Volume (ac-ft)
0.000	0.000	0.000	0.001	0.001	0.002
2.431	0.003	0.004	0.005	0.005	0.006
4.861	0.007	0.008	0.009	0.009	0.010
7.292	0.011	0.012	0.013	0.014	0.014
9.722	0.016	0.017	0.018	0.019	0.020
12.153	0.022	0.028	0.041	0.065	0.101
14.583	0.158	0.243	0.336	0.382	0.383
17.014	0.356	0.336	0.331	0.327	0.327
19.444	0.326	0.326	0.326	0.326	0.326
21.875	0.326	0.326	0.326	0.326	0.326
24.306	0.326	(N/A)	(N/A)	(N/A)	(N/A)

Detention Basin Calculations

Subsection: Elevation-Area Volume Curve

Label: Detention Pond

Elevation (ft)	Planimeter (ft^2)	Area (ft^2)	A1+A2+sqr (A1*A2) (ft^2)	Volume (ac-ft)	Volume (Total) (ac-ft)
2,843.72	0.0	135.000	0.000	0.000	0.000
2,850.72	0.0	6,300.000	7,357.226	0.394	0.394

Detention Basin Calculations

Subsection: Volume Equations
Label: Detention Pond

Pond Volume Equations

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2 - El1) * (Area1 + Area2 + sqr(Area1 * Area2))

where:	EL1, EL2	Lower and upper elevations of the increment
	Area1, Area2	Areas computed for EL1, EL2, respectively
	Volume	Incremental volume between EL1 and EL2

Detention Basin Calculations

Subsection: Outlet Input Data

Label: Composite Outlet Structure - 1

Requested Pond Water Surface Elevations	
Minimum (Headwater)	2,846.72 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	2,850.72 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Rectangular Weir	Weir - 1	Forward	TW	2,850.22	2,850.72
Tailwater Settings	Tailwater			(N/A)	(N/A)

Detention Basin Calculations

Subsection: Outlet Input Data

Label: Composite Outlet Structure - 1

Structure ID: Weir - 1 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	2,850.22 ft
Weir Length	10.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: TW Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Detention Basin Calculations

Subsection: Individual Outlet Curves
Label: Composite Outlet Structure - 1

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Weir - 1 (Rectangular Weir)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
2,843.72	0.00	(N/A)	0.00
2,844.22	0.00	(N/A)	0.00
2,844.72	0.00	(N/A)	0.00
2,845.22	0.00	(N/A)	0.00
2,845.72	0.00	(N/A)	0.00
2,846.22	0.00	(N/A)	0.00
2,846.72	0.00	(N/A)	0.00
2,847.22	0.00	(N/A)	0.00
2,847.72	0.00	(N/A)	0.00
2,848.22	0.00	(N/A)	0.00
2,848.72	0.00	(N/A)	0.00
2,849.22	0.00	(N/A)	0.00
2,849.72	0.00	(N/A)	0.00
2,850.22	0.00	(N/A)	0.00
2,850.72	10.50	(N/A)	0.00

Computation Messages
HW & TW below Inv.El.=2850.220
HW & TW below Inv.El.=2850.220
HW & TW below Inv.El.=2850.220
HW & TW below Inv.El.=2850.220
HW & TW below Inv.El.=2850.220
HW & TW below Inv.El.=2850.220
HW & TW below Inv.El.=2850.220
HW & TW below Inv.El.=2850.220
HW & TW below Inv.El.=2850.220
HW & TW below Inv.El.=2850.220
HW & TW below Inv.El.=2850.220

Detention Basin Calculations

Subsection: Individual Outlet Curves
Label: Composite Outlet Structure - 1

RATING TABLE FOR ONE OUTLET TYPE
Structure ID = Weir - 1 (Rectangular Weir)

Upstream ID = (Pond Water Surface)
Downstream ID = Tailwater (Pond Outfall)

Computation Messages
HW & TW below Inv.El.=2850.220
HW & TW below Inv.El.=2850.220
H=.00; Htw=.00; Qfree=.00;
H=.50; Htw=.00; Qfree=10.50;

Detention Basin Calculations

Subsection: Composite Rating Curve

Label: Composite Outlet Structure - 1

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)	Convergence Error (ft)
2,843.72	0.00	(N/A)	0.00
2,844.22	0.00	(N/A)	0.00
2,844.72	0.00	(N/A)	0.00
2,845.22	0.00	(N/A)	0.00
2,845.72	0.00	(N/A)	0.00
2,846.22	0.00	(N/A)	0.00
2,846.72	0.00	(N/A)	0.00
2,847.22	0.00	(N/A)	0.00
2,847.72	0.00	(N/A)	0.00
2,848.22	0.00	(N/A)	0.00
2,848.72	0.00	(N/A)	0.00
2,849.22	0.00	(N/A)	0.00
2,849.72	0.00	(N/A)	0.00
2,850.22	0.00	(N/A)	0.00
2,850.72	10.50	(N/A)	0.00

Contributing Structures
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
None Contributing
Weir - 1
Weir - 1

Detention Basin Calculations

Subsection: Elevation-Volume-Flow Table (Pond)
Label: Detention Pond

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	2,843.72 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.486 hours

Elevation (ft)	Outflow (ft³/s)	Storage (ac-ft)	Area (ft²)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
2,843.72	0.00	0.000	135.000	0.00	0.00	0.00
2,844.22	0.00	0.002	270.882	0.00	0.00	0.11
2,844.72	0.00	0.006	453.606	0.00	0.00	0.32
2,845.22	0.00	0.013	683.173	0.00	0.00	0.64
2,845.72	0.00	0.022	959.582	0.00	0.00	1.11
2,846.22	0.00	0.035	1,282.833	0.00	0.00	1.75
2,846.72	0.00	0.052	1,652.927	0.00	0.00	2.58
2,847.22	0.00	0.073	2,069.863	0.00	0.00	3.64
2,847.72	0.00	0.100	2,533.641	0.00	0.00	4.96
2,848.22	0.00	0.132	3,044.262	0.00	0.00	6.55
2,848.72	0.00	0.170	3,601.725	0.00	0.00	8.45
2,849.22	0.00	0.214	4,206.030	0.00	0.00	10.67
2,849.72	0.00	0.266	4,857.178	0.00	0.00	13.26
2,850.22	0.00	0.326	5,555.168	0.00	0.00	16.23
2,850.72	10.50	0.394	6,300.000	0.00	10.50	30.12

Detention Basin Calculations

Subsection: Level Pool Pond Routing Summary

Label: Detention Pond (IN)

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	2,843.72 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.486 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	8.97 ft³/s	Time to Peak (Flow, In)	16.042 hours
Flow (Peak Outlet)	8.82 ft³/s	Time to Peak (Flow, Outlet)	16.528 hours

Elevation (Water Surface, Peak)	2,850.64 ft
Volume (Peak)	0.383 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	1.404 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	1.078 ac-ft
Volume (Retained)	0.326 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

Detention Basin Calculations

Subsection: Pond Routed Hydrograph (total out)
Label: Detention Pond (OUT)

Peak Discharge	8.82 ft³/s
Time to Peak	16.528 hours
Hydrograph Volume	1.077 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.486 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
15.069	0.00	1.59	8.73	8.82	4.78
17.500	1.59	0.88	0.12	0.10	0.01
19.931	0.04	0.02	0.02	0.02	0.02
22.361	0.02	0.02	0.02	0.02	0.00

Detention Basin Calculations

Subsection: Pond Inflow Summary
Label: Detention Pond (IN)

Summary for Hydrograph Addition at 'Detention Pond'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Area B

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	Area B	1.532	16.250	20.34
Flow (In)	Detention Pond	1.404	16.042	8.97

Detention Basin Calculations

Subsection: Diverted Hydrograph

Label: Outlet-1

Peak Discharge	8.82 ft³/s
Time to Peak	16.528 hours
Hydrograph Volume	1.077 ac-ft

HYDROGRAPH ORDINATES (ft³/s)

Output Time Increment = 0.486 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
15.069	0.00	1.59	8.73	8.82	4.78
17.500	1.59	0.88	0.12	0.10	0.01
19.931	0.04	0.02	0.02	0.02	0.02
22.361	0.02	0.02	0.02	0.02	0.00

Detention Basin Calculations

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                           Analysis prepared by:




 ************************** DESCRIPTION OF STUDY **************************
* General Atomics                                                        *
* El Mirage Airport                                                      *
* Proposed Unit Hydrograph Area B                                        *
 ************************************************************************

  FILE NAME: GAUHPB.DAT
  TIME/DATE OF STUDY: 17:32 09/13/2018


************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    202.00 IS CODE =   1
------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
========================================================================

      (UNIT-HYDROGRAPH ADDED TO STREAM #1)

         WATERSHED AREA =      18.210 ACRES
         BASEFLOW =   0.000 CFS/SQUARE-MILE
         *USER ENTERED "LAG" TIME =    0.230 HOURS
          CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
          THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
          MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
         DESERT(UNDEVELOPED) S-GRAPH SELECTED
         MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) =  0.142
         LOW LOSS FRACTION = 0.986
         *HYDROGRAPH MODEL #1 SPECIFIED*

         SPECIFIED PEAK  5-MINUTES RAINFALL(INCH)=  0.22
         SPECIFIED PEAK 30-MINUTES RAINFALL(INCH)=  0.53
         SPECIFIED PEAK  1-HOUR RAINFALL(INCH) =  0.74
         SPECIFIED PEAK  3-HOUR RAINFALL(INCH) =  1.31
         SPECIFIED PEAK  6-HOUR RAINFALL(INCH) =  1.84
         SPECIFIED PEAK 24-HOUR RAINFALL(INCH) =  3.45

         PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
           5-MINUTE FACTOR = 0.999
          30-MINUTE FACTOR = 0.999
           1-HOUR FACTOR = 0.999
           3-HOUR FACTOR = 1.000
           6-HOUR FACTOR = 1.000
          24-HOUR FACTOR = 1.000

         UNIT HYDROGRAPH TIME UNIT =   5.000 MINUTES
         UNIT INTERVAL PERCENTAGE OF LAG-TIME =  36.232
```

UNIT HYDROGRAPH DETERMINATION

INTERVAL NUMBER	"S" GRAPH MEAN VALUES	UNIT HYDROGRAPH ORDINATES(CFS)
1	2.355	5.187
2	14.606	26.979
3	43.157	62.877
4	61.537	40.479
5	71.417	21.758
6	78.024	14.549
7	82.713	10.328
8	86.338	7.983
9	89.150	6.192
10	91.259	4.644
11	93.030	3.902
12	94.466	3.163
13	95.650	2.606
14	96.612	2.118
15	97.357	1.641
16	97.911	1.222
17	98.285	0.824
18	98.709	0.933
19	99.143	0.957
20	99.567	0.933
21	99.990	0.933
22	100.000	0.021

FF

UNIT PERIOD (NUMBER)	UNIT RAINFALL (INCHES)	UNIT SOIL-LOSS (INCHES)	EFFECTIVE RAINFALL (INCHES)
1	0.0054	0.0054	0.0001
2	0.0054	0.0054	0.0001
3	0.0055	0.0054	0.0001
4	0.0055	0.0054	0.0001
5	0.0055	0.0054	0.0001
6	0.0055	0.0054	0.0001
7	0.0055	0.0055	0.0001
8	0.0055	0.0055	0.0001
9	0.0056	0.0055	0.0001
10	0.0056	0.0055	0.0001
11	0.0056	0.0055	0.0001
12	0.0056	0.0055	0.0001
13	0.0056	0.0056	0.0001
14	0.0056	0.0056	0.0001
15	0.0057	0.0056	0.0001
16	0.0057	0.0056	0.0001
17	0.0057	0.0056	0.0001
18	0.0057	0.0056	0.0001
19	0.0057	0.0057	0.0001
20	0.0058	0.0057	0.0001
21	0.0058	0.0057	0.0001
22	0.0058	0.0057	0.0001
23	0.0058	0.0057	0.0001
24	0.0058	0.0057	0.0001
25	0.0058	0.0058	0.0001
26	0.0059	0.0058	0.0001
27	0.0059	0.0058	0.0001

28	0.0059	0.0058	0.0001
29	0.0059	0.0058	0.0001
30	0.0059	0.0059	0.0001
31	0.0060	0.0059	0.0001
32	0.0060	0.0059	0.0001
33	0.0060	0.0059	0.0001
34	0.0060	0.0059	0.0001
35	0.0060	0.0060	0.0001
36	0.0061	0.0060	0.0001
37	0.0061	0.0060	0.0001
38	0.0061	0.0060	0.0001
39	0.0061	0.0061	0.0001
40	0.0061	0.0061	0.0001
41	0.0062	0.0061	0.0001
42	0.0062	0.0061	0.0001
43	0.0062	0.0061	0.0001
44	0.0062	0.0062	0.0001
45	0.0063	0.0062	0.0001
46	0.0063	0.0062	0.0001
47	0.0063	0.0062	0.0001
48	0.0063	0.0062	0.0001
49	0.0064	0.0063	0.0001
50	0.0064	0.0063	0.0001
51	0.0064	0.0063	0.0001
52	0.0064	0.0063	0.0001
53	0.0065	0.0064	0.0001
54	0.0065	0.0064	0.0001
55	0.0065	0.0064	0.0001
56	0.0065	0.0064	0.0001
57	0.0066	0.0065	0.0001
58	0.0066	0.0065	0.0001
59	0.0066	0.0065	0.0001
60	0.0066	0.0065	0.0001
61	0.0067	0.0066	0.0001
62	0.0067	0.0066	0.0001
63	0.0067	0.0066	0.0001
64	0.0068	0.0067	0.0001
65	0.0068	0.0067	0.0001
66	0.0068	0.0067	0.0001
67	0.0068	0.0068	0.0001
68	0.0069	0.0068	0.0001
69	0.0069	0.0068	0.0001
70	0.0069	0.0068	0.0001
71	0.0070	0.0069	0.0001
72	0.0070	0.0069	0.0001
73	0.0070	0.0069	0.0001
74	0.0071	0.0070	0.0001
75	0.0071	0.0070	0.0001
76	0.0071	0.0070	0.0001
77	0.0072	0.0071	0.0001
78	0.0072	0.0071	0.0001
79	0.0072	0.0071	0.0001
80	0.0073	0.0072	0.0001
81	0.0073	0.0072	0.0001
82	0.0073	0.0072	0.0001
83	0.0074	0.0073	0.0001
84	0.0074	0.0073	0.0001
85	0.0075	0.0074	0.0001
86	0.0075	0.0074	0.0001
87	0.0075	0.0074	0.0001
88	0.0076	0.0075	0.0001
89	0.0076	0.0075	0.0001
90	0.0076	0.0075	0.0001
91	0.0077	0.0076	0.0001

193	92	0.0077	0.0076	0.0001
194	93	0.0078	0.0077	0.0001
195	94	0.0078	0.0077	0.0001
196	95	0.0079	0.0078	0.0001
197	96	0.0079	0.0078	0.0001
198	97	0.0079	0.0078	0.0001
199	98	0.0080	0.0079	0.0001
200	99	0.0080	0.0079	0.0001
201	100	0.0081	0.0080	0.0001
202	101	0.0081	0.0080	0.0001
203	102	0.0082	0.0081	0.0001
204	103	0.0082	0.0081	0.0001
205	104	0.0083	0.0082	0.0001
206	105	0.0083	0.0082	0.0001
207	106	0.0084	0.0083	0.0001
208	107	0.0084	0.0083	0.0001
209	108	0.0085	0.0084	0.0001
210	109	0.0086	0.0084	0.0001
211	110	0.0086	0.0085	0.0001
212	111	0.0087	0.0085	0.0001
213	112	0.0087	0.0086	0.0001
214	113	0.0088	0.0087	0.0001
215	114	0.0088	0.0087	0.0001
216	115	0.0089	0.0088	0.0001
217	116	0.0090	0.0088	0.0001
218	117	0.0090	0.0089	0.0001
219	118	0.0091	0.0090	0.0001
220	119	0.0092	0.0090	0.0001
221	120	0.0092	0.0091	0.0001
222	121	0.0093	0.0092	0.0001
223	122	0.0094	0.0092	0.0001
224	123	0.0095	0.0093	0.0001
225	124	0.0095	0.0094	0.0001
226	125	0.0096	0.0095	0.0001
227	126	0.0097	0.0095	0.0001
228	127	0.0098	0.0096	0.0001
229	128	0.0098	0.0097	0.0001
230	129	0.0099	0.0098	0.0001
231	130	0.0100	0.0099	0.0001
232	131	0.0101	0.0100	0.0001
233	132	0.0102	0.0100	0.0001
234	133	0.0103	0.0101	0.0001
235	134	0.0104	0.0102	0.0001
236	135	0.0105	0.0103	0.0001
237	136	0.0105	0.0104	0.0001
238	137	0.0107	0.0105	0.0001
239	138	0.0108	0.0106	0.0001
240	139	0.0109	0.0108	0.0001
241	140	0.0110	0.0108	0.0001
242	141	0.0111	0.0110	0.0002
243	142	0.0112	0.0111	0.0002
244	143	0.0114	0.0112	0.0002
245	144	0.0115	0.0113	0.0002
246	145	0.0126	0.0118	0.0007
247	146	0.0127	0.0118	0.0008
248	147	0.0128	0.0118	0.0010
249	148	0.0129	0.0118	0.0011
250	149	0.0131	0.0118	0.0013
251	150	0.0132	0.0118	0.0014
252	151	0.0135	0.0118	0.0016
253	152	0.0136	0.0118	0.0017
254	153	0.0138	0.0118	0.0020
255	154	0.0139	0.0118	0.0021
256	155	0.0142	0.0118	0.0023

156	0.0143	0.0118	0.0025
157	0.0146	0.0118	0.0027
158	0.0147	0.0118	0.0029
159	0.0150	0.0118	0.0032
160	0.0152	0.0118	0.0033
161	0.0155	0.0118	0.0037
162	0.0157	0.0118	0.0038
163	0.0160	0.0118	0.0042
164	0.0162	0.0118	0.0044
165	0.0166	0.0118	0.0048
166	0.0168	0.0118	0.0050
167	0.0172	0.0118	0.0054
168	0.0175	0.0118	0.0056
169	0.0192	0.0118	0.0073
170	0.0194	0.0118	0.0076
171	0.0200	0.0118	0.0081
172	0.0203	0.0118	0.0084
173	0.0209	0.0118	0.0091
174	0.0213	0.0118	0.0094
175	0.0220	0.0118	0.0102
176	0.0224	0.0118	0.0106
177	0.0233	0.0118	0.0115
178	0.0238	0.0118	0.0120
179	0.0249	0.0118	0.0131
180	0.0255	0.0118	0.0137
181	0.0268	0.0118	0.0150
182	0.0276	0.0118	0.0158
183	0.0294	0.0118	0.0175
184	0.0304	0.0118	0.0186
185	0.0295	0.0118	0.0177
186	0.0310	0.0118	0.0192
187	0.0346	0.0118	0.0228
188	0.0371	0.0118	0.0252
189	0.0468	0.0118	0.0349
190	0.0517	0.0118	0.0399
191	0.0694	0.0118	0.0575
192	0.0903	0.0118	0.0785
193	0.2158	0.0118	0.2040
194	0.0586	0.0118	0.0467
195	0.0400	0.0118	0.0281
196	0.0327	0.0118	0.0208
197	0.0315	0.0118	0.0197
198	0.0284	0.0118	0.0166
199	0.0261	0.0118	0.0143
200	0.0243	0.0118	0.0125
201	0.0229	0.0118	0.0110
202	0.0216	0.0118	0.0098
203	0.0206	0.0118	0.0088
204	0.0197	0.0118	0.0079
205	0.0177	0.0118	0.0059
206	0.0170	0.0118	0.0052
207	0.0164	0.0118	0.0046
208	0.0158	0.0118	0.0040
209	0.0153	0.0118	0.0035
210	0.0149	0.0118	0.0030
211	0.0144	0.0118	0.0026
212	0.0140	0.0118	0.0022
213	0.0137	0.0118	0.0019
214	0.0134	0.0118	0.0015
215	0.0130	0.0118	0.0012
216	0.0128	0.0118	0.0009
217	0.0115	0.0114	0.0002
218	0.0113	0.0111	0.0002
219	0.0111	0.0109	0.0002

220	0.0108	0.0107	0.0001
221	0.0106	0.0105	0.0001
222	0.0104	0.0103	0.0001
223	0.0102	0.0101	0.0001
224	0.0100	0.0099	0.0001
225	0.0099	0.0097	0.0001
226	0.0097	0.0096	0.0001
227	0.0096	0.0094	0.0001
228	0.0094	0.0093	0.0001
229	0.0093	0.0091	0.0001
230	0.0091	0.0090	0.0001
231	0.0090	0.0089	0.0001
232	0.0089	0.0087	0.0001
233	0.0087	0.0086	0.0001
234	0.0086	0.0085	0.0001
235	0.0085	0.0084	0.0001
236	0.0084	0.0083	0.0001
237	0.0083	0.0082	0.0001
238	0.0082	0.0081	0.0001
239	0.0081	0.0080	0.0001
240	0.0080	0.0079	0.0001
241	0.0079	0.0078	0.0001
242	0.0078	0.0077	0.0001
243	0.0077	0.0076	0.0001
244	0.0077	0.0076	0.0001
245	0.0076	0.0075	0.0001
246	0.0075	0.0074	0.0001
247	0.0074	0.0073	0.0001
248	0.0074	0.0073	0.0001
249	0.0073	0.0072	0.0001
250	0.0072	0.0071	0.0001
251	0.0071	0.0070	0.0001
252	0.0071	0.0070	0.0001
253	0.0070	0.0069	0.0001
254	0.0069	0.0069	0.0001
255	0.0069	0.0068	0.0001
256	0.0068	0.0067	0.0001
257	0.0068	0.0067	0.0001
258	0.0067	0.0066	0.0001
259	0.0067	0.0066	0.0001
260	0.0066	0.0065	0.0001
261	0.0065	0.0065	0.0001
262	0.0065	0.0064	0.0001
263	0.0064	0.0064	0.0001
264	0.0064	0.0063	0.0001
265	0.0063	0.0063	0.0001
266	0.0063	0.0062	0.0001
267	0.0063	0.0062	0.0001
268	0.0062	0.0061	0.0001
269	0.0062	0.0061	0.0001
270	0.0061	0.0060	0.0001
271	0.0061	0.0060	0.0001
272	0.0060	0.0060	0.0001
273	0.0060	0.0059	0.0001
274	0.0060	0.0059	0.0001
275	0.0059	0.0058	0.0001
276	0.0059	0.0058	0.0001
277	0.0058	0.0058	0.0001
278	0.0058	0.0057	0.0001
279	0.0058	0.0057	0.0001
280	0.0057	0.0056	0.0001
281	0.0057	0.0056	0.0001
282	0.0057	0.0056	0.0001
283	0.0056	0.0055	0.0001

284	0.0056	0.0055	0.0001
285	0.0056	0.0055	0.0001
286	0.0055	0.0054	0.0001
287	0.0055	0.0054	0.0001
288	0.0055	0.0054	0.0001

TOTAL STORM RAINFALL(INCHES) = 3.45
TOTAL SOIL-LOSS(INCHES) = 2.44
TOTAL EFFECTIVE RAINFALL(INCHES) = 1.01

TOTAL SOIL-LOSS VOLUME(ACRE-FEET) = 3.7028
TOTAL STORM RUNOFF VOLUME(ACRE-FEET) = 1.5316

FF

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2 4 - H O U R S T O R M
R U N O F F H Y D R O G R A P H

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HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
(Note: Time indicated is at END of Each Unit Intervals)

TIME(HRS)	VOLUME(AF)	Q(CFS)	0.	7.5	15.0	22.5	30.0
0.083	0.0000	0.00	Q	.	.	.	.
0.167	0.0000	0.00	Q	.	.	.	.
0.250	0.0001	0.01	Q	.	.	.	.
0.333	0.0001	0.01	Q	.	.	.	.
0.417	0.0002	0.01	Q	.	.	.	.
0.500	0.0003	0.01	Q	.	.	.	.
0.583	0.0004	0.01	Q	.	.	.	.
0.667	0.0005	0.01	Q	.	.	.	.
0.750	0.0006	0.01	Q	.	.	.	.
0.833	0.0007	0.02	Q	.	.	.	.
0.917	0.0008	0.02	Q	.	.	.	.
1.000	0.0009	0.02	Q	.	.	.	.
1.083	0.0010	0.02	Q	.	.	.	.
1.167	0.0011	0.02	Q	.	.	.	.
1.250	0.0013	0.02	Q	.	.	.	.
1.333	0.0014	0.02	Q	.	.	.	.
1.417	0.0015	0.02	Q	.	.	.	.
1.500	0.0016	0.02	Q	.	.	.	.
1.583	0.0017	0.02	Q	.	.	.	.
1.667	0.0018	0.02	Q	.	.	.	.
1.750	0.0019	0.02	Q	.	.	.	.
1.833	0.0021	0.02	Q	.	.	.	.
1.917	0.0022	0.02	Q	.	.	.	.
2.000	0.0023	0.02	Q	.	.	.	.
2.083	0.0024	0.02	Q	.	.	.	.
2.167	0.0025	0.02	Q	.	.	.	.
2.250	0.0027	0.02	Q	.	.	.	.
2.333	0.0028	0.02	Q	.	.	.	.
2.417	0.0029	0.02	Q	.	.	.	.
2.500	0.0030	0.02	Q	.	.	.	.
2.583	0.0031	0.02	Q	.	.	.	.
2.667	0.0033	0.02	Q	.	.	.	.
2.750	0.0034	0.02	Q	.	.	.	.
2.833	0.0035	0.02	Q	.	.	.	.
2.917	0.0036	0.02	Q	.	.	.	.
3.000	0.0038	0.02	Q	.	.	.	.
3.083	0.0039	0.02	Q	.	.	.	.
3.167	0.0040	0.02	Q	.	.	.	.

449	3.250	0.0041	0.02	Q	.	.	.	.
450	3.333	0.0043	0.02	Q	.	.	.	.
451	3.417	0.0044	0.02	Q	.	.	.	.
452	3.500	0.0045	0.02	Q	.	.	.	.
453	3.583	0.0046	0.02	Q	.	.	.	.
454	3.667	0.0048	0.02	Q	.	.	.	.
455	3.750	0.0049	0.02	Q	.	.	.	.
456	3.833	0.0050	0.02	Q	.	.	.	.
457	3.917	0.0051	0.02	Q	.	.	.	.
458	4.000	0.0053	0.02	Q	.	.	.	.
459	4.083	0.0054	0.02	Q	.	.	.	.
460	4.167	0.0055	0.02	Q	.	.	.	.
461	4.250	0.0057	0.02	Q	.	.	.	.
462	4.333	0.0058	0.02	Q	.	.	.	.
463	4.417	0.0059	0.02	Q	.	.	.	.
464	4.500	0.0061	0.02	Q	.	.	.	.
465	4.583	0.0062	0.02	Q	.	.	.	.
466	4.667	0.0063	0.02	Q	.	.	.	.
467	4.750	0.0064	0.02	Q	.	.	.	.
468	4.833	0.0066	0.02	Q	.	.	.	.
469	4.917	0.0067	0.02	Q	.	.	.	.
470	5.000	0.0069	0.02	Q	.	.	.	.
471	5.083	0.0070	0.02	Q	.	.	.	.
472	5.167	0.0071	0.02	Q	.	.	.	.
473	5.250	0.0073	0.02	Q	.	.	.	.
474	5.333	0.0074	0.02	Q	.	.	.	.
475	5.417	0.0075	0.02	Q	.	.	.	.
476	5.500	0.0077	0.02	Q	.	.	.	.
477	5.583	0.0078	0.02	Q	.	.	.	.
478	5.667	0.0080	0.02	Q	.	.	.	.
479	5.750	0.0081	0.02	Q	.	.	.	.
480	5.833	0.0082	0.02	Q	.	.	.	.
481	5.917	0.0084	0.02	Q	.	.	.	.
482	6.000	0.0085	0.02	Q	.	.	.	.
483	6.083	0.0087	0.02	Q	.	.	.	.
484	6.167	0.0088	0.02	Q	.	.	.	.
485	6.250	0.0089	0.02	Q	.	.	.	.
486	6.333	0.0091	0.02	Q	.	.	.	.
487	6.417	0.0092	0.02	Q	.	.	.	.
488	6.500	0.0094	0.02	Q	.	.	.	.
489	6.583	0.0095	0.02	Q	.	.	.	.
490	6.667	0.0097	0.02	Q	.	.	.	.
491	6.750	0.0098	0.02	Q	.	.	.	.
492	6.833	0.0100	0.02	Q	.	.	.	.
493	6.917	0.0101	0.02	Q	.	.	.	.
494	7.000	0.0103	0.02	Q	.	.	.	.
495	7.083	0.0104	0.02	Q	.	.	.	.
496	7.167	0.0106	0.02	Q	.	.	.	.
497	7.250	0.0107	0.02	Q	.	.	.	.
498	7.333	0.0109	0.02	Q	.	.	.	.
499	7.417	0.0110	0.02	Q	.	.	.	.
500	7.500	0.0112	0.02	Q	.	.	.	.
501	7.583	0.0113	0.02	Q	.	.	.	.
502	7.667	0.0115	0.02	Q	.	.	.	.
503	7.750	0.0116	0.02	Q	.	.	.	.
504	7.833	0.0118	0.02	Q	.	.	.	.
505	7.917	0.0120	0.02	Q	.	.	.	.
506	8.000	0.0121	0.02	Q	.	.	.	.
507	8.083	0.0123	0.02	Q	.	.	.	.
508	8.167	0.0124	0.02	Q	.	.	.	.
509	8.250	0.0126	0.02	Q	.	.	.	.
510	8.333	0.0128	0.02	Q	.	.	.	.
511	8.417	0.0129	0.02	Q	.	.	.	.
512	8.500	0.0131	0.02	Q	.	.	.	.

513	8.583	0.0133	0.02	Q	.	.	.	.
514	8.667	0.0134	0.02	Q	.	.	.	.
515	8.750	0.0136	0.02	Q	.	.	.	.
516	8.833	0.0138	0.02	Q	.	.	.	.
517	8.917	0.0139	0.02	Q	.	.	.	.
518	9.000	0.0141	0.02	Q	.	.	.	.
519	9.083	0.0143	0.02	Q	.	.	.	.
520	9.167	0.0145	0.03	Q	.	.	.	.
521	9.250	0.0146	0.03	Q	.	.	.	.
522	9.333	0.0148	0.03	Q	.	.	.	.
523	9.417	0.0150	0.03	Q	.	.	.	.
524	9.500	0.0152	0.03	Q	.	.	.	.
525	9.583	0.0153	0.03	Q	.	.	.	.
526	9.667	0.0155	0.03	Q	.	.	.	.
527	9.750	0.0157	0.03	Q	.	.	.	.
528	9.833	0.0159	0.03	Q	.	.	.	.
529	9.917	0.0161	0.03	Q	.	.	.	.
530	10.000	0.0162	0.03	Q	.	.	.	.
531	10.083	0.0164	0.03	Q	.	.	.	.
532	10.167	0.0166	0.03	Q	.	.	.	.
533	10.250	0.0168	0.03	Q	.	.	.	.
534	10.333	0.0170	0.03	Q	.	.	.	.
535	10.417	0.0172	0.03	Q	.	.	.	.
536	10.500	0.0174	0.03	Q	.	.	.	.
537	10.583	0.0176	0.03	Q	.	.	.	.
538	10.667	0.0178	0.03	Q	.	.	.	.
539	10.750	0.0180	0.03	Q	.	.	.	.
540	10.833	0.0182	0.03	Q	.	.	.	.
541	10.917	0.0184	0.03	Q	.	.	.	.
542	11.000	0.0186	0.03	Q	.	.	.	.
543	11.083	0.0188	0.03	Q	.	.	.	.
544	11.167	0.0190	0.03	Q	.	.	.	.
545	11.250	0.0192	0.03	Q	.	.	.	.
546	11.333	0.0194	0.03	Q	.	.	.	.
547	11.417	0.0196	0.03	Q	.	.	.	.
548	11.500	0.0198	0.03	Q	.	.	.	.
549	11.583	0.0200	0.03	Q	.	.	.	.
550	11.667	0.0203	0.03	Q	.	.	.	.
551	11.750	0.0205	0.03	Q	.	.	.	.
552	11.833	0.0207	0.03	Q	.	.	.	.
553	11.917	0.0209	0.03	Q	.	.	.	.
554	12.000	0.0212	0.03	Q	.	.	.	.
555	12.083	0.0214	0.04	Q	.	.	.	.
556	12.167	0.0218	0.05	Q	.	.	.	.
557	12.250	0.0224	0.09	Q	.	.	.	.
558	12.333	0.0233	0.13	Q	.	.	.	.
559	12.417	0.0244	0.16	Q	.	.	.	.
560	12.500	0.0257	0.19	Q	.	.	.	.
561	12.583	0.0272	0.22	Q	.	.	.	.
562	12.667	0.0290	0.25	Q	.	.	.	.
563	12.750	0.0310	0.29	Q	.	.	.	.
564	12.833	0.0332	0.32	Q	.	.	.	.
565	12.917	0.0356	0.36	Q	.	.	.	.
566	13.000	0.0383	0.39	QV	.	.	.	.
567	13.083	0.0413	0.43	QV	.	.	.	.
568	13.167	0.0446	0.47	QV	.	.	.	.
569	13.250	0.0481	0.51	QV	.	.	.	.
570	13.333	0.0519	0.56	QV	.	.	.	.
571	13.417	0.0561	0.60	QV	.	.	.	.
572	13.500	0.0606	0.65	QV	.	.	.	.
573	13.583	0.0654	0.70	QV	.	.	.	.
574	13.667	0.0705	0.75	QV	.	.	.	.
575	13.750	0.0761	0.81	.Q	.	.	.	.
576	13.833	0.0820	0.86	.QV	.	.	.	.

577	13.917	0.0884	0.92	.QV . . . .
578	14.000	0.0951	0.98	.QV . . . .
579	14.083	0.1024	1.06	.QV . . . .
580	14.167	0.1104	1.16	.QV . . . .
581	14.250	0.1194	1.31	.Q V . . . .
582	14.333	0.1293	1.43	.Q V . . . .
583	14.417	0.1399	1.55	. QV . . . .
584	14.500	0.1513	1.65	. QV . . . .
585	14.583	0.1634	1.76	. Q V . . . .
586	14.667	0.1763	1.87	. Q V . . . .
587	14.750	0.1900	1.99	. Q V . . . .
588	14.833	0.2045	2.11	. Q V . . . .
589	14.917	0.2200	2.25	. Q V . . . .
590	15.000	0.2365	2.39	. Q V . . . .
591	15.083	0.2540	2.55	. Q V . . . .
592	15.167	0.2728	2.72	. Q V . . . .
593	15.250	0.2929	2.92	. Q V . . . .
594	15.333	0.3145	3.13	. Q V . . . .
595	15.417	0.3377	3.37	. Q V . . . .
596	15.500	0.3622	3.56	. Q V. . . .
597	15.583	0.3876	3.69	. Q V . . .
598	15.667	0.4148	3.95	. Q V . . .
599	15.750	0.4451	4.40	. Q .V . . .
600	15.833	0.4799	5.05	. Q . V . . .
601	15.917	0.5220	6.11	. Q . V . . .
602	16.000	0.5739	7.55	. Q V . . .
603	16.083	0.6455	10.39	. . Q V . . .
604	16.167	0.7510	15.32	. . VQ . .
605	16.250	0.8910	20.34	. . . V Q . .
606	16.333	1.0004	15.88	. . .Q V . .
607	16.417	1.0795	11.49	. . Q . V . .
608	16.500	1.1422	9.10	. . Q . V. .
609	16.583	1.1946	7.61	. Q . .V .
610	16.667	1.2396	6.53	. Q . . V .
611	16.750	1.2783	5.62	. Q . . V .
612	16.833	1.3117	4.85	. Q . . V .
613	16.917	1.3412	4.28	. Q . . V .
614	17.000	1.3671	3.77	. Q . . V .
615	17.083	1.3900	3.32	. Q . . V .
616	17.167	1.4099	2.90	. Q . . V .
617	17.250	1.4270	2.47	. Q . . V .
618	17.333	1.4416	2.12	. Q . . V .
619	17.417	1.4542	1.83	. Q . . V .
620	17.500	1.4655	1.65	. Q . . V .
621	17.583	1.4757	1.48	.Q . . V .
622	17.667	1.4846	1.30	.Q . . V .
623	17.750	1.4923	1.11	.Q . . V .
624	17.833	1.4980	0.83	.Q . . V.
625	17.917	1.5028	0.69	Q . . V.
626	18.000	1.5068	0.58	Q . . V.
627	18.083	1.5102	0.49	Q . . V.
628	18.167	1.5129	0.39	Q . . V.
629	18.250	1.5148	0.29	Q . . V.
630	18.333	1.5163	0.22	Q . . V.
631	18.417	1.5176	0.18	Q . . V.
632	18.500	1.5185	0.14	Q . . V.
633	18.583	1.5193	0.12	Q . . V.
634	18.667	1.5200	0.10	Q . . V.
635	18.750	1.5206	0.08	Q . . V.
636	18.833	1.5210	0.07	Q . . V.
637	18.917	1.5214	0.06	Q . . V.
638	19.000	1.5218	0.05	Q . . V.
639	19.083	1.5221	0.05	Q . . V.
640	19.167	1.5224	0.04	Q . . V.

19.250	1.5227	0.04	Q	.	.	.	V.
19.333	1.5229	0.03	Q	.	.	.	V.
19.417	1.5231	0.03	Q	.	.	.	V.
19.500	1.5233	0.03	Q	.	.	.	V.
19.583	1.5235	0.03	Q	.	.	.	V.
19.667	1.5237	0.03	Q	.	.	.	V.
19.750	1.5239	0.03	Q	.	.	.	V.
19.833	1.5241	0.03	Q	.	.	.	V.
19.917	1.5243	0.03	Q	.	.	.	V.
20.000	1.5244	0.03	Q	.	.	.	V.
20.083	1.5246	0.02	Q	.	.	.	V.
20.167	1.5248	0.02	Q	.	.	.	V.
20.250	1.5249	0.02	Q	.	.	.	V.
20.333	1.5251	0.02	Q	.	.	.	V.
20.417	1.5253	0.02	Q	.	.	.	V.
20.500	1.5254	0.02	Q	.	.	.	V.
20.583	1.5256	0.02	Q	.	.	.	V.
20.667	1.5258	0.02	Q	.	.	.	V.
20.750	1.5259	0.02	Q	.	.	.	V.
20.833	1.5261	0.02	Q	.	.	.	V.
20.917	1.5262	0.02	Q	.	.	.	V.
21.000	1.5264	0.02	Q	.	.	.	V.
21.083	1.5265	0.02	Q	.	.	.	V.
21.167	1.5267	0.02	Q	.	.	.	V.
21.250	1.5268	0.02	Q	.	.	.	V.
21.333	1.5270	0.02	Q	.	.	.	V.
21.417	1.5271	0.02	Q	.	.	.	V.
21.500	1.5273	0.02	Q	.	.	.	V.
21.583	1.5274	0.02	Q	.	.	.	V.
21.667	1.5275	0.02	Q	.	.	.	V.
21.750	1.5277	0.02	Q	.	.	.	V.
21.833	1.5278	0.02	Q	.	.	.	V.
21.917	1.5280	0.02	Q	.	.	.	V.
22.000	1.5281	0.02	Q	.	.	.	V.
22.083	1.5282	0.02	Q	.	.	.	V.
22.167	1.5284	0.02	Q	.	.	.	V.
22.250	1.5285	0.02	Q	.	.	.	V.
22.333	1.5286	0.02	Q	.	.	.	V.
22.417	1.5288	0.02	Q	.	.	.	V.
22.500	1.5289	0.02	Q	.	.	.	V.
22.583	1.5290	0.02	Q	.	.	.	V.
22.667	1.5291	0.02	Q	.	.	.	V.
22.750	1.5293	0.02	Q	.	.	.	V.
22.833	1.5294	0.02	Q	.	.	.	V.
22.917	1.5295	0.02	Q	.	.	.	V.
23.000	1.5297	0.02	Q	.	.	.	V.
23.083	1.5298	0.02	Q	.	.	.	V.
23.167	1.5299	0.02	Q	.	.	.	V.
23.250	1.5300	0.02	Q	.	.	.	V.
23.333	1.5301	0.02	Q	.	.	.	V.
23.417	1.5303	0.02	Q	.	.	.	V.
23.500	1.5304	0.02	Q	.	.	.	V.
23.583	1.5305	0.02	Q	.	.	.	V.
23.667	1.5306	0.02	Q	.	.	.	V.
23.750	1.5307	0.02	Q	.	.	.	V.
23.833	1.5309	0.02	Q	.	.	.	V.
23.917	1.5310	0.02	Q	.	.	.	V.
24.000	1.5311	0.02	Q	.	.	.	V.
24.083	1.5312	0.02	Q	.	.	.	V.
24.167	1.5313	0.01	Q	.	.	.	V.
24.250	1.5314	0.01	Q	.	.	.	V.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have

an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1455.0
10%	155.0
20%	75.0
30%	50.0
40%	30.0
50%	25.0
60%	15.0
70%	15.0
80%	5.0
90%	5.0

END OF FLOODSCx ROUTING ANALYSIS

FLO2-D CALCULATION OUTPUT FOR CROSS-SECTION A

CROSSMAX.txt

THE MAXIMUM DISCHARGE FROM CROSS SECTION A IS: 86.88 CFS AT TIME: 29.16 HOURS

THE MAXIMUM DISCHARGE FROM NODE 114391 IS: 1.31 CFS AT TIME 30.62 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.15 AF

THE MAXIMUM DISCHARGE FROM NODE 115175 IS: 1.22 CFS AT TIME 28.80 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.25 AF

THE MAXIMUM DISCHARGE FROM NODE 115958 IS: 1.01 CFS AT TIME 32.22 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.54 AF

THE MAXIMUM DISCHARGE FROM NODE 116733 IS: 1.74 CFS AT TIME 29.08 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.17 FEET AND A MAXIMUM VOLUME OF: 1.11 AF

THE MAXIMUM DISCHARGE FROM NODE 117504 IS: 2.29 CFS AT TIME 29.14 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.17 FEET AND A MAXIMUM VOLUME OF: 1.46 AF

THE MAXIMUM DISCHARGE FROM NODE 118274 IS: 1.71 CFS AT TIME 29.29 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.13 FEET AND A MAXIMUM VOLUME OF: 1.12 AF

THE MAXIMUM DISCHARGE FROM NODE 119042 IS: 1.43 CFS AT TIME 29.51 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.11 FEET AND A MAXIMUM VOLUME OF: 1.00 AF

THE MAXIMUM DISCHARGE FROM NODE 119808 IS: 1.55 CFS AT TIME 29.57 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.12 FEET AND A MAXIMUM VOLUME OF: 1.11 AF

THE MAXIMUM DISCHARGE FROM NODE 120569 IS: 2.11 CFS AT TIME 29.52 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.15 FEET AND A MAXIMUM VOLUME OF: 1.50 AF

THE MAXIMUM DISCHARGE FROM NODE 121327 IS: 2.68 CFS AT TIME 29.48 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.17 FEET AND A MAXIMUM VOLUME OF: 1.91 AF

THE MAXIMUM DISCHARGE FROM NODE 122084 IS: 5.29 CFS AT TIME 29.06 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.21 FEET AND A MAXIMUM VOLUME OF: 3.28 AF

THE MAXIMUM DISCHARGE FROM NODE 122839 IS: 12.35 CFS AT TIME 29.06 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.30 FEET AND A MAXIMUM VOLUME OF: 7.77 AF

THE MAXIMUM DISCHARGE FROM NODE 123593 IS: 17.83 CFS AT TIME 29.26 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.37 FEET AND A MAXIMUM VOLUME OF: 13.09 AF

THE MAXIMUM DISCHARGE FROM NODE 124345 IS: 15.42 CFS AT TIME 29.29 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.33 FEET AND A MAXIMUM VOLUME OF: 11.21 AF

THE MAXIMUM DISCHARGE FROM NODE 125097 IS: 10.55 CFS AT TIME 28.99 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.28 FEET AND A MAXIMUM VOLUME OF: 6.72 AF

THE MAXIMUM DISCHARGE FROM NODE 125848 IS: 4.42 CFS AT TIME 29.13 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.22 FEET AND A MAXIMUM VOLUME OF: 2.92 AF

THE MAXIMUM DISCHARGE FROM NODE 126597 IS: 4.32 CFS AT TIME 29.13 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.27 FEET AND A MAXIMUM VOLUME OF: 2.70 AF

THE MAXIMUM DISCHARGE FROM CROSS SECTION B IS: 52.82 CFS AT TIME: 27.44 HOURS

THE MAXIMUM DISCHARGE FROM NODE 64628 IS: 0.00 CFS AT TIME 0.00 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.00 AF

THE MAXIMUM DISCHARGE FROM NODE 65681 IS: 0.00 CFS AT TIME 0.00 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.08 FEET AND A MAXIMUM VOLUME OF: 0.00 AF

THE MAXIMUM DISCHARGE FROM NODE 66734 IS: 0.00 CFS AT TIME 0.00 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.07 FEET AND A MAXIMUM VOLUME OF: 0.00 AF

THE MAXIMUM DISCHARGE FROM NODE 67786 IS: 0.00 CFS AT TIME 0.00 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.07 FEET AND A MAXIMUM VOLUME OF: 0.00 AF

THE MAXIMUM DISCHARGE FROM NODE 68838 IS: 1.83 CFS AT TIME 29.32 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.46 AF

THE MAXIMUM DISCHARGE FROM NODE 69890 IS: 2.25 CFS AT TIME 28.13 HOURS

WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.22 AF

THE MAXIMUM DISCHARGE FROM NODE 70941 IS: 2.39 CFS AT TIME 27.83 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.02 AF

THE MAXIMUM DISCHARGE FROM NODE 71992 IS: 0.00 CFS AT TIME 0.00 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.08 FEET AND A MAXIMUM VOLUME OF:
0.00 AF

THE MAXIMUM DISCHARGE FROM NODE 73043 IS: 0.00 CFS AT TIME 0.00 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.09 FEET AND A MAXIMUM VOLUME OF:
0.00 AF

THE MAXIMUM DISCHARGE FROM NODE 74093 IS: 1.96 CFS AT TIME 32.41 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.01 AF

THE MAXIMUM DISCHARGE FROM NODE 75142 IS: 1.79 CFS AT TIME 26.79 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.09 AF

THE MAXIMUM DISCHARGE FROM NODE 76190 IS: 1.79 CFS AT TIME 30.07 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.24 AF

THE MAXIMUM DISCHARGE FROM NODE 77237 IS: 1.69 CFS AT TIME 28.21 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.44 AF

THE MAXIMUM DISCHARGE FROM NODE 78284 IS: 1.57 CFS AT TIME 27.44 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.62 AF

THE MAXIMUM DISCHARGE FROM NODE 79330 IS: 1.50 CFS AT TIME 27.93 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.79 AF

THE MAXIMUM DISCHARGE FROM NODE 80375 IS: 1.48 CFS AT TIME 24.03 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
1.03 AF

THE MAXIMUM DISCHARGE FROM NODE 81420 IS: 1.75 CFS AT TIME 26.86 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.11 FEET AND A MAXIMUM VOLUME OF:
1.19 AF

THE MAXIMUM DISCHARGE FROM NODE 82461 IS: 1.76 CFS AT TIME 27.04 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.11 FEET AND A MAXIMUM VOLUME OF:

1.17 AF

THE MAXIMUM DISCHARGE FROM NODE 83492 IS: 1.78 CFS AT TIME 27.06 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.11 FEET AND A MAXIMUM VOLUME OF:
1.17 AF

THE MAXIMUM DISCHARGE FROM NODE 84514 IS: 2.02 CFS AT TIME 27.10 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.12 FEET AND A MAXIMUM VOLUME OF:
1.27 AF

THE MAXIMUM DISCHARGE FROM NODE 85527 IS: 1.83 CFS AT TIME 27.13 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.12 FEET AND A MAXIMUM VOLUME OF:
1.13 AF

THE MAXIMUM DISCHARGE FROM NODE 86532 IS: 1.61 CFS AT TIME 27.06 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.11 FEET AND A MAXIMUM VOLUME OF:
0.99 AF

THE MAXIMUM DISCHARGE FROM NODE 87528 IS: 1.56 CFS AT TIME 26.90 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.13 FEET AND A MAXIMUM VOLUME OF:
0.96 AF

THE MAXIMUM DISCHARGE FROM NODE 88516 IS: 1.63 CFS AT TIME 26.67 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.13 FEET AND A MAXIMUM VOLUME OF:
0.98 AF

THE MAXIMUM DISCHARGE FROM NODE 89494 IS: 1.42 CFS AT TIME 29.10 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.54 AF

THE MAXIMUM DISCHARGE FROM NODE 90460 IS: 1.39 CFS AT TIME 33.21 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.37 AF

THE MAXIMUM DISCHARGE FROM NODE 91410 IS: 1.50 CFS AT TIME 29.56 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.09 AF

THE MAXIMUM DISCHARGE FROM NODE 92350 IS: 1.50 CFS AT TIME 30.43 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.07 AF

THE MAXIMUM DISCHARGE FROM NODE 93282 IS: 1.46 CFS AT TIME 27.66 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.08 AF

THE MAXIMUM DISCHARGE FROM NODE 94208 IS: 1.26 CFS AT TIME 29.62 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.15 AF

THE MAXIMUM DISCHARGE FROM NODE 95129 IS: 1.36 CFS AT TIME 30.49 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.12 AF

THE MAXIMUM DISCHARGE FROM NODE 96035 IS: 1.45 CFS AT TIME 29.53 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.09 AF

THE MAXIMUM DISCHARGE FROM NODE 96933 IS: 1.54 CFS AT TIME 28.66 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.07 AF

THE MAXIMUM DISCHARGE FROM NODE 97823 IS: 1.57 CFS AT TIME 34.02 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.05 AF

THE MAXIMUM DISCHARGE FROM NODE 98703 IS: 1.42 CFS AT TIME 35.58 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.07 AF

THE MAXIMUM DISCHARGE FROM NODE 99579 IS: 1.44 CFS AT TIME 29.68 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.12 AF

THE MAXIMUM DISCHARGE FROM NODE 100447 IS: 1.44 CFS AT TIME 27.43 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.19 AF

THE MAXIMUM DISCHARGE FROM NODE 101308 IS: 1.31 CFS AT TIME 28.72 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.57 AF

THE MAXIMUM DISCHARGE FROM NODE 102164 IS: 1.29 CFS AT TIME 27.60 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.72 AF

THE MAXIMUM DISCHARGE FROM NODE 103013 IS: 1.38 CFS AT TIME 29.88 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.67 AF

THE MAXIMUM DISCHARGE FROM NODE 103858 IS: 1.42 CFS AT TIME 27.62 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.64 AF

THE MAXIMUM DISCHARGE FROM NODE 104700 IS: 1.47 CFS AT TIME 29.61 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.55 AF

THE MAXIMUM DISCHARGE FROM NODE 105539 IS: 1.42 CFS AT TIME 29.03 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.76 AF

THE MAXIMUM DISCHARGE FROM NODE 106372 IS: 1.58 CFS AT TIME 27.96 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.11 FEET AND A MAXIMUM VOLUME OF: 0.89 AF

THE MAXIMUM DISCHARGE FROM NODE 107194 IS: 1.78 CFS AT TIME 27.92 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.13 FEET AND A MAXIMUM VOLUME OF: 1.03 AF

THE MAXIMUM DISCHARGE FROM NODE 108013 IS: 1.72 CFS AT TIME 27.93 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.13 FEET AND A MAXIMUM VOLUME OF: 1.01 AF

THE MAXIMUM DISCHARGE FROM NODE 108824 IS: 1.33 CFS AT TIME 27.34 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.77 AF

THE MAXIMUM DISCHARGE FROM NODE 109631 IS: 1.23 CFS AT TIME 27.73 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.76 AF

THE MAXIMUM DISCHARGE FROM NODE 110435 IS: 1.35 CFS AT TIME 27.79 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.11 FEET AND A MAXIMUM VOLUME OF: 0.80 AF

THE MAXIMUM DISCHARGE FROM NODE 111231 IS: 1.11 CFS AT TIME 27.74 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.62 AF

THE MAXIMUM DISCHARGE FROM NODE 112019 IS: 1.49 CFS AT TIME 28.50 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.28 AF

THE MAXIMUM DISCHARGE FROM NODE 112805 IS: 1.70 CFS AT TIME 29.26 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.11 AF

THE MAXIMUM DISCHARGE FROM NODE 113590 IS: 1.52 CFS AT TIME 27.24 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.15 AF

THE MAXIMUM DISCHARGE FROM NODE 114374 IS: 1.53 CFS AT TIME 29.15 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.12 AF

THE MAXIMUM DISCHARGE FROM CROSS SECTION C IS: 298.44 CFS AT TIME: 29.36 HOURS

THE MAXIMUM DISCHARGE FROM NODE 64655 IS: 1.28 CFS AT TIME 35.29 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.27 AF

THE MAXIMUM DISCHARGE FROM NODE 65708 IS: 1.23 CFS AT TIME 33.06 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.17 AF

THE MAXIMUM DISCHARGE FROM NODE 66761 IS: 1.33 CFS AT TIME 28.68 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.04 AF

THE MAXIMUM DISCHARGE FROM NODE 67813 IS: 1.28 CFS AT TIME 37.68 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.03 AF

THE MAXIMUM DISCHARGE FROM NODE 68865 IS: 1.37 CFS AT TIME 30.72 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.01 AF

THE MAXIMUM DISCHARGE FROM NODE 69917 IS: 1.49 CFS AT TIME 31.45 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.00 AF

THE MAXIMUM DISCHARGE FROM NODE 70968 IS: 1.40 CFS AT TIME 23.74 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.00 AF

THE MAXIMUM DISCHARGE FROM NODE 72019 IS: 1.44 CFS AT TIME 29.59 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.01 AF

THE MAXIMUM DISCHARGE FROM NODE 73070 IS: 1.28 CFS AT TIME 27.85 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.02 AF

THE MAXIMUM DISCHARGE FROM NODE 74120 IS: 1.30 CFS AT TIME 26.28 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.02 AF

THE MAXIMUM DISCHARGE FROM NODE 75169 IS: 1.31 CFS AT TIME 28.37 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.02 AF

THE MAXIMUM DISCHARGE FROM NODE 76217 IS: 1.32 CFS AT TIME 27.69 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:

0.03 AF

THE MAXIMUM DISCHARGE FROM NODE 77264 IS: 1.39 CFS AT TIME 25.86 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.04 AF

THE MAXIMUM DISCHARGE FROM NODE 78311 IS: 1.34 CFS AT TIME 30.79 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.08 AF

THE MAXIMUM DISCHARGE FROM NODE 79357 IS: 1.37 CFS AT TIME 27.40 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.10 AF

THE MAXIMUM DISCHARGE FROM NODE 80402 IS: 1.32 CFS AT TIME 26.53 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.16 AF

THE MAXIMUM DISCHARGE FROM NODE 81447 IS: 1.32 CFS AT TIME 27.11 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.22 AF

THE MAXIMUM DISCHARGE FROM NODE 82488 IS: 1.24 CFS AT TIME 29.32 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.31 AF

THE MAXIMUM DISCHARGE FROM NODE 83519 IS: 1.23 CFS AT TIME 28.15 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.39 AF

THE MAXIMUM DISCHARGE FROM NODE 84541 IS: 1.21 CFS AT TIME 30.06 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.47 AF

THE MAXIMUM DISCHARGE FROM NODE 85554 IS: 1.46 CFS AT TIME 24.00 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.14 FEET AND A MAXIMUM VOLUME OF:
0.93 AF

THE MAXIMUM DISCHARGE FROM NODE 86559 IS: 1.34 CFS AT TIME 24.02 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.11 FEET AND A MAXIMUM VOLUME OF:
0.91 AF

THE MAXIMUM DISCHARGE FROM NODE 87555 IS: 1.57 CFS AT TIME 24.12 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.12 FEET AND A MAXIMUM VOLUME OF:
1.19 AF

THE MAXIMUM DISCHARGE FROM NODE 88543 IS: 2.95 CFS AT TIME 28.33 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.20 FEET AND A MAXIMUM VOLUME OF:
2.20 AF

THE MAXIMUM DISCHARGE FROM NODE 89521 IS: 2.66 CFS AT TIME 28.39 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.17 FEET AND A MAXIMUM VOLUME OF: 1.92 AF

THE MAXIMUM DISCHARGE FROM NODE 90487 IS: 2.55 CFS AT TIME 28.73 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.17 FEET AND A MAXIMUM VOLUME OF: 1.88 AF

THE MAXIMUM DISCHARGE FROM NODE 91437 IS: 2.09 CFS AT TIME 28.71 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.14 FEET AND A MAXIMUM VOLUME OF: 1.55 AF

THE MAXIMUM DISCHARGE FROM NODE 92377 IS: 1.85 CFS AT TIME 28.58 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.14 FEET AND A MAXIMUM VOLUME OF: 1.43 AF

THE MAXIMUM DISCHARGE FROM NODE 93309 IS: 1.27 CFS AT TIME 31.39 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.57 AF

THE MAXIMUM DISCHARGE FROM NODE 94235 IS: 1.43 CFS AT TIME 28.85 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.16 AF

THE MAXIMUM DISCHARGE FROM NODE 95156 IS: 1.36 CFS AT TIME 28.67 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.12 AF

THE MAXIMUM DISCHARGE FROM NODE 96062 IS: 1.29 CFS AT TIME 28.24 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.13 AF

THE MAXIMUM DISCHARGE FROM NODE 96960 IS: 1.39 CFS AT TIME 33.96 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.06 AF

THE MAXIMUM DISCHARGE FROM NODE 97850 IS: 1.40 CFS AT TIME 31.57 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.05 AF

THE MAXIMUM DISCHARGE FROM NODE 98730 IS: 1.36 CFS AT TIME 30.72 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.03 AF

THE MAXIMUM DISCHARGE FROM NODE 99606 IS: 1.24 CFS AT TIME 33.79 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.07 AF

THE MAXIMUM DISCHARGE FROM NODE 100474 IS: 1.27 CFS AT TIME 35.53 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.10 AF

THE MAXIMUM DISCHARGE FROM NODE 101335 IS: 1.35 CFS AT TIME 33.46 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.11 AF

THE MAXIMUM DISCHARGE FROM NODE 102191 IS: 1.38 CFS AT TIME 33.79 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.15 AF

THE MAXIMUM DISCHARGE FROM NODE 103040 IS: 1.33 CFS AT TIME 34.18 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.22 AF

THE MAXIMUM DISCHARGE FROM NODE 103885 IS: 1.26 CFS AT TIME 27.87 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.36 AF

THE MAXIMUM DISCHARGE FROM NODE 104727 IS: 1.31 CFS AT TIME 30.53 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.43 AF

THE MAXIMUM DISCHARGE FROM NODE 105566 IS: 1.31 CFS AT TIME 27.97 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.55 AF

THE MAXIMUM DISCHARGE FROM NODE 106399 IS: 1.27 CFS AT TIME 28.97 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.65 AF

THE MAXIMUM DISCHARGE FROM NODE 107221 IS: 1.34 CFS AT TIME 28.68 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.52 AF

THE MAXIMUM DISCHARGE FROM NODE 108040 IS: 1.33 CFS AT TIME 29.17 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.44 AF

THE MAXIMUM DISCHARGE FROM NODE 108851 IS: 1.26 CFS AT TIME 29.95 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.50 AF

THE MAXIMUM DISCHARGE FROM NODE 109658 IS: 1.31 CFS AT TIME 30.68 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.37 AF

THE MAXIMUM DISCHARGE FROM NODE 110462 IS: 1.22 CFS AT TIME 27.82 HOURS

WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.38 AF

THE MAXIMUM DISCHARGE FROM NODE 111258 IS: 1.25 CFS AT TIME 33.62 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.29 AF

THE MAXIMUM DISCHARGE FROM NODE 112046 IS: 1.21 CFS AT TIME 28.69 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.25 AF

THE MAXIMUM DISCHARGE FROM NODE 112832 IS: 1.25 CFS AT TIME 28.61 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.21 AF

THE MAXIMUM DISCHARGE FROM NODE 113617 IS: 1.28 CFS AT TIME 28.17 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.21 AF

THE MAXIMUM DISCHARGE FROM NODE 114401 IS: 1.27 CFS AT TIME 33.61 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.26 AF

THE MAXIMUM DISCHARGE FROM NODE 115185 IS: 1.26 CFS AT TIME 28.94 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.29 AF

THE MAXIMUM DISCHARGE FROM NODE 115968 IS: 1.40 CFS AT TIME 30.60 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.30 AF

THE MAXIMUM DISCHARGE FROM NODE 116743 IS: 1.42 CFS AT TIME 28.28 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.60 AF

THE MAXIMUM DISCHARGE FROM NODE 117514 IS: 1.54 CFS AT TIME 29.84 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.51 AF

THE MAXIMUM DISCHARGE FROM NODE 118284 IS: 1.34 CFS AT TIME 29.98 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.92 AF

THE MAXIMUM DISCHARGE FROM NODE 119052 IS: 1.37 CFS AT TIME 30.22 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:
0.53 AF

THE MAXIMUM DISCHARGE FROM NODE 119818 IS: 1.51 CFS AT TIME 30.32 HOURS
WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.13 FEET AND A MAXIMUM VOLUME OF:

1.06 AF

THE MAXIMUM DISCHARGE FROM NODE 120579 IS: 1.17 CFS AT TIME 31.94 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.70 AF

THE MAXIMUM DISCHARGE FROM NODE 121337 IS: 1.11 CFS AT TIME 32.20 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.63 AF

THE MAXIMUM DISCHARGE FROM NODE 122094 IS: 1.02 CFS AT TIME 31.00 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.48 AF

THE MAXIMUM DISCHARGE FROM NODE 122849 IS: 0.87 CFS AT TIME 30.36 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.52 AF

THE MAXIMUM DISCHARGE FROM NODE 123603 IS: 1.03 CFS AT TIME 29.55 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.22 AF

THE MAXIMUM DISCHARGE FROM NODE 124355 IS: 0.70 CFS AT TIME 32.05 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.25 AF

THE MAXIMUM DISCHARGE FROM NODE 125107 IS: 0.61 CFS AT TIME 29.88 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.22 AF

THE MAXIMUM DISCHARGE FROM NODE 125858 IS: 1.09 CFS AT TIME 29.85 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.20 FEET AND A MAXIMUM VOLUME OF: 0.40 AF

THE MAXIMUM DISCHARGE FROM NODE 126607 IS: 7.47 CFS AT TIME 29.70 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.42 FEET AND A MAXIMUM VOLUME OF: 3.44 AF

THE MAXIMUM DISCHARGE FROM NODE 127355 IS: 15.40 CFS AT TIME 29.72 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.65 FEET AND A MAXIMUM VOLUME OF: 10.52 AF

THE MAXIMUM DISCHARGE FROM NODE 128103 IS: 22.96 CFS AT TIME 29.76 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.72 FEET AND A MAXIMUM VOLUME OF: 18.33 AF

THE MAXIMUM DISCHARGE FROM NODE 128849 IS: 20.54 CFS AT TIME 31.79 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.62 FEET AND A MAXIMUM VOLUME OF: 16.66 AF

THE MAXIMUM DISCHARGE FROM NODE 129591 IS: 12.23 CFS AT TIME 29.83 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.35 FEET AND A MAXIMUM VOLUME OF: 6.18 AF

THE MAXIMUM DISCHARGE FROM NODE 130330 IS: 2.65 CFS AT TIME 30.04 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.18 FEET AND A MAXIMUM VOLUME OF: 1.05 AF

THE MAXIMUM DISCHARGE FROM NODE 131065 IS: 1.26 CFS AT TIME 30.25 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.11 FEET AND A MAXIMUM VOLUME OF: 0.67 AF

THE MAXIMUM DISCHARGE FROM NODE 131795 IS: 1.15 CFS AT TIME 35.61 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.61 AF

THE MAXIMUM DISCHARGE FROM NODE 132522 IS: 1.35 CFS AT TIME 30.35 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.12 FEET AND A MAXIMUM VOLUME OF: 0.75 AF

THE MAXIMUM DISCHARGE FROM NODE 133248 IS: 2.79 CFS AT TIME 30.16 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.20 FEET AND A MAXIMUM VOLUME OF: 1.36 AF

THE MAXIMUM DISCHARGE FROM NODE 133973 IS: 7.60 CFS AT TIME 30.09 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.26 FEET AND A MAXIMUM VOLUME OF: 4.09 AF

THE MAXIMUM DISCHARGE FROM NODE 134698 IS: 13.84 CFS AT TIME 29.62 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.35 FEET AND A MAXIMUM VOLUME OF: 8.96 AF

THE MAXIMUM DISCHARGE FROM NODE 135422 IS: 20.85 CFS AT TIME 29.33 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.46 FEET AND A MAXIMUM VOLUME OF: 15.68 AF

THE MAXIMUM DISCHARGE FROM NODE 136144 IS: 24.00 CFS AT TIME 29.33 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.48 FEET AND A MAXIMUM VOLUME OF: 18.81 AF

THE MAXIMUM DISCHARGE FROM NODE 136861 IS: 25.45 CFS AT TIME 29.33 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.51 FEET AND A MAXIMUM VOLUME OF: 20.19 AF

THE MAXIMUM DISCHARGE FROM NODE 137573 IS: 22.46 CFS AT TIME 29.34 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.45 FEET AND A MAXIMUM VOLUME OF: 16.89 AF

THE MAXIMUM DISCHARGE FROM NODE 138280 IS: 17.01 CFS AT TIME 29.36 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.38 FEET AND A MAXIMUM VOLUME OF: 11.55 AF

THE MAXIMUM DISCHARGE FROM NODE 138981 IS: 12.34 CFS AT TIME 29.37 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.34 FEET AND A MAXIMUM VOLUME OF: 7.39 AF

THE MAXIMUM DISCHARGE FROM NODE 139677 IS: 5.22 CFS AT TIME 29.46 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.27 FEET AND A MAXIMUM VOLUME OF: 3.03 AF

THE MAXIMUM DISCHARGE FROM NODE 140368 IS: 3.41 CFS AT TIME 29.63 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.22 FEET AND A MAXIMUM VOLUME OF: 1.92 AF

THE MAXIMUM DISCHARGE FROM NODE 141054 IS: 2.41 CFS AT TIME 29.87 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.20 FEET AND A MAXIMUM VOLUME OF: 1.39 AF

THE MAXIMUM DISCHARGE FROM NODE 141734 IS: 1.54 CFS AT TIME 29.99 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.15 FEET AND A MAXIMUM VOLUME OF: 0.98 AF

THE MAXIMUM DISCHARGE FROM NODE 142409 IS: 0.89 CFS AT TIME 29.99 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.12 FEET AND A MAXIMUM VOLUME OF: 0.58 AF

THE MAXIMUM DISCHARGE FROM NODE 143079 IS: 0.66 CFS AT TIME 19.81 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.22 AF

THE MAXIMUM DISCHARGE FROM NODE 143744 IS: 0.70 CFS AT TIME 31.18 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.07 AF

THE MAXIMUM DISCHARGE FROM NODE 144403 IS: 1.03 CFS AT TIME 31.53 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.03 AF

THE MAXIMUM DISCHARGE FROM CROSS SECTION D IS: 28190.07 CFS AT TIME: 10.78 HOURS

THE MAXIMUM DISCHARGE FROM NODE 65998 IS: 3.18 CFS AT TIME 13.97 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.15 AF

THE MAXIMUM DISCHARGE FROM NODE 67050 IS: 3.22 CFS AT TIME 18.17 HOURS

WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.15 AF

THE MAXIMUM DISCHARGE FROM NODE 68102 IS: 134.50 CFS AT TIME 10.79 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.68 FEET AND A MAXIMUM VOLUME OF: 5.96 AF

THE MAXIMUM DISCHARGE FROM NODE 69154 IS: 3686.07 CFS AT TIME 10.77 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 3.36 FEET AND A MAXIMUM VOLUME OF: 929.72 AF

THE MAXIMUM DISCHARGE FROM NODE 70205 IS: 4082.12 CFS AT TIME 10.77 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 2.57 FEET AND A MAXIMUM VOLUME OF: 906.10 AF

THE MAXIMUM DISCHARGE FROM NODE 71256 IS: 4958.18 CFS AT TIME 10.78 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 2.92 FEET AND A MAXIMUM VOLUME OF: 1179.69 AF

THE MAXIMUM DISCHARGE FROM NODE 72307 IS: 4926.50 CFS AT TIME 10.78 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 2.82 FEET AND A MAXIMUM VOLUME OF: 928.82 AF

THE MAXIMUM DISCHARGE FROM NODE 73357 IS: 5544.41 CFS AT TIME 10.78 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 3.10 FEET AND A MAXIMUM VOLUME OF: 788.45 AF

THE MAXIMUM DISCHARGE FROM NODE 74406 IS: 4859.37 CFS AT TIME 10.78 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 4.10 FEET AND A MAXIMUM VOLUME OF: 810.73 AF

THE MAXIMUM DISCHARGE FROM NODE 75454 IS: 2.91 CFS AT TIME 23.40 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.06 AF

THE MAXIMUM DISCHARGE FROM NODE 76501 IS: 3.34 CFS AT TIME 19.79 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.29 AF

THE MAXIMUM DISCHARGE FROM NODE 77548 IS: 3.75 CFS AT TIME 19.79 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.32 AF

THE MAXIMUM DISCHARGE FROM NODE 78594 IS: 3.58 CFS AT TIME 19.81 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF: 0.42 AF

THE MAXIMUM DISCHARGE FROM NODE 79639 IS: 3.56 CFS AT TIME 19.81 HOURS WITH A MAXIMUM FLOODPLAIN DEPTH OF: 0.10 FEET AND A MAXIMUM VOLUME OF:

0.60 AF

Appendix D – Hydrologic Data Sources (Hangar 80 Expansion)

Figure ADD-1
Antecedent Moisture Condition (AMC)

5-day Rainfall - NOAA Atlas 14
(50% of Total Rainfall Prior to Peak)*

*1/2 (11-day - 1-day) =
1/2 (([10-day] + (1/10 ([20-day] - [10-day]))) - [1-day])

5 0 5 10 15
Miles

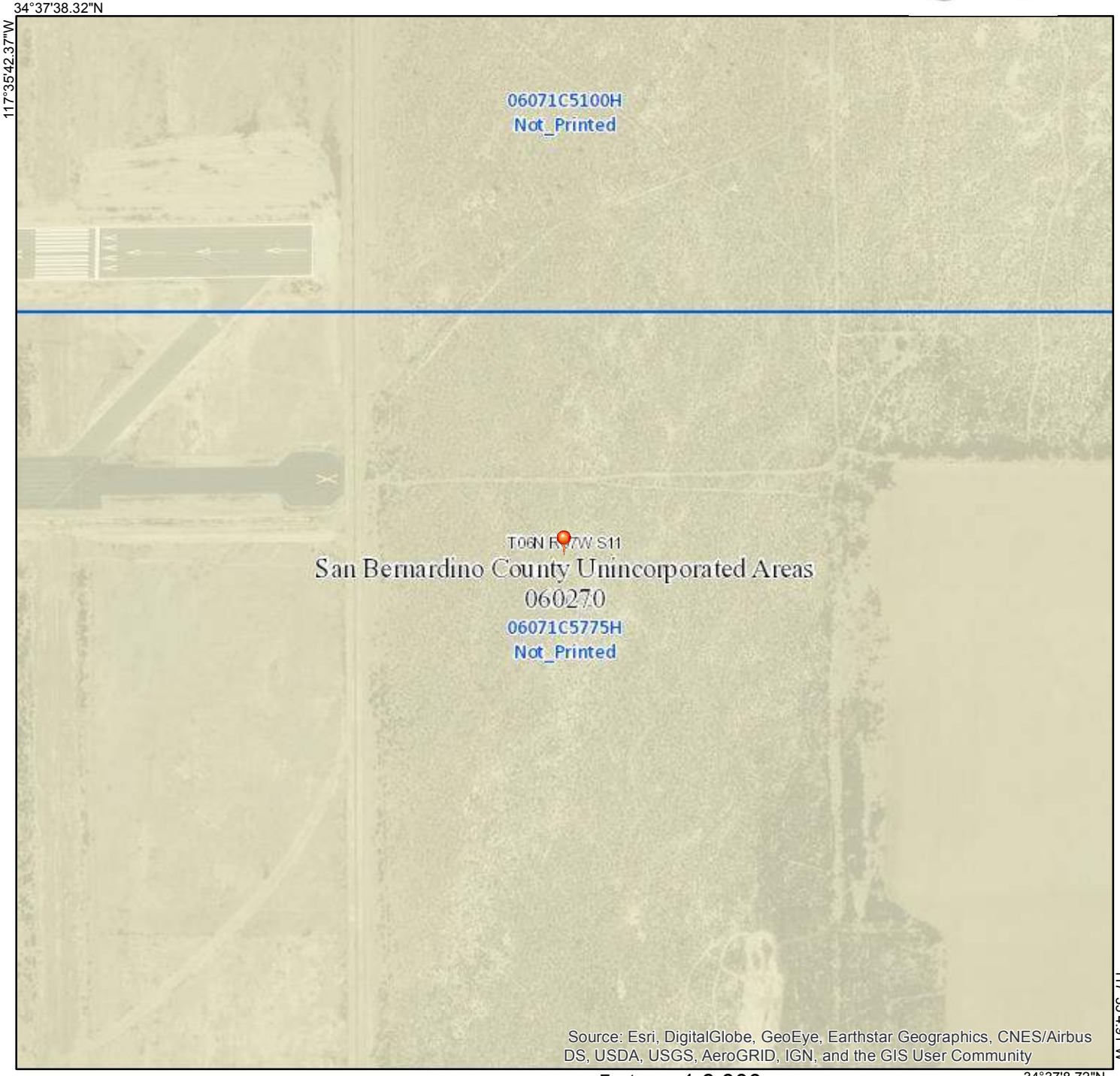
N
W E
S

Growing Season
- AMC I
- AMC II
- AMC III

Barstow
Ridgecrest
Boron
Adelanto
Victorville
Apple Valley
Hesperia
Wrightwood
Crestline
Lake Arrowhead
Running Springs
Big Bear City
Big Bear Lake
Yucca Valley
Morongo Valley
Joshua Tree
Twentynine Palms
Needles
Havasu Lake
Big River
Claremont
STATE HWY 395
STATE HWY 247
STATE HWY 62
I-15
I-40

National Flood Hazard Layer FIRMette

FEMA



Legend

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

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

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

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

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

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

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

N

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/17/2018 at 2:42:27 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

Definitions of FEMA Flood Zone Designations

Flood zones are geographic areas that the FEMA has defined according to varying levels of flood risk. These zones are depicted on a community's Flood Insurance Rate Map (FIRM) or Flood Hazard Boundary Map. Each zone reflects the severity or type of flooding in the area.

Moderate to Low Risk Areas

In communities that participate in the NFIP, flood insurance is available to all property owners and renters in these zones:

ZONE	DESCRIPTION
B and X (shaded)	Area of moderate flood hazard, usually the area between the limits of the 100-year and 500-year floods. B Zones are also used to designate base floodplains of lesser hazards, such as areas protected by levees from 100-year flood, or shallow flooding areas with average depths of less than one foot or drainage areas less than 1 square mile.
C and X (unshaded)	Area of minimal flood hazard, usually depicted on FIRMs as above the 500-year flood level. Zone C may have ponding and local drainage problems that don't warrant a detailed study or designation as base floodplain. Zone X is the area determined to be outside the 500-year flood and protected by levee from 100-year flood.

High Risk Areas

In communities that participate in the NFIP, mandatory flood insurance purchase requirements apply to all of these zones:

ZONE	DESCRIPTION
A	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.
AE	The base floodplain where base flood elevations are provided. AE Zones are now used on new format FIRMs instead of A1-A30 Zones.
A1-30	These are known as numbered A Zones (e.g., A7 or A14). This is the base floodplain where the FIRM shows a BFE (old format).
AH	Areas with a 1% annual chance of shallow flooding, usually in the form of a pond, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.
AO	River or stream flood hazard areas, and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones.
AR	Areas with a temporarily increased flood risk due to the building or restoration of a flood control system (such as a levee or a dam). Mandatory flood insurance purchase requirements will apply, but rates will not exceed the rates for unnumbered A zones if the structure is built or restored in compliance with Zone AR floodplain management regulations.
A99	Areas with a 1% annual chance of flooding that will be protected by a Federal flood control system where construction has reached specified legal requirements. No depths or base flood elevations are shown within these zones.

High Risk - Coastal Areas

In communities that participate in the NFIP, mandatory flood insurance purchase requirements apply to all of these zones.

ZONE	DESCRIPTION
V	Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. These areas have a 26% chance of flooding over the life of a 30-year mortgage. No base flood elevations are shown within these zones.
VE, V1 - 30	Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.

Undetermined Risk Areas

ZONE	DESCRIPTION
D	Areas with possible but undetermined flood hazards. No flood hazard analysis has been conducted. Flood insurance rates are commensurate with the uncertainty of the flood risk.

From FEMA Map Service Center:
http://msc.fema.gov/webapp/wcs/stores/servlet/info?storeId=10001&catalogId=10001&langId=-1&content=floodZones&title=FEMA%20Flood%20Zone%20Designations

NOAA Atlas 14, Volume 6, Version 2
Location name: Adelanto, California, USA*
Latitude: 34.6163°, Longitude: -117.6015°
Elevation: 2872.71 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.055** (0.045-0.067)	**0.075** (0.061-0.091)	**0.102** (0.084-0.125)	**0.125** (0.102-0.155)	**0.159** (0.125-0.204)	**0.186** (0.144-0.243)	**0.215** (0.162-0.288)	**0.246** (0.180-0.338)	**0.289** (0.204-0.415)	**0.325** (0.221-0.482)
10-min	**0.078** (0.065-0.096)	**0.107** (0.088-0.131)	**0.146** (0.120-0.180)	**0.180** (0.147-0.223)	**0.228** (0.180-0.292)	**0.267** (0.206-0.349)	**0.308** (0.232-0.413)	**0.352** (0.258-0.485)	**0.415** (0.292-0.595)	**0.465** (0.316-0.691)
15-min	**0.095** (0.078-0.116)	**0.129** (0.107-0.158)	**0.177** (0.145-0.217)	**0.217** (0.177-0.269)	**0.276** (0.217-0.353)	**0.323** (0.249-0.422)	**0.373** (0.281-0.499)	**0.426** (0.312-0.587)	**0.502** (0.353-0.720)	**0.563** (0.383-0.836)
30-min	**0.135** (0.111-0.165)	**0.184** (0.152-0.225)	**0.251** (0.207-0.309)	**0.309** (0.252-0.383)	**0.392** (0.309-0.502)	**0.459** (0.354-0.600)	**0.530** (0.399-0.709)	**0.606** (0.444-0.834)	**0.713** (0.502-1.02)	**0.800** (0.544-1.19)
60-min	**0.187** (0.154-0.229)	**0.255** (0.210-0.312)	**0.348** (0.286-0.428)	**0.428** (0.349-0.530)	**0.543** (0.428-0.695)	**0.635** (0.491-0.831)	**0.734** (0.553-0.983)	**0.839** (0.615-1.16)	**0.988** (0.695-1.42)	**1.11** (0.753-1.65)
2-hr	**0.270** (0.223-0.331)	**0.368** (0.303-0.450)	**0.502** (0.413-0.617)	**0.617** (0.503-0.764)	**0.781** (0.617-1.00)	**0.914** (0.706-1.20)	**1.06** (0.795-1.41)	**1.21** (0.884-1.66)	**1.42** (0.997-2.03)	**1.59** (1.08-2.36)
3-hr	**0.335** (0.277-0.410)	**0.456** (0.376-0.559)	**0.622** (0.512-0.764)	**0.764** (0.624-0.947)	**0.967** (0.763-1.24)	**1.13** (0.874-1.48)	**1.30** (0.984-1.75)	**1.49** (1.09-2.05)	**1.75** (1.23-2.51)	**1.96** (1.33-2.91)
6-hr	**0.477** (0.394-0.584)	**0.649** (0.535-0.795)	**0.885** (0.728-1.09)	**1.09** (0.886-1.35)	**1.37** (1.08-1.76)	**1.60** (1.24-2.09)	**1.84** (1.39-2.47)	**2.10** (1.54-2.90)	**2.47** (1.74-3.54)	**2.76** (1.88-4.10)
12-hr	**0.643** (0.531-0.786)	**0.880** (0.726-1.08)	**1.21** (0.991-1.48)	**1.48** (1.21-1.83)	**1.86** (1.47-2.39)	**2.17** (1.68-2.84)	**2.50** (1.88-3.34)	**2.84** (2.08-3.91)	**3.32** (2.33-4.76)	**3.70** (2.51-5.49)
24-hr	**0.882** (0.782-1.01)	**1.22** (1.08-1.40)	**1.68** (1.48-1.94)	**2.06** (1.80-2.40)	**2.59** (2.19-3.12)	**3.01** (2.50-3.70)	**3.45** (2.80-4.35)	**3.92** (3.08-5.07)	**4.56** (3.45-6.16)	**5.07** (3.70-7.09)
2-day	**1.03** (0.911-1.18)	**1.43** (1.27-1.65)	**1.97** (1.74-2.28)	**2.43** (2.13-2.83)	**3.06** (2.60-3.69)	**3.56** (2.96-4.38)	**4.08** (3.31-5.15)	**4.63** (3.65-6.00)	**5.39** (4.07-7.29)	**6.00** (4.38-8.38)
3-day	**1.10** (0.978-1.27)	**1.54** (1.37-1.78)	**2.14** (1.89-2.47)	**2.63** (2.31-3.07)	**3.32** (2.82-4.00)	**3.87** (3.21-4.76)	**4.43** (3.59-5.59)	**5.03** (3.96-6.52)	**5.86** (4.42-7.91)	**6.51** (4.75-9.10)
4-day	**1.17** (1.04-1.35)	**1.64** (1.46-1.89)	**2.28** (2.02-2.64)	**2.82** (2.47-3.28)	**3.56** (3.02-4.29)	**4.14** (3.44-5.10)	**4.75** (3.85-5.99)	**5.39** (4.25-6.99)	**6.28** (4.75-8.48)	**6.98** (5.10-9.76)
7-day	**1.27** (1.12-1.46)	**1.78** (1.58-2.06)	**2.49** (2.20-2.88)	**3.08** (2.70-3.59)	**3.91** (3.31-4.71)	**4.56** (3.78-5.61)	**5.23** (4.24-6.59)	**5.94** (4.68-7.70)	**6.92** (5.23-9.35)	**7.69** (5.61-10.8)
10-day	**1.32** (1.17-1.52)	**1.87** (1.65-2.15)	**2.62** (2.31-3.02)	**3.25** (2.84-3.78)	**4.13** (3.50-4.97)	**4.82** (4.00-5.93)	**5.54** (4.49-6.98)	**6.30** (4.96-8.16)	**7.35** (5.55-9.93)	**8.18** (5.97-11.4)
20-day	**1.53** (1.35-1.76)	**2.19** (1.94-2.52)	**3.11** (2.75-3.59)	**3.88** (3.40-4.52)	**4.98** (4.22-5.99)	**5.85** (4.85-7.19)	**6.75** (5.47-8.51)	**7.71** (6.07-9.99)	**9.03** (6.82-12.2)	**10.1** (7.35-14.1)
30-day	**1.68** (1.49-1.94)	**2.44** (2.16-2.81)	**3.48** (3.08-4.02)	**4.38** (3.83-5.10)	**5.65** (4.79-6.80)	**6.66** (5.53-8.19)	**7.71** (6.25-9.72)	**8.83** (6.95-11.4)	**10.4** (7.83-14.0)	**11.6** (8.45-16.2)
45-day	**1.97** (1.75-2.26)	**2.87** (2.54-3.30)	**4.12** (3.64-4.76)	**5.20** (4.56-6.06)	**6.75** (5.72-8.13)	**8.00** (6.64-9.84)	**9.31** (7.54-11.7)	**10.7** (8.41-13.8)	**12.6** (9.52-17.0)	**14.1** (10.3-19.7)
60-day	**2.24** (1.98-2.57)	**3.26** (2.88-3.75)	**4.69** (4.15-5.42)	**5.93** (5.20-6.91)	**7.72** (6.55-9.30)	**9.18** (7.62-11.3)	**10.7** (8.67-13.5)	**12.3** (9.71-16.0)	**14.6** (11.0-19.7)	**16.4** (12.0-22.9)

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

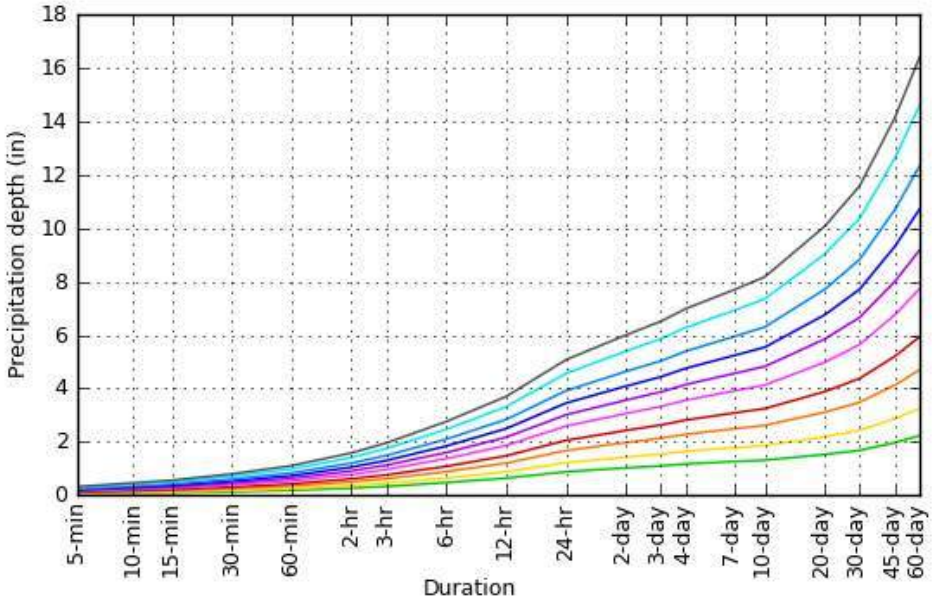
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper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

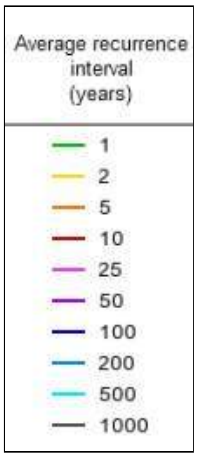
Please refer to NOAA Atlas 14 document for more information.

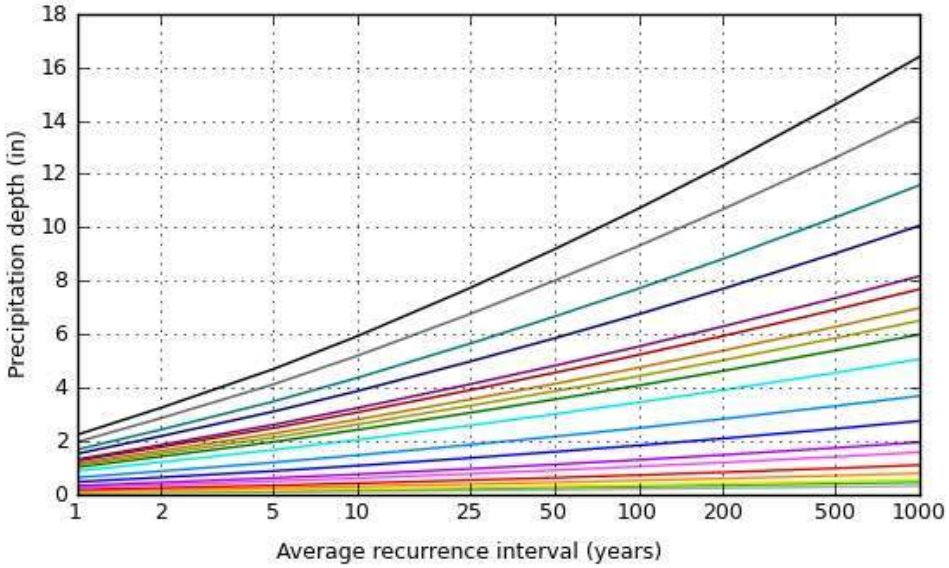
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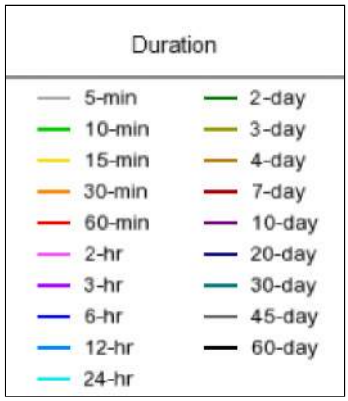
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 34.6163°, Longitude: -117.6015°









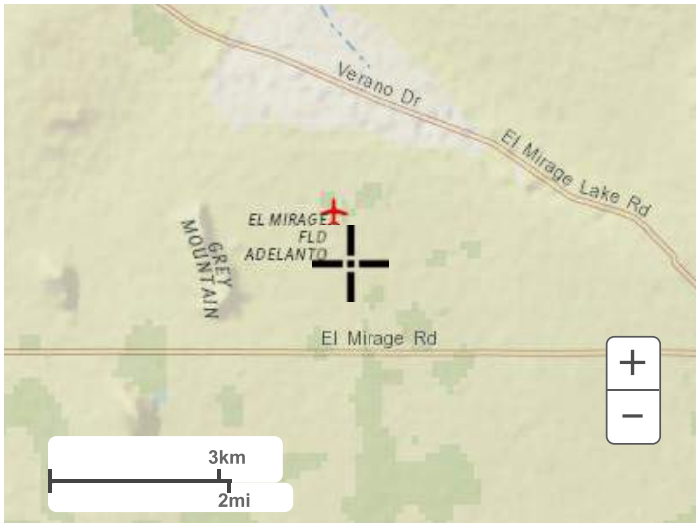
NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Thu May 17 18:23:19 2018

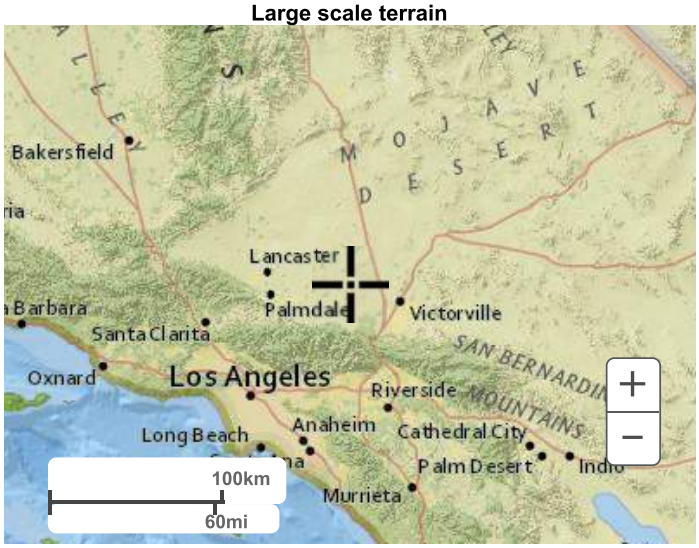
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Maps & aerials

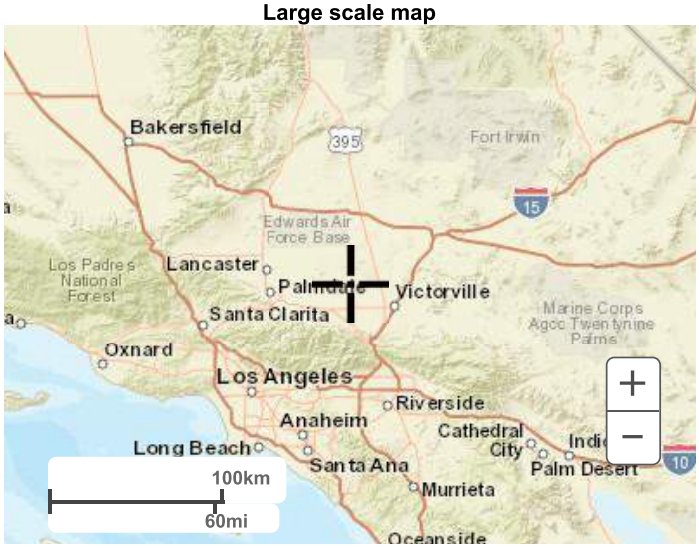
Small scale terrain



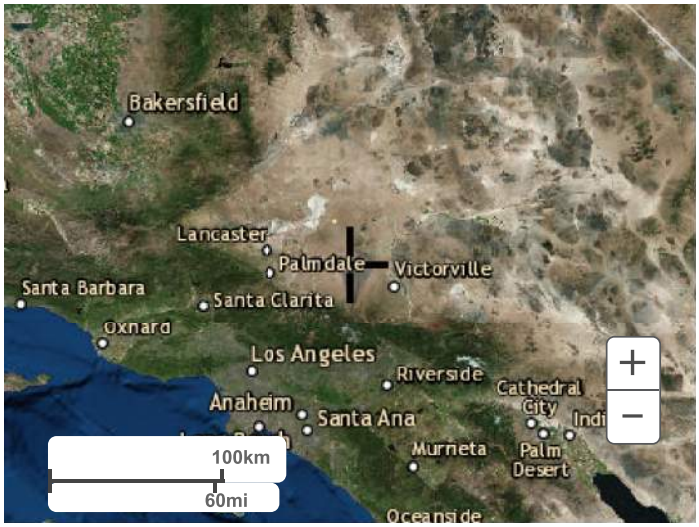
Large scale terrain



Large scale map



Large scale aerial



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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Appendix E – Onsite Hydrology (Shipping & Receiving Building)

DISCHARGE TO CHANNEL

V_{100}=12,069 CF

LENGTH = 363 FT
SLOPE = 0.5%

A-1
1.93

LEGEND

FLOW DIRECTION LINE

SUBAREA BOUNDARY

A-1
0.93
SUBAREA ID
AREA (ACRES)

SURFACE FLOW DIRECTION

HYDROLOGIC SOIL TYPE: A

NORTH

GRAPHIC SCALE IN FEET
0 25 50 100
1" = 50'
WHEN PRINTED AT FULL SIZE
(24" X 36")

SHIPPING & RECEIVING BUILDING
EXISTING CONDITIONS
HYDROLOGY MAP
December 3, 2018

Kimley»Horn

© 2010 KIMLEY-HORN AND ASSOCIATES, INC.
765 THE CITY DRIVE, SUITE 200, ORANGE, CA 92868
PHONE: 714-939-1030 FAX: 714-938-9488

LEGEND

- FLOW DIRECTION LINE
- SUBAREA BOUNDARY
- A–1 / 0.93 — SUBAREA ID / AREA (ACRES)
- SURFACE FLOW DIRECTION

HYDROLOGIC SOIL TYPE: A

DISCHARGE TO CHANNEL

2866.46 FS

2865.23 FS

V_{100} = 21,725 CF

2866.67 FS

FF=2867.75

A–1
1.93

LENGTH = 220 FT
SLOPE = 0.4%

2867.23 FS

2866.25 FS

NORTH

GRAPHIC SCALE IN FEET
0 25 50 100
1" = 50'
WHEN PRINTED AT FULL SIZE
(24" X 36")

SHIPPING & RECEIVING BUILDING
PROPOSED CONDITIONS
HYDROLOGY MAP
December 5, 2018

Kimley»Horn

© 2010 KIMLEY–HORN AND ASSOCIATES, INC.
765 THE CITY DRIVE, SUITE 200, ORANGE, CA 92868
PHONE: 714–939–1030 FAX: 714–938–9488

	Existing	Proposed
Pervious (SF)	83961	26902
Impervious (SF)	0	57059
Total (SF)	83961	83961
Total (Acres)	1.93	1.93

100-yr, 24-hr Depth (in)	3.45	3.45
Runoff Factor	0.5	0.9

Runoff Volume (CF)	12069	21725
Increase in Runoff (CF)	9656	

PF tabular | PF graphical | Supplementary information

Print page

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.059 (0.048-0.072)	0.080 (0.066-0.099)	0.111 (0.091-0.136)	0.136 (0.111-0.169)	0.173 (0.137-0.222)	0.203 (0.157-0.266)	0.235 (0.177-0.315)	0.269 (0.197-0.370)	0.317 (0.223-0.455)	0.356 (0.242-0.529)
10-min	0.084 (0.069-0.103)	0.115 (0.095-0.141)	0.158 (0.130-0.195)	0.195 (0.159-0.242)	0.248 (0.196-0.318)	0.291 (0.225-0.381)	0.337 (0.254-0.451)	0.385 (0.283-0.531)	0.454 (0.320-0.652)	0.510 (0.347-0.758)
15-min	0.102 (0.084-0.125)	0.139 (0.115-0.171)	0.192 (0.158-0.235)	0.236 (0.193-0.293)	0.300 (0.237-0.384)	0.352 (0.272-0.460)	0.407 (0.307-0.545)	0.466 (0.342-0.642)	0.549 (0.387-0.789)	0.617 (0.419-0.916)
30-min	0.144 (0.119-0.176)	0.197 (0.162-0.241)	0.271 (0.223-0.333)	0.334 (0.272-0.413)	0.424 (0.335-0.543)	0.498 (0.384-0.651)	0.575 (0.434-0.771)	0.659 (0.483-0.907)	0.776 (0.546-1.12)	0.872 (0.593-1.30)
60-min	0.197 (0.162-0.241)	0.269 (0.222-0.330)	0.370 (0.304-0.455)	0.456 (0.372-0.565)	0.580 (0.458-0.743)	0.680 (0.526-0.889)	0.787 (0.593-1.05)	0.900 (0.660-1.24)	1.06 (0.747-1.52)	1.19 (0.810-1.77)
2-hr	0.284 (0.234-0.347)	0.385 (0.317-0.472)	0.525 (0.432-0.645)	0.645 (0.526-0.799)	0.817 (0.645-1.05)	0.957 (0.739-1.25)	1.10 (0.832-1.48)	1.26 (0.925-1.74)	1.48 (1.04-2.13)	1.66 (1.13-2.47)
3-hr	0.351 (0.290-0.429)	0.475 (0.391-0.582)	0.646 (0.531-0.793)	0.792 (0.646-0.981)	1.00 (0.790-1.28)	1.17 (0.905-1.53)	1.35 (1.02-1.81)	1.54 (1.13-2.12)	1.81 (1.27-2.60)	2.03 (1.38-3.01)
6-hr	0.494 (0.408-0.605)	0.667 (0.550-0.817)	0.905 (0.744-1.11)	1.11 (0.903-1.37)	1.40 (1.10-1.79)	1.63 (1.26-2.13)	1.88 (1.41-2.51)	2.14 (1.57-2.94)	2.51 (1.76-3.60)	2.80 (1.91-4.16)
12-hr	0.655 (0.540-0.801)	0.893 (0.737-1.10)	1.22 (1.00-1.50)	1.50 (1.22-1.85)	1.89 (1.49-2.41)	2.20 (1.70-2.87)	2.52 (1.90-3.38)	2.87 (2.10-3.95)	3.35 (2.36-4.81)	3.73 (2.54-5.55)
24-hr	0.889 (0.788-1.02)	1.23 (1.09-1.42)	1.70 (1.50-1.96)	2.08 (1.83-2.42)	2.63 (2.23-3.16)	3.06 (2.54-3.76)	3.50 (2.84-4.41)	3.98 (3.13-5.15)	4.63 (3.50-6.26)	5.15 (3.76-7.21)
2-day	1.03 (0.913-1.18)	1.44 (1.27-1.66)	1.99 (1.76-2.30)	2.46 (2.15-2.86)	3.10 (2.63-3.74)	3.62 (3.00-4.44)	4.14 (3.36-5.22)	4.70 (3.71-6.10)	5.48 (4.14-7.40)	6.09 (4.45-8.51)
3-day	1.11 (0.980-1.27)	1.55 (1.38-1.79)	2.16 (1.91-2.50)	2.67 (2.34-3.11)	3.38 (2.86-4.07)	3.93 (3.27-4.84)	4.51 (3.65-5.68)	5.12 (4.03-6.63)	5.96 (4.51-8.05)	6.63 (4.84-9.27)
4-day	1.17 (1.04-1.35)	1.65 (1.47-1.91)	2.31 (2.04-2.67)	2.86 (2.50-3.33)	3.62 (3.07-4.36)	4.22 (3.50-5.19)	4.84 (3.92-6.10)	5.49 (4.33-7.12)	6.40 (4.84-8.64)	7.12 (5.20-9.95)
7-day	1.26 (1.12-1.45)	1.79 (1.59-2.06)	2.52 (2.22-2.91)	3.12 (2.74-3.64)	3.97 (3.37-4.78)	4.64 (3.85-5.70)	5.33 (4.31-6.71)	6.05 (4.76-7.84)	7.04 (5.32-9.51)	7.83 (5.71-10.9)
10-day	1.31 (1.17-1.51)	1.87 (1.66-2.16)	2.65 (2.34-3.06)	3.30 (2.89-3.84)	4.21 (3.57-5.07)	4.92 (4.09-6.05)	5.67 (4.59-7.14)	6.44 (5.07-8.35)	7.52 (5.68-10.2)	8.36 (6.10-11.7)
20-day	1.52 (1.34-1.74)	2.19 (1.94-2.53)	3.14 (2.78-3.63)	3.95 (3.46-4.60)	5.09 (4.32-6.13)	6.01 (4.99-7.39)	6.96 (5.64-8.77)	7.96 (6.27-10.3)	9.34 (7.05-12.6)	10.4 (7.61-14.6)
30-day	1.68 (1.49-1.93)	2.45 (2.17-2.82)	3.54 (3.13-4.09)	4.47 (3.92-5.21)	5.82 (4.93-7.01)	6.90 (5.73-8.48)	8.02 (6.50-10.1)	9.21 (7.25-11.9)	10.8 (8.19-14.6)	12.1 (8.85-17.0)
45-day	1.95 (1.73-2.25)	2.87 (2.54-3.30)	4.17 (3.69-4.82)	5.30 (4.65-6.18)	6.95 (5.89-8.37)	8.29 (6.88-10.2)	9.70 (7.85-12.2)	11.2 (8.80-14.5)	13.2 (10.00-17.9)	14.9 (10.8-20.8)
60-day	2.21 (1.96-2.54)	3.24 (2.87-3.73)	4.72 (4.17-5.45)	6.02 (5.27-7.01)	7.91 (6.70-9.52)	9.46 (7.85-11.6)	11.1 (9.00-14.0)	12.8 (10.1-16.6)	15.3 (11.5-20.6)	17.2 (12.6-24.0)

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

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

Please refer to NOAA Atlas 14 document for more information.

Estimates from the table in CSV format: Precipitation frequency estimates ▼ Submit

Appendix F – Offsite Hydraulic Analysis (Shipping & Receiving Building)

MJ Drainage Channel

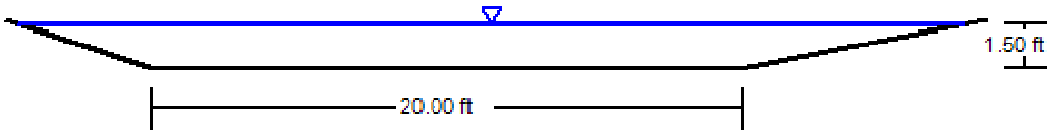
Project Description

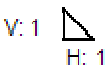
Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.00500	ft/ft
Normal Depth	1.50	ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	20.00	ft
Discharge	154.59	ft³/s

Cross Section Image





Appendix G – Design References

GENERAL NOTES:

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE COUNTY OF SAN BERNARDINO STANDARDS AND, THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (GREEN BOOK) LATEST EDITION, AND ALL SUPPLEMENTS. THE PRELIMINARY SOILS REPORT DATED AND ANY SPECIAL REQUIREMENTS OF THE PERMIT.

2. APPROVAL OF THIS PLAN BY THE COUNTY OF SAN BERNARDINO DOES NOT CONSTITUTE A REPRESENTATION AS TO THE ACCURACY OF THE LOCATION OR OF THE EXISTENCE OR NON-EXISTENCE OF ANY UNDERGROUND UTILITY PIPE OR STRUCTURE WITHIN THE LIMITS OF THIS PROJECT. THE CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR THE PROTECTION OF ALL UTILITIES WITHIN THE LIMITS OF THIS PROJECT.

3. PROPOSED STARTING DATE _____AND COMPLETION DATE _____ OF GRADING.

4. CUT YARDAGE: 1,760 C.Y. FILL YARDAGE: 1,314 C.Y.

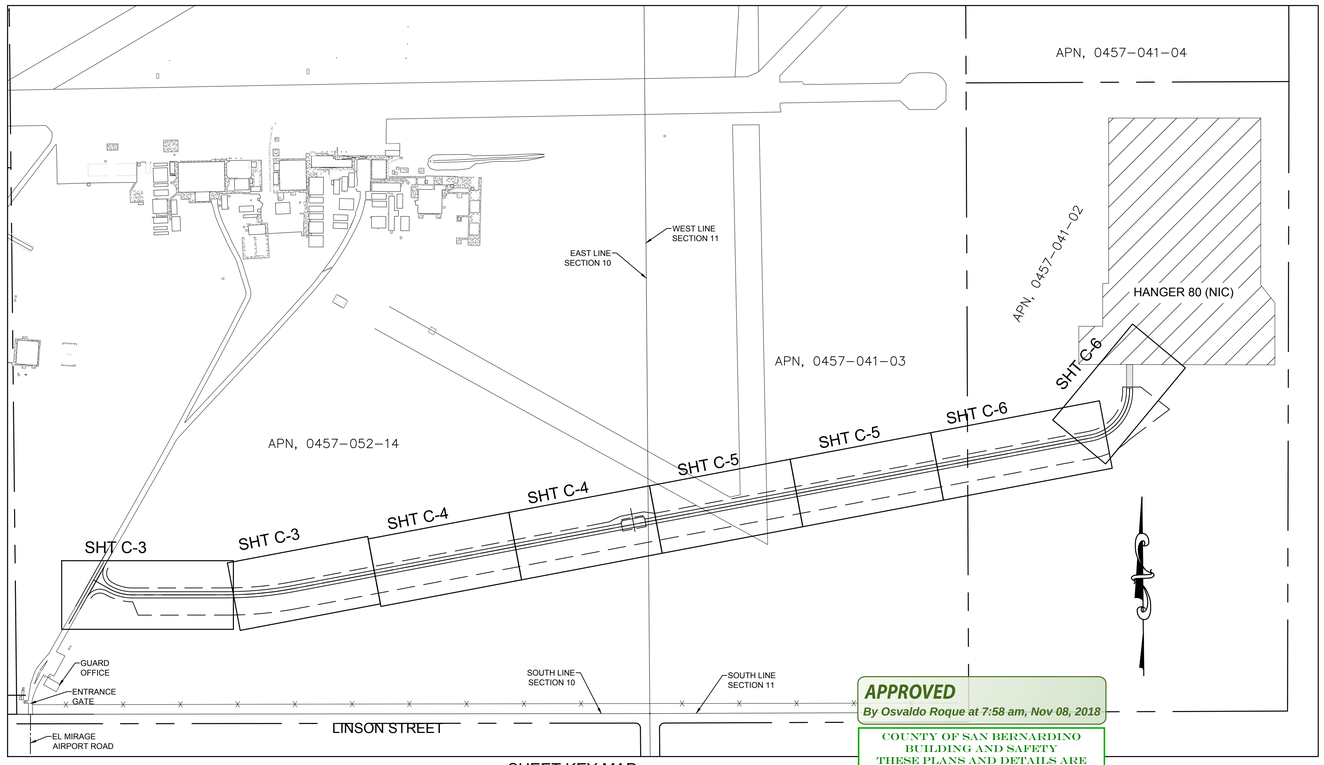
5. DUST SHALL BE CONTROLLED BY WATERING.

6. FINISH GRADING WILL BE COMPLETED AND APPROVED BEFORE OCCUPANCY OF BUILDINGS.

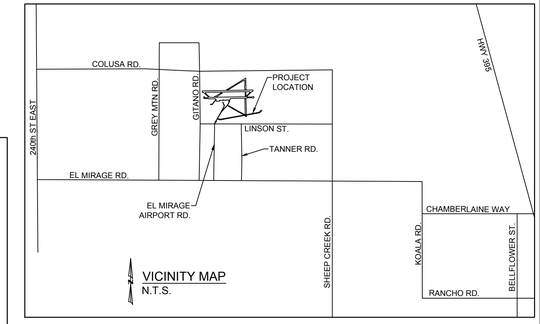
7 . PUBLIC STREETS SHALL BE KEPT CLEAN AND FREE FROM DIRT AND/OR DEBRIS. THE GRADING CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS INCURRED IN STREET CLEANING NECESSITATED BY HIS OPERATION.

8 . NO GRADING IN EXCESS OF 5000 CU. YDS. SHALL BE STARTED WITHOUT FIRST NOTIFYING THE ENGINEER. A PRE-GRADING MEETING AT THE SITE IS REQUIRED BEFORE START OF GRADING WITH THE FOLLOWING PEOPLE PRESENT: OWNER, GRADING CONTRACTOR, SUPERVISING CIVIL ENGINEER, SOILS ENGINEER AND/OR GEOLOGIST, COUNTY CONSTRUCTION INSPECTORS OR THEIR REPRESENTATIVES.

9 . THE PERMITTEE OR HIS AGENT SHALL NOTIFY THE COUNTY OF SAN BERNARDINO WHEN THE GRADING OPERATION (EXCEEDING 5000 CU. YDS.) IS READY FOR REQUIRED INSPECTIONS AS SHOWN IN THE TESTING AND INSPECTION REQUIREMENTS OF DIVISION V.



SHEET KEY MAP
N.T.S.



VICINITY MAP
N.T.S.

APPROVED
By Osvaldo Roque at 7:58 am, Nov 08, 2018

COUNTY OF SAN BERNARDINO
BUILDING AND SAFETY
THESE PLANS AND DETAILS ARE
APPROVED
THE APPROVAL OF THESE PLANS SHALL NOT BE CONSTRUED TO BE A PERMIT FOR ANY VIOLATION OF ANY CODE OR ORDINANCE OF THIS COUNTY.
THESE PLANS SHALL BE ON THE JOB FOR ALL REQUESTED INSPECTIONS.

NOTICE TO CONTRACTOR FROM ENGINEER:

THE CONTRACTOR SHALL ASCERTAIN THE EXISTENCE OF ANY CONDITIONS AFFECTING THE COST OF THE WORK WHICH WOULD HAVE BEEN DISCLOSED BY REASONABLE EXAMINATION OF THE SITE.

THE CONTRACTOR SHALL IMMEDIATELY BRING ANY ERRORS OR OMISSIONS DISCOVERED IN THE PLANS TO THE ATTENTION OF THE ENGINEER.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING IN PLACE ALL EXISTING IMPROVEMENTS WITHIN THE CONSTRUCTION AREA THAT ARE NOT DESIGNED FOR REMOVAL, AND SHALL BE RESPONSIBLE FOR REPAIRING OR REPLACING SUCH IMPROVEMENTS THAT ARE DAMAGED DURING THE COURSE OF THE WORK. REPAIRS AND REPLACEMENT SHALL BE AT LEAST EQUAL TO EXISTING IMPROVEMENTS AND SHALL MATCH THEM IN FINISH AND DIMENSION.

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS ARE NOT GUARANTEED. THESE DRAWINGS WERE PREPARED BASED ON SURFACE DATA AND A SEARCH OF AVAILABLE RECORDS TO THE BEST OF OUR KNOWLEDGE. IT IS POSSIBLE THAT ADDITIONAL UNDERGROUND UTILITIES COULD BE PRESENT THAT ARE NOT SHOWN. THE CONTRACTOR IS REQUIRED TO TAKE PRECAUTIONARY MEASURES TO PROTECT THE UTILITY LINES OR STRUCTURES SHOWN AND ANY OTHER LINES OR STRUCTURES NOT OF RECORD OR NOT SHOWN ON THIS DRAWING. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TAKING ALL PRECAUTIONS NECESSARY TO PROTECT ALL EXISTING UTILITIES AND STRUCTURES FROM DAMAGE DURING THE COURSE OF THE WORK, AND SHALL BE RESPONSIBLE FOR REPAIRING OR REPLACING ANY UTILITIES OR STRUCTURES DAMAGED DURING THE COURSE OF THE WORK.

ALL CONTRACTORS AND SUBCONTRACTORS PERFORMING WORK SHOWN ON OR RELATED TO THESE PLANS SHALL CONDUCT THEIR OPERATION SO THAT ALL EMPLOYEES ARE PROVIDED A SAFE PLACE TO WORK AND THE PUBLIC IS PROTECTED. ALL CONTRACTORS AND SUBCONTRACTORS SHALL COMPLY WITH THE "OCCUPATIONAL SAFETY AND HEALTH REGULATION" OF U.S. DEPARTMENT OF LABOR, AND WITH THE STATE OF CALIFORNIA DEPARTMENT OF INDUSTRIAL RELATIONS "CONSTRUCTION SAFETY ORDERS".

THE ARCHITECT/CIVIL ENGINEER AND OWNER SHALL NOT BE RESPONSIBLE IN ANY WAY FOR THE CONTRACTORS' AND SUBCONTRACTORS' COMPLIANCE WITH THE "OCCUPATIONAL SAFETY AND HEALTH REGULATION" OF U.S. DEPARTMENT OF LABOR, AND WITH THE STATE OF CALIFORNIA DEPARTMENT OF INDUSTRIAL RELATIONS "CONSTRUCTION SAFETY ORDERS".

THE CONTRACTOR IS HEREBY NOTIFIED THAT DURING THE ENTIRE TERM OF CONSTRUCTION, HE SHALL ADHERE TO N.P.D.E.S. GUIDELINES AND REQUIREMENTS SUCH AS THOSE FOUND IN THE CONSTRUCTION GENERAL PERMIT (CGP) AND MUNICIPAL STORM WATER PERMITS (MS4) RELATED TO BUT NOT LIMITED TO DUST CONTROL, SPILL PREVENTION, BEST MANAGEMENT PRACTICES, FINAL STABILIZATION, ETC. IN ADDITION, THE CONTRACTOR SHALL ENSURE CGP PROJECTS HAVING A WATER DISCHARGE IDENTIFICATION NUMBER (WDID#) REMAIN IN CURRENT/GOOD STANDING DURING THE ENTIRE CONSTRUCTION PERIOD AND PROVIDE SITE ACCESS DURING NORMAL CONSTRUCTION HOURS FOR QUALIFIED SWPPP PRACTITIONER (QSP) INSPECTIONS AND/OR MS4, STATE APPOINTED INSPECTORS.

RECOMMENDATIONS OF GEOTECHNICAL REPORT IN THE CONSTRUCTION OF THIS PROJECT SHALL BE FOLLOWED. COLLAPSIBLE NON-COHESIVE SOILS SHOULD BE ANTICIPATED DURING EXCAVATION OPERATIONS. SLOPES SHALL BE OVERBUILT AND COMPACTED IN UNIFORM LIFTS AS APPROVED BY SOILS ENGINEER AND SHALL BE CUT BACK TO FINISH GRADE. (SEE PROJECT SOILS REPORT). FREE MOISTURE, LOOSE SAND AND LOOSE BOULDERS AND/OR COBBLES MAY BE ENCOUNTERED DURING CONSTRUCTION OPERATIONS AND EXCAVATION.

ALL SURVEY MONUMENTS AND MARKERS SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROTECT IN PLACE UNTIL SURVEYOR HAS TIED OUT LOCATIONS FOR REPLACEMENT PURSUANT TO BUSINESS AND PROFESSIONS CODE SECTION 8700 TO 8805 (LAND SURVEYOR'S ACT).

THE ESTIMATE OF QUANTITIES INCLUDED ON THESE PLANS ARE APPROXIMATE QUANTITIES AND IS INTENDED ONLY FOR PLANNING PURPOSES. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THEIR OWN QUANTITIES.

QUANTITIES:

A.C. PAVING.....118,341 S.F.
STOP MARKING & BAR.....1 EA
STOP SIGN.....1 EA
35 M.P.H SPEED LIMIT SIGN.....2 EA
CURVE SIGN.....1 EA
DELINEATOR POST.....11 EA

CONSTRUCTION NOTES:

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2. INSTALL STOP SIGN R1-1 PER MUTCD
3. STOP MARKING PER 2014 CA MUTCD 3B-23 (CA) AND 12" WHITE LIMIT LINE PER 2012 CA MUTCD
4. INSTALL TYPE G CLASS 1 DELINEATOR PER CA MUTCD 3F-101 (CA)
5. INSTALL CURVE SIGN W1-2 PER MUTCD
6. INSTALL 30 MPH SPEED LIMIT SIGN R2-1 PER MUTCD
7. SAWCUT AC TO CREATE CLEAN EDGE FOR JOINING NEW PAVING

GRADING QUANTITIES:

CUT VOLUME: .....1,760 C.Y.
FILL VOLUME: .....762 C.Y.
NET VOLUME: .....CUT 998 C.Y.
SUBSIDENCE OF 0.10": .....438 C.Y.
SHRINKAGE FACTOR OF 15%: .114 C.Y.
NET EXPORT OF : .....446 C.Y.
AREA OF DISTURBANCE.....524,592 S.F.

PROPERTY INFORMATION:

PROPERTY ADDRESS:
73 EL MIRAGE AIRPORT ROAD
ADELANTO, CA 92301

PROPERTY OWNER:
SORRENTO WEST PROPERTIES, INC

LEGEND:

HP HIGH POINT
FL FLOWLINE
GB GRADE BREAK
LP LOW POINT
STA STATION
EL ELEVATION
EC END CURVE
BC BEGIN CURVE
BP BEGIN POINT
AC ASPHALT CONCRETE

UTILITY CONTACTS:

NATURAL GAS: SOUTHERN CALIFORNIA GAS COMPANY
1919 S. STATE COLLEGE BOULEVARD
ANAHEIM, CA. 92806
CONTACT: BRANDON INGRAM
(717) 634-3253

ELECTRICAL: SOUTHERN CALIFORNIA EDISON
1440 S. CALIFORNIA AVENUE
MONROVIA, CA. 91016
CONTACT: LARRY PASCHALL
(626) 303-8431

COMMUNICATIONS: VERIZON
1400 E. PHILLIPS BLVD. BLDG. A
POMONA, CA. 91766
CONTACT: JIM BOLLIER
(909) 469-6333

Sheet List		
SHEET	TITLE	STATION
C–1	TITLE SHEET	––
C–2	CONTROL SHEET	––
C–3	PLAN SHEET	STA. 10+00 – STA. 22+00
C–4	PLAN SHEET	STA. 22+00 – STA. 34+00
C–5	PLAN SHEET	STA. 34+00 – STA. 46+00
C–6	PLAN SHEET	STA. 46+00 – STA. 55+43.21
C–7	DETAIL SHEET	––

WDID NUMBER: **6B36C385146**
~~APPLICATION PENDING~~

LEGAL DESCRIPTION:

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF ADELANTO, IN THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

A PORTION OF THE SOUTH EAST QUARTER OF SECTION 10, TOWNSHIP 6 NORTH, RANGE 7 WEST, TOGETHER WITH A PORTION OF THE SOUTHWEST QUARTER OF SECTION 11, TOWNSHIP 6 NORTH RANGE 7 WEST, SAN BERNARDINO MERIDIAN, IN THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT THEREOF.

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REGISTERED PROFESSIONAL ENGINEER E. CARY PACKER No. C–51752 CIVIL STATE OF CALIFORNIA

11/7/18
E. CARY PACKER R.C.E. 51752

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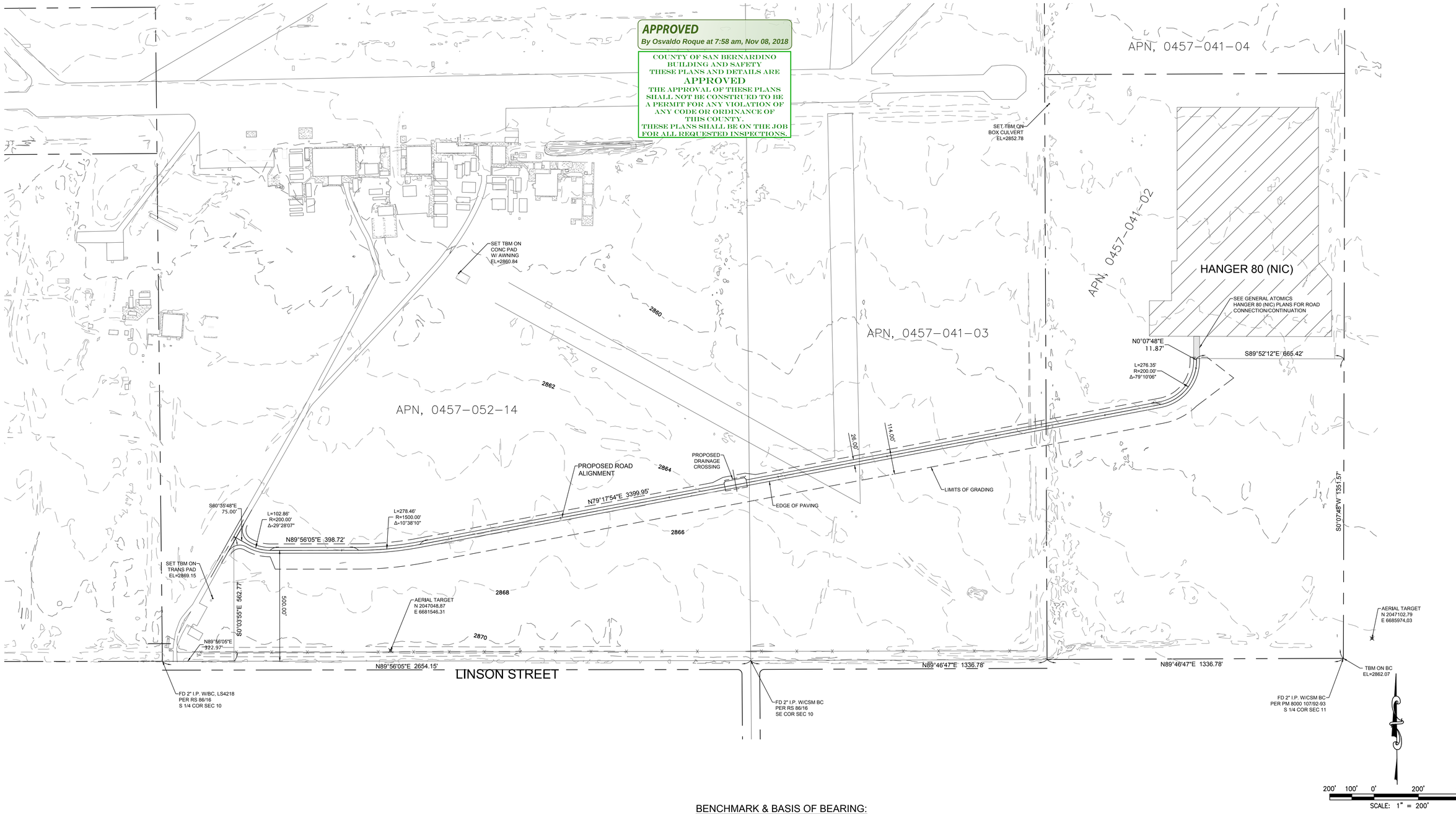
ON-SITE ACCESS ROAD
GENERAL ATOMICS
EL MIRAGE FIELD
TITLE SHEET

DRAWN BY: EKJ
DATE: 10/09/18
JOB NO. 841.008
SHEET C-1

northmon5225 8:17am 10 October 2018 P:\841.008 Cooley Const (GA Elmirage Access Road)\ACCESS ROAD.dwg – SHT 1 Merrell Johnson Companies

APPROVED
By Osvaldo Roque at 7:58 am, Nov 08, 2018

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BUILDING AND SAFETY
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BENCHMARK & BASIS OF BEARING:

SEE CONTROL SHOWN ON PLAN AS PROVIDED BY GENERAL ATOMICS.

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REGISTERED PROFESSIONAL ENGINEER
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CIVIL
STATE OF CALIFORNIA

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E. CARY PACKER R.C.E. 51752

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ON-SITE ACCESS ROAD
GENERAL ATOMICS
EL MIRAGE FIELD
CONTROL SHEET

DRAWN BY: EKJ
DATE: 10/09/18
JOB NO. 841.008
SHEET C-2

northman5225 8:17am 10 October 2018 P:\841.008 Cooley Const (GA Elmirage Access Road)\ACCESS ROAD.dwg - SHT 2 Merrell Johnson Companies

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3. STOP MARKING PER 2014 CA MUTCD 3B-23 (CA) AND 12" WHITE LIMIT LINE PER 2012 CA MUTCD
6. INSTALL 30 MPH SPEED LIMIT SIGN R2-1 PER MUTCD
7. SAWCUT AC TO CREATE CLEAN EDGE FOR JOINING NEW PAVING

EXISTING ACCESS ROAD
EC MATCH EXISTING GRADE (EL=2866.39)
3/4 DELTA STA. 10+16.37 EL=2866.45'
1/2 DELTA STA. 10+29.34 EL=2866.61'
L=94.75' R=60.00' Δ=90°28'42"
1/4 DELTA STA. 10+48.87 EL=2866.85'
BC STA. 10+71.95 EL=2867.13'
S60°35'48"E 75.00'
EXISTING FLOWLINE TO REMAIN
BP: 10+00.00
0.66%
10.6%
3.44%
0.51%
STOP
(EXIST) GB STA. 10+11.00 EL=2866.77'
GB STA. 10+36.00 EL=2867.14'
PC: 10+75.00
GRADING LIMITS (TYP.)
SHOULDER (TYP.)
AC PAVING (TYP.)
26.00'
30.00'
114.00'
PT: 11+77.86
Δ=29°28'07"
L=102.86'
R=200.00'
11+00
12+00
13+00
14+00
15+00
16+
N89°56'05"E 398.72'
5.0% TYP.
1.50% TYP.
5.00% TYP.
0.11%
BC MATCH EXISTING GRADE (EL=2867.19)
1/4 DELTA STA. 10+16.41 EL=2867.08'
1/2 DELTA STA. 10+29.42 EL=2867.04'
L=94.25' R=60.00' Δ=90°00'00"
3/4 DELTA STA. 10+48.88 EL=2867.06'
EC STA. 10+71.84 EL=2867.14'
GB/HP STA. 11+25.00 EL=2867.59'
FIELD VERIFY EXISTING WATER LINE LOCATION

STA. 16+00 SEE ABOVE

Δ=10°38'10"
L=278.46'
R=1500.00'
17+00
18+00
PT: 18+55.04
19+00
20+00
21+00
N79°17'54"E 3399.95'
22+
STA. 22+00 SEE SHEET 4

20' 10' 0' 20' 40'
SCALE: 1" = 20'

APPROVED
By Osvaldo Roque at 7:58 am, Nov 08, 2018

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ON-SITE ACCESS ROAD
GENERAL ATOMICS
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PLAN SHEET
STA. 10+00 - STA. 22+00

DRAWN BY: EKJ
DATE: 10/09/18
JOB NO. 841.008
SHEET C-3

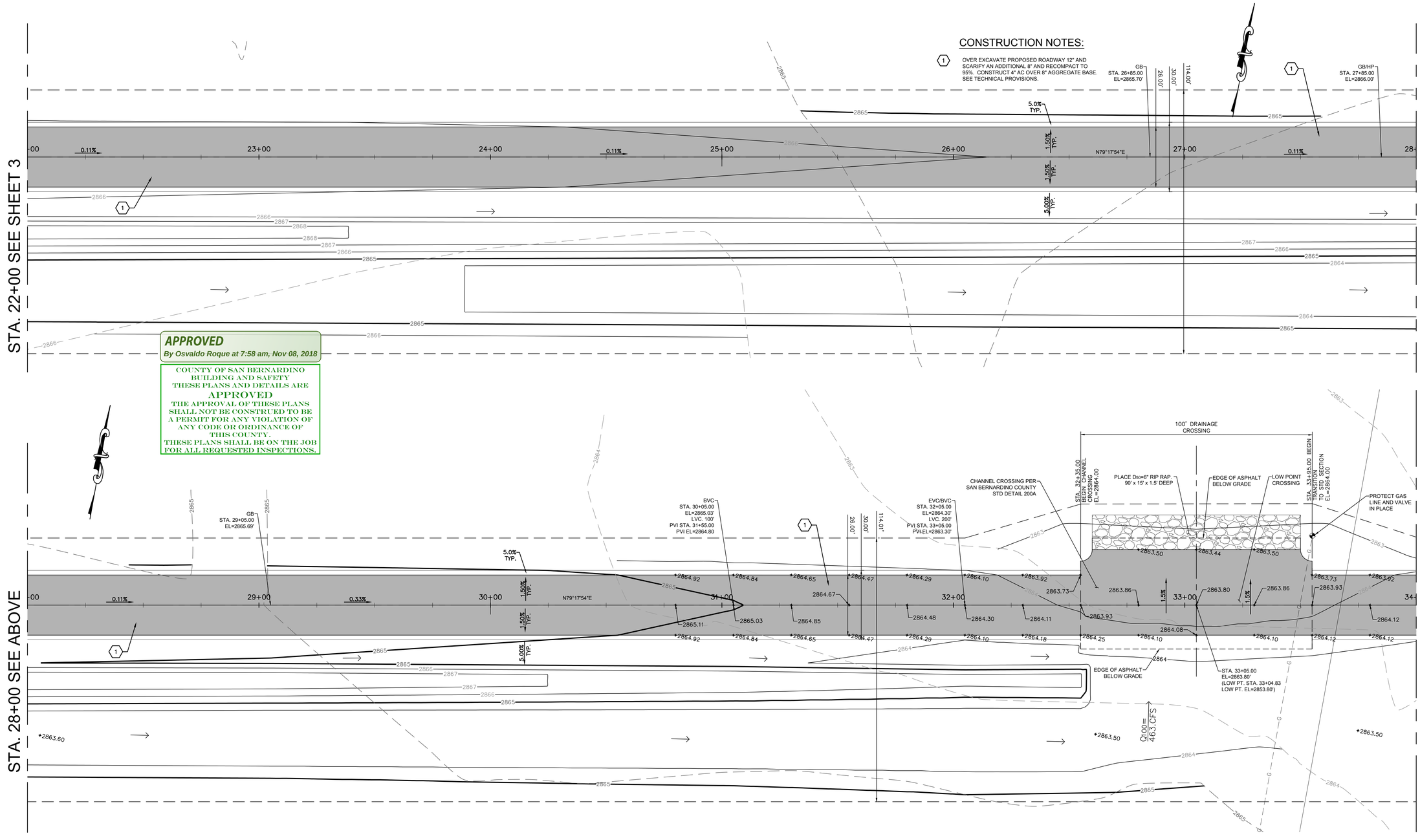
northman5225 8:17am 10 October 2018 P:\841.008 Cooley Const (GA Elmirage Access Road)\ACCESS ROAD.dwg — SHT 3 Merrell Johnson Companies

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STA. 22+00 SEE SHEET 3

STA. 28+00 SEE BELOW



STA.34+00 SEE SHEET 5

20' 10' 0' 20' 40'

SCALE: 1" = 20'

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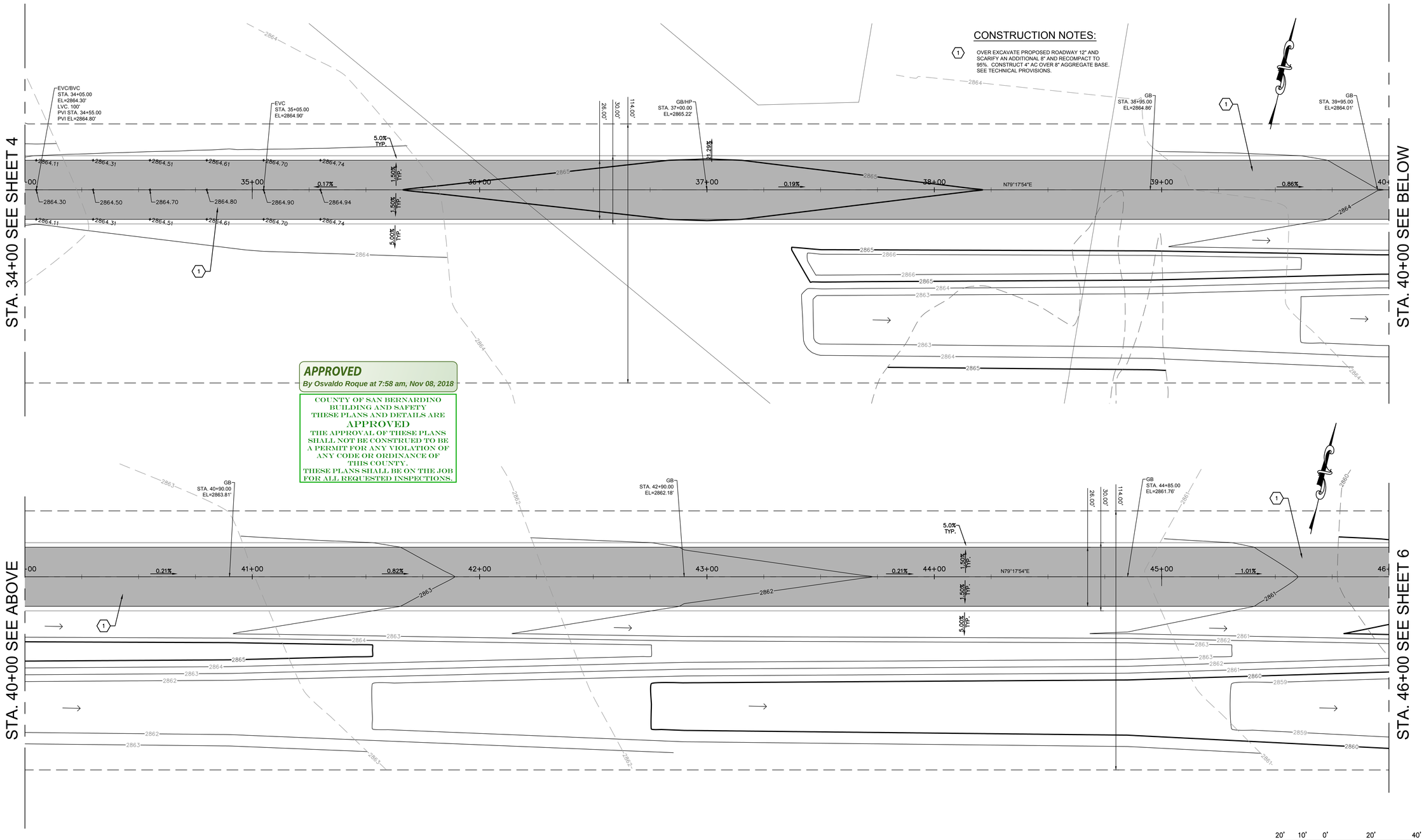
ON-SITE ACCESS ROAD
GENERAL ATOMICS
EL MIRAGE FIELD
PLAN SHEET
STA. 22+00 - STA. 34+00

DRAWN BY: EKJ
DATE: 10/09/18

JOB NO. 841.008

SHEET C-4

northsm5225 8:17am 10 October 2018 P:\841.008 Cooley Const (GA Elmirage Access Road)\ACCESS ROAD.dwg — SHT 4 Merrell Johnson Companies



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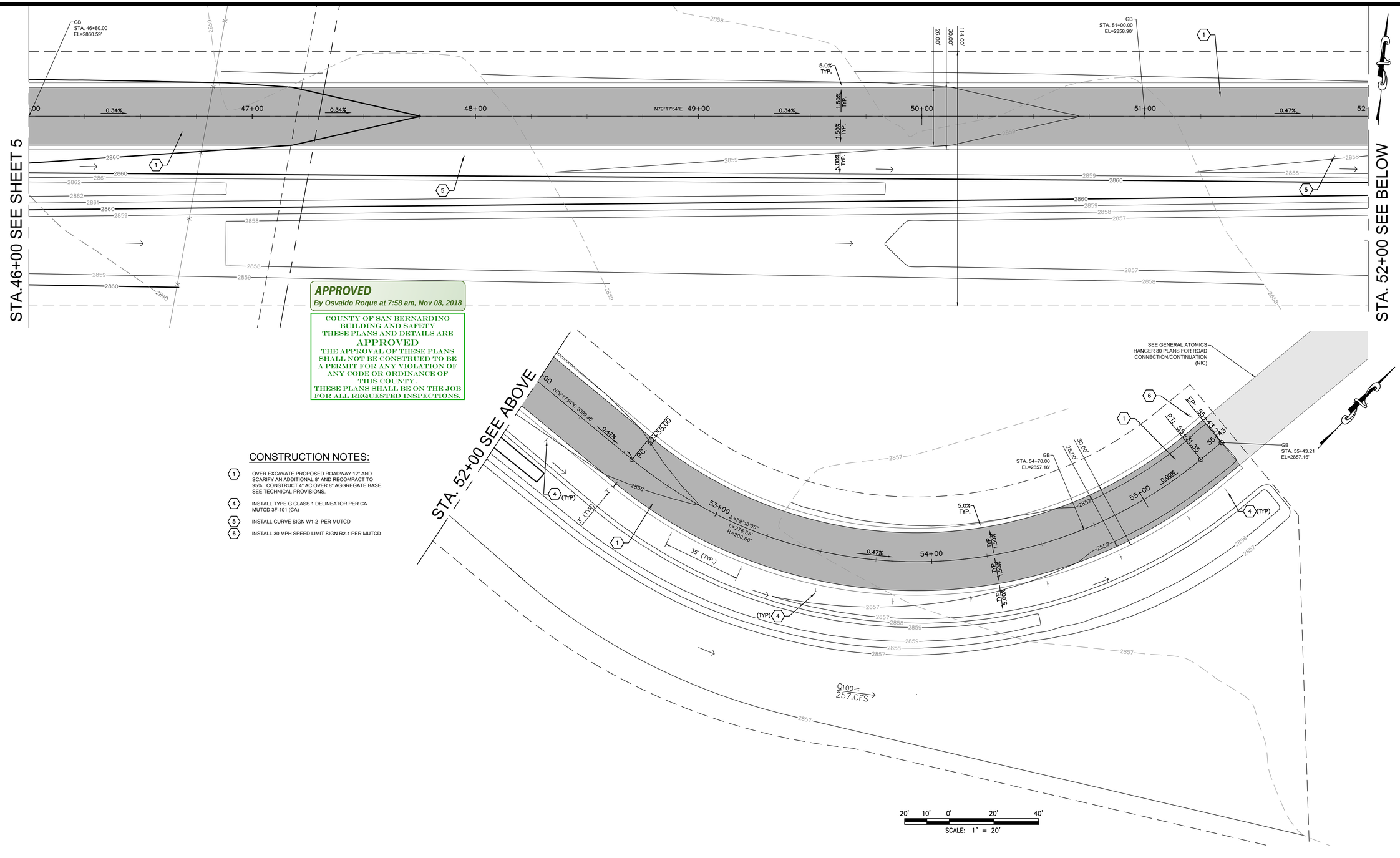
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JOB NO. 841.008
SHEET C-5

northman5225 8:18am 10 October 2018 P:\841.008 Cooley Const (GA Elmirage Access Road)\ACCESS ROAD.dwg — SHT 5 Merrell Johnson Companies



APPROVED
By Osvaldo Roque at 7:58 am, Nov 08, 2018

COUNTY OF SAN BERNARDINO
BUILDING AND SAFETY
THESE PLANS AND DETAILS ARE
APPROVED
THE APPROVAL OF THESE PLANS SHALL NOT BE CONSTRUED TO BE A PERMIT FOR ANY VIOLATION OF ANY CODE OR ORDINANCE OF THIS COUNTY.
THESE PLANS SHALL BE ON THE JOB FOR ALL REQUESTED INSPECTIONS.

CONSTRUCTION NOTES:

1. OVER EXCAVATE PROPOSED ROADWAY 12" AND SCARIFY AN ADDITIONAL 8" AND RECOMPACT TO 95%. CONSTRUCT 4" AC OVER 8" AGGREGATE BASE. SEE TECHNICAL PROVISIONS.
4. INSTALL TYPE G CLASS 1 DELINEATOR PER CA MUTCD 3F-101 (CA)
5. INSTALL CURVE SIGN W1-2 PER MUTCD
6. INSTALL 30 MPH SPEED LIMIT SIGN R2-1 PER MUTCD

811 Know what's below. Call before you dig.

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NOTE:
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NOTE:
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NOTE:
THE LOCATIONS AND EXISTENCE OF UNDERGROUND UTILITIES ARE NOT SHOWN. THESE DRAWINGS WERE PREPARED BASED ON SURFACE DATA INFORMATION AND IT IS POSSIBLE THAT ADDITIONAL UNDERGROUND UTILITIES COULD BE PRESENT THAT ARE NOT SHOWN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFICATION OF THE LOCATION AND DEPTH OF EXISTING UNDERGROUND UTILITIES AND SHALL PERFORM POTHOLING AS NECESSARY AT ALL GROSSING PRIOR TO COMMENCING CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TAKING ALL PRECAUTIONS NECESSARY TO PROTECT ALL EXISTING UTILITIES AND STRUCTURES FROM DAMAGE DURING THE COURSE OF THE WORK, AND SHALL BE RESPONSIBLE FOR REPAIRING OR REPLACING ANY UTILITIES OR STRUCTURE DAMAGED DURING THE COURSE OF THE WORK.

REGISTERED PROFESSIONAL ENGINEER
E. CARY PACKER
No. C-51752
CIVIL
STATE OF CALIFORNIA

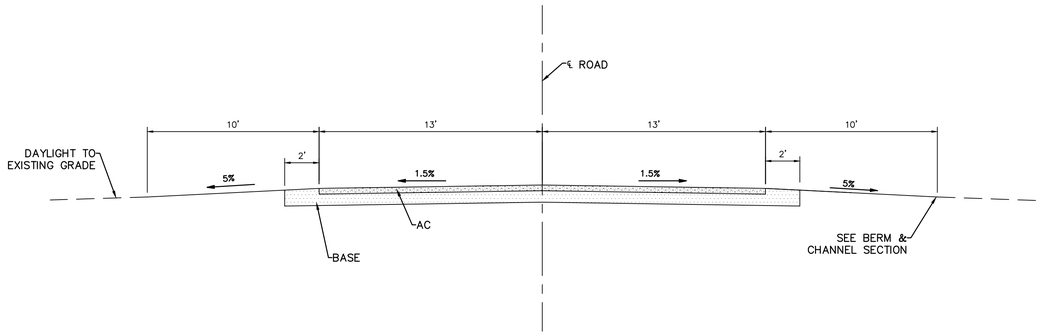
11/7/18
E. CARY PACKER R.C.E. 51752

Merrell Johnson COMPANIES
22221 HIGHWAY 18
APPLE VALLEY, CALIFORNIA 92307
(760) 240-8000
(760) 240-1400 FAX
16091 KAMANA RD
APPLE VALLEY, CALIFORNIA 92307
(760) 256-2068
(760) 530-6672 FAX

ON-SITE ACCESS ROAD
GENERAL ATOMICS
EL MIRAGE FIELD
PLAN SHEET
STA. 46+00 - STA. 55+43.21

DRAWN BY: EKJ
DATE: 10/09/18
JOB NO. 841.008
SHEET C-6

northmon5225 8:18am 10 October 2018 P:\841.008 Cooley Const (GA Elmirage Access Road)\ACCESS ROAD.dwg — SHT 6 Merrell Johnson Companies



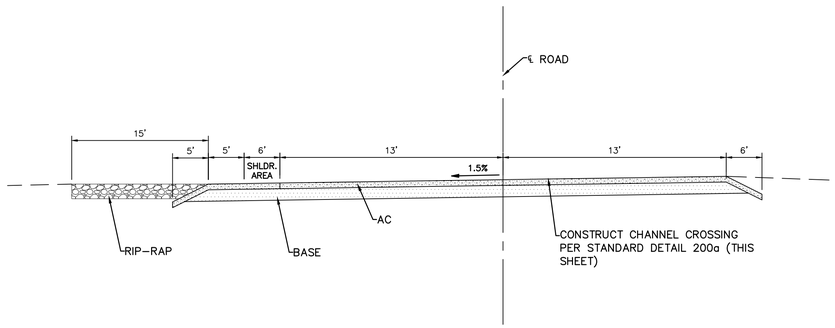
(TYP) ROAD SECTION

STA. 10+75- 32+05 & STA.34+05-55+43.21

N.T.S.

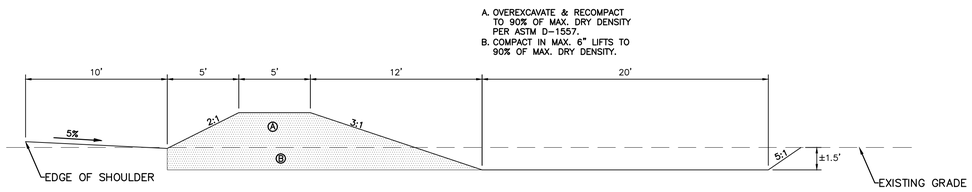
HATCH LEGEND:

- AC PAVING
- COMPACTED ROAD BASE
- RIP-RAP
- COMPACTED BERM



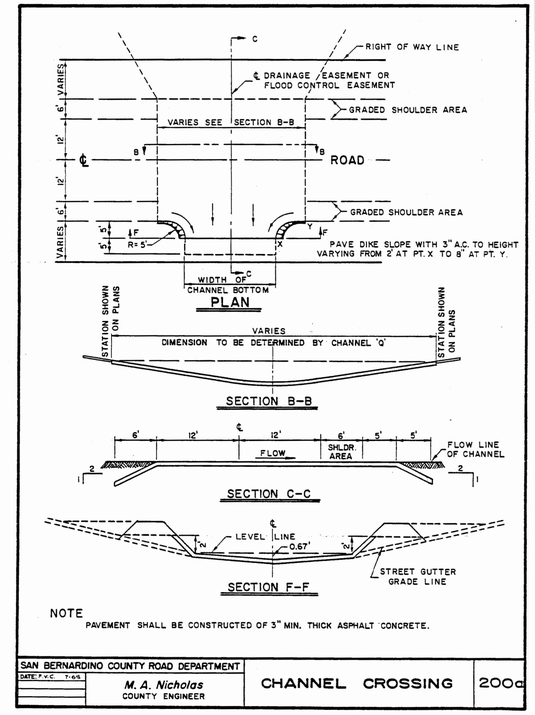
(TYP) TILT SECTION @ LOW POINT CROSSING

N.T.S.



(TYP) BERM & CHANNEL SECTION

N.T.S.



NOTE

PAVEMENT SHALL BE CONSTRUCTED OF 3" MIN. THICK ASPHALT CONCRETE.

SAN BERNARDINO COUNTY ROAD DEPARTMENT		
DATE P.V.C. T-6/5	M. A. Nicholas COUNTY ENGINEER	CHANNEL CROSSING 200a

APPROVED

By Osvaldo Roque at 7:58 am, Nov 08, 2018

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REGISTERED PROFESSIONAL ENGINEER E. CARY PACKER No. C-51752 CIVIL STATE OF CALIFORNIA

11/7/18

E. CARY PACKER R.C.E. 51752

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ON-SITE ACCESS ROAD
GENERAL ATOMICS
EL MIRAGE FIELD
DETAIL SHEET

DRAWN BY: EKJ
DATE: 10/09/18

JOB NO. 841.008

SHEET C-7

northman5225 8:18am 10 October 2018 P:\841.008 Cooley Const (GA Elmirage Access Road)\ACCESS ROAD.dwg — SHT 7 Merrell Johnson Companies

NOTICE TO CONTRACTOR FROM ENGINEER:

THE CONTRACTOR SHALL ASCERTAIN THE EXISTENCE OF ANY CONDITIONS AFFECTING THE COST OF THE WORK WHICH WOULD HAVE BEEN DISCLOSED BY REASONABLE EXAMINATION OF THE SITE.

CONTRACTOR SHALL IMMEDIATELY BRING ANY ERRORS OR OMISSIONS DISCOVERED IN THE PLANS TO THE ATTENTION OF THE QUALIFIED SWPPP DEVELOPER (QSD), INCLUDING POTENTIAL DRAINAGE ISSUES NOT SHOWN ON INFORMATION SUPPLIED TO ENGINEER/QSD.

CONTRACTOR SHALL REPAIR OR REPLACE DAMAGES DONE TO EXISTING FEATURES/STRUCTURES THAT ARE NOT PART OF THESE IMPROVEMENTS OR WERE DESIGNED TO REMAIN. REPAIRS AND REPLACEMENTS SHALL BE AT LEAST EQUAL TO EXISTING AND SHALL MATCH IN FINISH AND DIMENSION.

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES ARE NOT SHOWN ON THIS PLAN. THESE PLANS ARE NOT INTENDED TO SHOW LOCATIONS OF UNDERGROUND UTILITIES. THE CONTRACTOR SHALL TAKE PRECAUTIONARY MEASURES TO PROTECT ALL UTILITIES AND STRUCTURES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFICATION OF THE LOCATION AND DEPTH OF EXISTING UNDERGROUND UTILITIES AND SHALL PERFORM POTHOLING AS NECESSARY AT ALL CROSSING PRIOR TO COMMENCING CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TAKING ALL PRECAUSIONS NECESSARY TO PROTECT ALL EXISTING UTILITIES AND STRUCTURES FROM DAMAGE DURING THE COURSE OF THE WORK, AND SHALL BE RESPONSIBLE FOR REPAIRING OR REPLACING ANY UTILIES OR STRUCTURE DAMAGED DURING THE COURSE OF THE WORK.

ALL CONTRACTORS AND SUBCONTRACTORS PERFORMING WORK SHOWN ON OR RELATED TO THESE PLANS SHALL CONDUCT THEIR OPERATIONS SO THAT ALL EMPLOYEES ARE PROVIDED A SAFE PLACE TO WORK AND THE PUBLIC IS PROTECTED. ALL CONTRACTORS AND SUBCONTRACTORS SHALL COMPLY WITH THE "OCCUPATIONAL SAFETY AND HEALTH REGULATION" OF THE DEPARTMENT OF U.S. LABOR, AND WITH THE STATE OF CALIFORNIA DEPARTMENT OF INDUSTRIAL RELATIONS "CONSTRUCTION SAFETY ORDERS".

THE ARCHITECT/CIVIL ENGINEER SHALL NOT BE RESPONSIBLE IN ANY WAY FOR THE CONTRACTOR'S AND SUBCONTRACTORS' COMPLIANCE WITH THE "OCCUPATIONAL HEALTH AND SAFETY REGULATIONS" OF U.S. DEPARTMENT OF LABOR OR WITH THE STATE OF CALIFORNIA DEPARTMENT OF INDUSTRIAL RELATIONS "CONSTRUCTION SAFETY ORDERS".

THE CONTRACTOR IS HEREBY NOTIFIED THAT DURING THE ENTIRE TERM OF CONSTRUCTION, HE SHALL ADHERE TO N.P.D.E.S. GUIDELINES AND REQUIREMENTS RELATED TO BUT NOT LIMITED TO DUST CONTROL, ENVIRONMENTAL CONSIDERATIONS, ETC. IN ADDITION, THE CONTRACTOR SHALL ADHERE AND IMPLEMENT THIS EROSION CONTROL PLAN AND SWPPP. CONTRACTOR SHALL ENSURE THE PROPERTY OWNER/LEGAL RESPONSIBLE PERSON HAS FILED A NOTICE OF INTENT WITH THE STATE WATER CONTROL BOARD AND A WATER DISCHARGE IDENTIFICATION NUMBER (WDID#) HAS BEEN ISSUED AND REMAINS IN CURRENT/GOOD STANDING DURING THE ENTIRE CONSTRUCTION PERIOD. CONTRACTOR SHALL MAINTAIN SAID DOCUMENTS ON SITE AND AVAILABLE UPON REQUEST THROUGHOUT THE DURATION OF CONSTRUCTION. INSPECTIONS REQUIRED BASED ON THE CONSTRUCTION GENERAL PERMIT SHALL BE KEPT IN THE SWPPP OR BY AN APPOINTED QUALIFIED SWPPP PRACTICIONER (QSP) AND AVAILABLE UPON REQUEST.

THE CONTRACTOR IS HEREBY NOTIFIED THAT THE SIGNING QSD AS LISTED BELOW IS TO BE THE QSD FOR THE ENTIRE DURATION OF THE PROJECT, INCLUDING QSP OBLIGATIONS. IF THE CONTRACTOR IS TO EMPLOY ANOTHER QSD/QSP FOR THIS PROJECT A WRITTEN NOTIFICATION SHALL BE SIGNED BY LEGAL RESPONSIBLE PERSON (LRP), THE QSD LISTED BELOW AND THE CONTRACTOR. THE NEW QSD/QSP WILL ASSUME N.P.D.E.S. REQUIREMENTS.

CONTRACTOR SHALL COMMUNICATE/CORESPOND WITH QSD/QSP IN REGARDS TO CONSTRUCTION GENERAL PERMIT ITEMS OF CONCERN THAT COULD ALTER OR CHANGE RISK FACTORS OR COMPLIANCE ISSUES. THIS INCLUDES BUT IS NOT LIMITED TO: CONSTRUCTION SCHEDULING CHANGES, WEATHER FORECAST/CONSTRAINTS, RAIN GAUGE LOCATION OR OPTIMAL FUNCTION, BMP DEFICIENCIES, DISCHARGES, INCREASE OF DISTURBANCE SIZE, HAZARDOUS SPILLS, ETC.

THE CONTRACTOR IS REQUIRED BY GOVERNMENT CODE 4216 "CALIFORNIA ONE CALL LAW" TO CALL DIG ALERT AT LEAST TWO (2) WORKING DAYS BEFORE DIGGING. CONTRACTOR IS REQUIRED BY SAME CODE TO HAND-EXPOSE TO THE POINT OF NO CONFLICT 24" ON EITHER SIDE OF THE UNDERGROUND FACILITY SO YOU CAN DETERMINE ITS EXACT LOCATION BEFORE USING POWER EQUIPMENT.

GENERAL CONSTRUCTION NOTES:

1. PRIOR TO CONSTRUCTION THE CONTRACTOR SHALL CONTACT ALL UTILITY COMPANIES TO DETERMINE THE EXACT LOCATION OF ALL UNDERGROUND FACILITIES WHETHER SHOWN OR NOT SHOWN. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROTECT ALL EXISTING FACILITIES FROM DAMAGE DURING CONSTRUCTION.
2. THE CONTRACTOR IS RESONSIBLE FOR THE COORDINATION OF THE REMOVAL OR RELOCATION OF ANY AND ALL EXISTING UTILITIES WITH THE RESPECTIVE UTILITY COMPANY. COST OF THIS COORDINATION IS TO BE INCLUDE IN THE PRICE BID FOR THE VARIOUS IMPROVEMENTS TO COMPLETE THE PROJECT.
3. THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR ANY FIELD CHANGES MADE WITHOUT PRIOR WRITTEN AUTHORIZATION FROM THE UNDERSIGNED ENGINEER.
4. THE CONTRACTOR IS RESPONSIBLE FOR PROTECTING ALL SURVEY MONUMENTS. ANY SURVEY MONUMENTS DISTURBED DURING THE COURSE OF CONSTRUCTION SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.
5. THE CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY THAT THIS REQUIREMENT SHALL APPLY CONTINUALLY AND NOT BE LIMITED TO NORMAL WORKING HOURS; AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER AND THE ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT.

MATERIALS/ACTIVITIES AND POLLUTANT CATEGORY

ADHESIVES: GLUES, RESINS, EPOXY SYNTHETICS, PVC CEMENT CAULKS, SEALERS, PUTTY, SEALING AGENTS AND COAL TARS (NAPHTHA, PITCH)	OIL AND GREASE, SYNTHETIC ORGANICS
ASPHALT: HOT AND COLD MIX	OIL AND GREASE
CLEANERS: POLISHES (METAL, CERAMIC, TILE), ETCHING AGENTS, CLEANERS, AMMONIA, LYE, CAUSTIC SODAS, BLEACHING AGENTS AND CHROMATE SALTS	METALS, SYNTHETIC ORGANICS
CONCRETE/MASONRY: CEMENT AND BRICK DUST COLORED CHALKS, CONCRETE CURING COMPOUNDS, GLAZING COMPOUNDS SURFACES CLEANERS, SAW CUT SLURRIES TILE CUTTING	METALS, SYNTHETIC ORGANICS
DRY-WALL: SAW-CUTTING	METALS
FRAMING/CARPENTRY: SAWDUST, PARTICLE BOARD DUST, AND TREATED WOODS SAW CUT SLURRIES	METALS, SYNTHETIC ORGANICS
INSULATION: DEMOLITION OR CONSTRUCTION, VENTING SYSTEMS	METALS, SYNTHETIC ORGANICS
LIQUID WASTE: WASH WATERS, IRRIGATION LINE TESTING/FLUSHING	METALS, SYNTHETIC ORGANICS
PAINT: THINNERS, ACETONE, METHYL ETHYL KETONE, STRIPPER PAINTS, LACQUERS, VARNISH, ENAMELS, TURPENTINE, GUM SPIRIT, SOLVENTS, DYES, STRIPPING PIGMENTS AND SANDING	METALS, SYNTHETIC ORGANICS
VEGETATION: PESTICIDES/HERBICIDES, PLANTING, PLANT MAINTENANCE, VEGETATION REMOVAL	NUTRIENTS, METALS, SYNTHETIC ORGANICS
PLUMBING: SOLDER (LEAD, TIN), FLUX (ZINC CHLORIDE), PIPE FITTING, GALVANIZED METAL IN NAILS, FENCES, AND ELECTRIC WIRING	METALS, SYNTHETIC ORGANICS
CHLORINATED WATER: POOLS OR FOUNTAINS	SYNTHETIC ORGANICS
DEMOLITION: ASPHALT, CONCRETE, MASONRY, FRAMING, ROOFING, METAL STRUCTURES.	METALS, OIL AND GREASE, SYNTHETIC ORGANICS
ROOFING: FLASHING, SAW CUT SLURRIES (TILE CUTTING) SHINGLE SCRAP AND DEBRIS	METALS, OIL AND GREASE, SYNTHETIC ORGANICS
SANITARY WASTE: PORTABLE TOILETS, DISTURBANCE OF EXISTING SEWER LINES.	NUTRIENTS
GRADING: USE OF SOIL ADDITIVES/AMENDMENTS	NUTRIENTS
LITTER: CONSTRUCTION TRASH AND DEBRIS, VEGETATION	GROSS POLLUTANTS
UTILITY LINE TESTING: HYDROSTATIC TEST WATER PIPE FLUSHING	SYNTHETIC ORGANICS
VEHICLE & EQUIPMENT: OPERATION, MAINTENANCE, WASHING OR FUELING	OIL AND GREASE

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GENERAL STORM WATER POLLUTION CONSTRUCTION NOTES:

THE INFORMATION ON THESE DRAWINGS IS ACCURATE FOR STORM WATER POLLUTION CONTROL PURPOSES ONLY.

THIS EROSION CONTROL PLAN AND THE SWPPP (STORM WATER POLLUTION PREVENTION PLAN) PREPARED FOR THIS PROJECT ARE BASED ON THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) GENERAL PERMIT FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES, ORDER NO. 2009-0009-DWQ, NPDES NO. CAS000002, DATED SEPTEMBER 2, 2009, AS AMENDED BY ORDER 2010-0014-DWQ AND 2012-0006-DWQ AND AS ADOPTED BY THE STATE WATER BOARD RESOURCES CONTROL BOARD ON JULY 17, 2012. INFORMATION FOUND AT:
HTTP://WWW.WATERBOARDS.CA.GOV/WATER_ISSUES/PROGRAMS/STORMWATER/CONSTRUCTION
FOR BMPS: WWW.CASQA.ORG
IN ADDITION TO LOCAL STANDARDS AND REGULATIONS AS REQUIRED IN SPECIFICATIONS: W52 SWPPP SPECIFICATIONS, SECTION 01 57 13, TO INCLUDE: CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS), STANDARD SPECIFICATIONS, 2010, AND STANDARD PLANS, 2010. LOWS AS THOSE STANDARDS CONFORM WITH THE REQUIRED ELEMENTS OF THE STATE WATER RESOURCES CONTROL BOARD (SWRCB).

THE SWPPP REPORT AND THE EROSION CONTROL PLANS SHALL BE MODIFIED AND AMENDED BY A QUALIFIED SWPPP DEVELOPER ONLY AND DOCUMENTED IN SWPPP REPORT. IF THE AMENDMENTS ARE MADE BY A QSD OTHER THAN THE SIGNING ENGINEER BELOW, THESE PLANS ARE NULL AND VOID OF LIABILITIES DUE TO THE CHANGES.

THE INFORMATION ON THIS PLAN IS INTENDED TO BE USED AS A GUIDELINE FOR THE CONTRACTOR AND SUBCONTRACTORS TO INSTALL STORMWATER POLLUTION PREVENTION CONTROL DEVICES AT GENERAL LOCATIONS THROUGHOUT THE SITE. THESE DRAWINGS ARE TO TO BE USED IN CONJUNCTION WITH THE NARRATIVE SECTION OF THE STORM WATER POLLUTION PREVENTION PLAN (SWPPP).

FIELD CONDITIONS AND CONSTRUCTION PHASING MAY NECESSITATE MODIFICATIONS TO THESE DRAWINGS.

TEMPORARY SOIL STABILIZATION MEASURES WILL BE IMPLEMENTED 10 DAYS PRIOR TO THE START OF THE DEFINED RAINY SEASON AND AT REGULAR INTERVALS THROUGHOUT THE RAINY SEASON TO ACHIEVE AND MAINTAIN THE CONTRACT'S DISTURBED SOIL AREA (DSA) PROTECTION REQUIREMENTS.

CONTRACTOR SHALL REPORT TO THE STATE WATER BOARD ANYTIME ILLICIT DISCHARGE IS DISCOVERED OR ILLEGALLY DUMPED MATERIAL FOUND IN ACCORDANCE WITH NS-6.

TO MAINTAIN DRAWING CLARITY, THE LOCATIONS SHOWN ON THE DRAWINGS ARE FOR GENERAL AREAS OF DEPLOYMENT - THEY ARE NOT NECESSARILY REPRESENTATIVE OF THE REQUIRED ALIGNMENT OR LENGTH OF MATERIAL REQUIRED. ALL SEDIMENT CONTROL MEASURES, SUCH AS SAND BAGGING OR SILT FENCING, SHALL BE INSTALLED BELOW TOE OF SLOPES, IN SECTIONS AND ALONG CONTOURS (PERPENDICULAR TO DIRECTION OF SHEET FLOW).

ALL BMP'S SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE CALIFORNIA STORMWATER BMP HANDBOOK FOR CONSTRUCTION GUIDELINES AND AMENDMENTS THEREOF.

CLEARING AND GRUBBING SHALL BE LIMITED TO AREAS THAT WILL RECEIVE IMMEDIATE GRADING. EROSION CONTROL MEASURES WILL BE REQUIRED TO PROTECT AREAS WHICH HAVE BEEN CLEARED AND GRUBBED PRIOR TO GRADING OPERATIONS AND WHICH ARE SUBJECT TO RUN-OFF.

DURING UNDERGROUND UTILITY INSTALLATION, EROSION CONTROL BMPS THAT WERE TEMPORARILY REMOVED, SHALL BE PUT IN PLACE AT THE END OF EACH WORK DAY, ESPECIALLY WHEN THE THREE DAY RAIN PROBABILITY EXCEEDS FIFTY PERCENT (50%).

UPON IMPLEMENTATION AND INSTALLATION OF ANY BMPS, THE CONTRACTOR AND SUBCONTRACTORS SHALL ADDRESS ANY CONCERNS OR QUESTIONS REGARDING THIS PLAN AND THE SWPPP PROVIDED FOR THIS PROJECT WITH THE LEGAL RESPONSIBLE PERSON (LRP) AND THE SIGNING QSD ENGINEER. THIS INCLUDES, BUT IS NOT LIMITED TO, LOCATION OF BMPS, INSTALLATION REQUIREMENTS, EQUIPMENT NEEDS, AND MATERIALS TO BE USED. ANY CHANGES TO THOSE SPECIFIED SHALL BE BROUGHT TO THE ATTENTION OF THE QSD AND CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY.

PEDESTRIAN AND TRAFFIC SAFETY SHALL BE IN ACCORDANCE WITH CITY, STATE AND FEDERAL STANDARDS AND SHALL BE ESTABLISHED PRIOR TO THE START OF CONSTRUCTION. IT IS THE CONTRACTORS AND LRP RESPONSIBILITY TO ADDRESS ANY BMP ISSUES THAT MAY JEOPARDIZE THE SAFETY OF SUCH AND BRING TO THE ATTENTION OF THE SIGNING ENGINEER PRIOR TO INSTALLATION.

THIS PLAN AND SWPPP SHALL BE POSTED IN CONTRACTORS TRAILOR/OFFICE OR WHERE ALL CONTRACTORS AND SUBCONTRACTORS MAY HAVE EASY ACCESS AND BECOME FAMILIAR WITH ITS CONTENTS PRIOR TO BEGINNING WORK.

THE CONTRACTOR IS RESPONSIBLE FOR MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4) INCLUDING, BUT NOT LIMITED TO, DRAINS, INLETS, CONVEYANCES (SOFT OR HARDENED/CONSTRUCTED OR HISTORICAL) THAT MAY BE AFFECTED BY THE PROJECT. THE USE OF STRAW FIBER ROLLS OR SANDBAGS SHALL BE CAREFULLY MONITORED FOR DAMAGES AND DISPOSED OF IN SUCH A MANNER TO PREVENT BMP MATERIALS, DEBRIS OR SAND FROM ENTERING THE DRAINAGE SYSTEM. IN ADDITION, THE CONTRACTOR SHALL ENSURE SEDIMENTS STAY OUTSIDE THE INLET, BUT ALLOWS WATER IN. INSPECT STORM DRAIN INLETS PRIOR TO RAIN EVENT AND ENSURE THE STORM DRAIN IS NOT OBSTRUCTED FROM DEBRIS, SEDIMENTS, OR BMP MATERIALS, THUS FLOODING THE STREET AND CAUSING UNDUE DAMAGES.

A STAND BY CREW, AND ALL NECESSARY EQUIPMENT, SHALL BE AVAILABLE AT ALL TIMES DURING THE RAINY SEASONS. WHENEVER THE LIKELIHOOD OF RAIN IS IMMINENT, NECESSARY MATERIALS SHALL BE AVAILABLE ON SITE AND STOCKPILED AT CONVENIENT LOCATIONS TO FACILITATE THE RAPID CONSTRUCTION OF EMERGENCY CONTROLS.

EROSION CONTROL DEVICES PLACED ON ROADS AND RIGHT-OF-WAYS SHALL NOT BE PLACED, MOVED, AND RELOCATED WITHOUT THE APPROVAL OF THE COUNTY PUBLIC WORKS/APPROVING ENGINEER IN ACCORDANCE TO THEIR TRAFFIC/PUBLIC SAFETY STANDARDS AND REGULATIONS.

ALL AREAS SHALL BE MAINTAINED IN SUCH A STATE THAT FIRE DEPARTMENT ACCESS IS AVAILABLE AT ALL TIMES, INCLUDING ACCESS TO NEIGHBORING PROPERTY.

THE CONTRACTOR SHOULD BEAR IN MIND THE EROSION CONTROL PLAN WILL BE USED THROUGHOUT THE LIFE OF THE CONTRACT AND THAT THE PLAN UNCONTINUOUSLY REFLECTS SITE CONDITIONS.

NOTES DURING MASS GRADING

1. CONTRACTOR SHALL BE AWARE THAT EROSION CONTROL BMPS ARE TO BE USED IN CONJUNCTION WITH SEDIMENT CONTROLS, AND THERE IS NO STAND ALONE BMP METHODS DURING EARTHWORKS PHASE.
2. PRIMARY EROSION AND SEDIMENT CONTROLS ARE BASIN AND CHANNELS. ENSURE ADEQUATE DETENTION AND/OR DIVERSION MEASURES TO DISTURBANCE SECTION. INSTALL PERIMETER BMPS WHILE THESE AREAS ARE ACTIVELY CONSTRUCTED.
3. DISTURBANCES ALONG STREET PERIMETERS SHALL HAVE SILT FENCE INSTALLED PRIOR TO DISTURBANCE.
4. DUST/WIND CONTROL BMPS SHALL BE INCORPORATED DAILY, UNTIL ENTIRE SITE IS COMPLETED AND NOTICE OF TERMINATION IS APPROVED BY SWQCB.
5. ALL AREAS GRADED ARE REQUIRED TO BE STABILIZED. IN ADDITION TO DUST CONTROL, AREAS LONGER THAN 14 DAYS INACTIVITY REQUIRE SHORT-TERM OR LONG-TERM STABILIZATION. THIS INCLUDES, BUT NOT LIMITED TO, ONE OR MORE OF THE FOLLOWING: WATER SPRAY, COMPACTION, TRACK FOOTING, POLYMERIC EMULSION BLENDS, OR LONG TERM SOIL STABILIZERS (E.G., HYDRO-SEED, HYDRO-MULCH, GEO-TEXTILE MATS, ETC.) AS A SURFACE COVER.
6. HYDROSEED MIXES SHALL BE APPLIED AS SOON AS POSSIBLE TO ENSURE GROWTH BY END OF CONSTRUCTION, AND BE PREPARED TO REAPPLY SURFACE COVERS IF/AND AS MUCH NEEDED TO OBTAIN DESIRED FINAL STABILIZATION APPROVED BY RWQCB/CONSTRUCTION GENERAL PERMIT.
7. LONG-TERM SOIL STABILIZERS SHALL BE WATER PERMEABLE, FIBER BONDED EMULSION MULCH AND/OR SEEDED AND APPLIED TO SOLITARY (NO TRAFFIC) AREAS FOR A LONG DURATION OF TIME. IF SEEDED, GERMINATION MUST BE ACHIEVED BY WATERING REGULARLY AND PER MANUFACTURES SPECIFICATIONS.
8. SHORT TERM SOIL STABILIZERS SHALL BE POLYMERIC EMULSION BLENDS APPLIED TO AREAS OF FUTURE BUILD. AREAS OF HEAVY TRAFFIC, MAY ALTERNATIVE APPLY A CEMENTITIOUS BASED BINDER TO MINIMIZE REAPPLICATION. HOWEVER, CEMENTITIOUS BINDERS ARE NOT SUGGESTED IN FUTURE LANDSCAPED AND IN AREAS WHERE FUTURE GRADING ACTION IS REQUIRED.

APPROVED
By Osvaldo Roque at 7:58 am, Nov 08, 2018

COUNTY OF SAN BERNARDINO
BUILDING AND SAFETY
THESE PLANS AND DETAILS ARE
APPROVED
THE APPROVAL OF THESE PLANS SHALL NOT BE CONSTRUED TO BE A PERMIT FOR ANY VIOLATION OF ANY CODE OR ORDINANCE OF THIS COUNTY.
THESE PLANS SHALL BE ON THE JOB FOR ALL REQUESTED INSPECTIONS.

BMP SCHEDULING - CAUTIONARY NOTES:

A. FIELD CONDITIONS AND CONSTRUCTION PHASING MAY NECESSITATE MODIFICATIONS TO THESE DRAWINGS. THE CONTRACTOR/SUPERINTENDENT SHALL FIELD VERIFY IN ACCORDANCE TO THE N.P.D.E.S. REQUIREMENTS WHEN REPLACING, RELOCATING, BMPS. REFER TO SWPPP, SECTION 1.4, TABLE 1.1. FOR BMPS THAT CAN BE FIELD MODIFIED BY THE CONTRACTOR.

B. DETERMINE WITH COUNTY ENGINEERING AND DEPARTMENT OF PUBLIC WORKS PERSONNEL IN WRITING BEST LOCATIONS FOR SANITARY/SEPTIC WASTE MANAGEMENT FACILITY/FACILITIES, MINIMUM 50' FROM TRAFFIC AREAS. DO NOT PLACE FACILITIES IN DRAINAGE CONVEYANCES, INCLUDING CURB/GUTTERS. ENSURE PRIOR TO DELIVERY, SECONDARY CONTAINMENT MEASURES ARE PROVIDED (EACH UNIT SHALL CONTAIN A PAN IN GOOD CONDITION, OR SHALL BE BUILT).

C. AT THE END OF EACH WORK DAY/SHIFT, ALL WORK AREAS SHALL BE LEFT DEBRIS FREE AND ORDERLY. TEMPORARY TRASH CONTAINER(S) SHALL BE COVERED AND SECURE WITH APPROPRIATE LID TO ENSURE WEATHER CONDITIONS. RECYCLED MATERIALS SHALL BE HANDLED IN ACCORDANCE TO CONTRACT. WASTE MATERIALS SHALL NOT BE LEFT AT TRENCHING/INSTALLATION LOCATIONS OVER NIGHT. IN ADDITION, ENSURE HAZARDOUS WASTE MANAGEMENT PRACTICES ARE FOLLOWED BY ALL CONTRACTORS AND SUBCONTRACTORS ON SITE USING PETROLEUM PRODUCTS, CONCRETE CURING COMPOUNDS, SEPTIC WASTES, ASPHALT PRODUCTS, ACIDS, PAINTS, SOLVENTS AND/OR TARS. REFER AND MAKE AVAILABLE WM-6, WM-7, WM-4 FOR INSTRUCTIONS

D. ENSURE ALL PORTABLE WASHOUTS, STORAGE, TRAILERS/BOXES ARE WATERTIGHT AND REGULARLY HAULED OFF SITE WHEN FULL OR MAY CAUSE POLLUTION HAZARD AND WHEN RAIN EVENT IS ANTICIPATED. ENSURE PLASTIC SHEETING (IF USED) IS SECURE FROM HIGH WIND BLOW-AWAY.

E. VEHICLE AND EQUIPMENT MAINTENANCE/CLEANING SHALL BE CONDUCTED OFF-SITE AS MUCH AS POSSIBLE, HOWEVER, IN THE EVENT THE CONTRACTOR SHALL USE DRIP PANS OR EQUIVALENT, AND IN ADDITION TO SPILL KITS AND PROPER TRAINING AND DAILY INSPECTIONS FOR LEAKS. SEE NS-10 FOR PROPER IMPLEMENTATION. PARKED EQUIPMENT SHALL HAVE NO SIGNS OF LEAKS OR HAVE A DRIP PAN UNDER WHILE PARKED.

F. TRAFFIC CONTROL, PEDESTRIAN ACCESS, AND GENERAL PUBLIC SAFETY SHALL BE ESTABLISHED PRIOR TO CONSTRUCTION ACTIVITIES. CONTRACTOR IS RESPONSIBLE FOR BMP PLACEMENT AND SHALL USE HIS/HER BEST PROFESSIONAL JUDGEMENT IN REMOVING/RELOCATING, ADDING, PLACING SIGNS, BARRICADES, ROAD BLOCKS WHEN BMPs, OR BMP EFFECTS (SUCH AS DIVERTED FLOWS, PONDING/DAMS) AFFECT PUBLIC SAFETY. REFER TO APPROVED TRAFFIC CONTROL PLANS PROVIDED BY OTHERS.

G. CONTRACTOR SHALL INCORPORATE POTENTIAL WEATHER CONSTRAINTS IN CONJUNCTION WITH DAILY SCHEDULED ACTIVITIES AND PREPARE BY HAVING ADEQUATE BMP MATERIALS AND INSTALLATION MAN/MACHINE POWER READILY AVAILABLE.

BEST MANAGEMENT PRACTICES (BMPs) CALLOUTS & SEQUENCE OF PHASING

E10 ESTABLISH "OFF-LIMIT" AREAS. MARK-OFF OR CLEARLY INSTRUCT LIMIT PARAMETERS, OR "NO COMPACTION", AND INCLUDE A DESIGNATED (TEMPORARY) CONSTRUCTION ROADWAY/PATH OF TRAVEL. IT IS THE CONTRACTORS DISCRETION TO INSTALL ORANGE MARKING FENCES OR TEMPORARY SECURITY FENCES TO MAINTAIN AND DESIGNATE LIMITS OF DISTURBANCE.

E11 TEMPORARY CONSTRUCTION LAY DOWN "STAGING" AREA FOR EQUIPMENT, MATERIAL DELIVERY, AND TEMPORARY PARKING. MATERIAL DELIVERY/STORAGE BEST MANAGEMENT PRACTICES INCLUDE WATERTIGHT CONTAINERS AND SECONDARY CONTAINMENT FOR HAZARDOUS AND POTENTIALLY HAZARDOUS MATERIALS. ENSURE PROPER LABELS AND REGULAR INSPECTIONS. SEE WM-1 FOR APPLICATIONS AND PRACTICES. PROVIDE AMBLE SUPPLIES OF SPILL ABSORBENT MATERIALS, EQUIPMENT, AND DRIP PANS. REFER TO WASTE MANAGEMENT PRACTICES (WM) AND DETAILS ON SHEET 3.

E13 STABILIZED CONSTRUCTION ENTRANCE/EXIT WITH CORRUGATED STEEL PANELS. PANELS SHALL BE THE LENGTH OF FOUR TIMES THE CIRCUMFERENCE OF THE LARGEST CONSTRUCTION VEHICLE TIRE. STABILIZE A TEMPORARY CONSTRUCTION ROADWAY. SEE TC-1, & TC-2 AND FOR INSTALLATIONS. IF TC-3 MUST BE IMPLEMENTED, PLACE WITHIN PROPERTY. SEE DETAIL SHEET 1.

E15 DETERMINE BEST LOCATIONS FOR SANITARY/SEPTIC WASTE MANAGEMENT FACILITY/FACILITIES, MINIMUM 50' FROM DRAINAGE CONVEYANCES AND TRAFFIC AREAS. USE SECONDARY CONTAINMENT MEASURES, AND SECURE FACILITIES FROM OVERTURNING. ONLY A REPUTABLE, LICENSED WASTE HAULER SHALL BE USED. SEE WM-9 FOR INSTALLATION INSTRUCTIONS.

E16 INSTALL AND MAINTAIN TEMPORARY CONSTRUCTION TRASH CONTAINER(S). SEE WM-5 FOR INSTRUCTIONS AND LIMITATIONS. REFER TO WM-6 FOR HAZARDOUS WASTE MANAGEMENT APPLICATIONS. CONTAINERS SHALL BE SECURELY COVERED FROM WIND/RAIN, AND SHALL BE DUMPED FREQUENTLY AS NEEDED BY A REPUTABLE CONTRACTED WASTE HAULER.

E17 ENSURE HAZARDOUS WASTE MANAGEMENT PRACTICES ARE FOLLOWED BY ALL CONTRACTORS AND SUBCONTRACTORS ON SITE USING PETROLEUM PRODUCTS, CONCRETE CURING COMPOUNDS, DUST PALLIATIVES, SEPTIC WASTES, ASPHALT PRODUCTS, AND/OR PAVING TARS. MAKE AVAILABLE MANUFACTURES SAFETY HANDLING SPECIFICATIONS AND WM-6, WM-7, WM-4 FOR INSTRUCTIONS.

E18 IMPLEMENT STREET SWEEPING/VACUUMING METHODS THROUGHOUT THE DURATION OF THE PROJECT. TRACKING OF DIRT, MUD, TIRE MARKINGS, SAW-CUTTING DEBRIS, OR ANY OTHER FORMS OF SEDIMENT (DUST) THAT HAS BEEN TRANSPORTED (BY TRAFFIC, WIND, WATER, SPILLED) ON TO PAVED SURFACES (E.G. ROADS, SIDEWALKS, CURBS/GUTTERS, PATHS) SHALL BE REMOVED PRIOR TO END OF DAY. CONDUCT DAILY INSPECTIONS. CONTRACTOR MAY APPLY ADDITIONAL MEASURES BASED ON OBSERVATIONS TO MEET REQUIREMENT. SEE SE-7, NS-3, TC-1 AND TC-2 FOR APPLICATIONS, AS NEEDED.

E19 INSTALL AND MAINTAIN SILT FENCE. SEE SE-1 FOR INSTALLATION INSTRUCTIONS. REPLACE FALLEN AND DAMAGED PER SWPPP STANDARDS. SEE DETAIL ON SHEET 1.

E20 ENSURE RAIN EVENT DOES NOT OVER FILL CONTAINMENT UNIT AND DISCHARGE WASTE. REMOVE OR SECURELY COVER WHEN RAIN IS PREDICTED AT 50%. REMOVE AND DISPOSE OF PROPERLY. DO NOT HOSE-OFF OR CLEAN ON SITE.

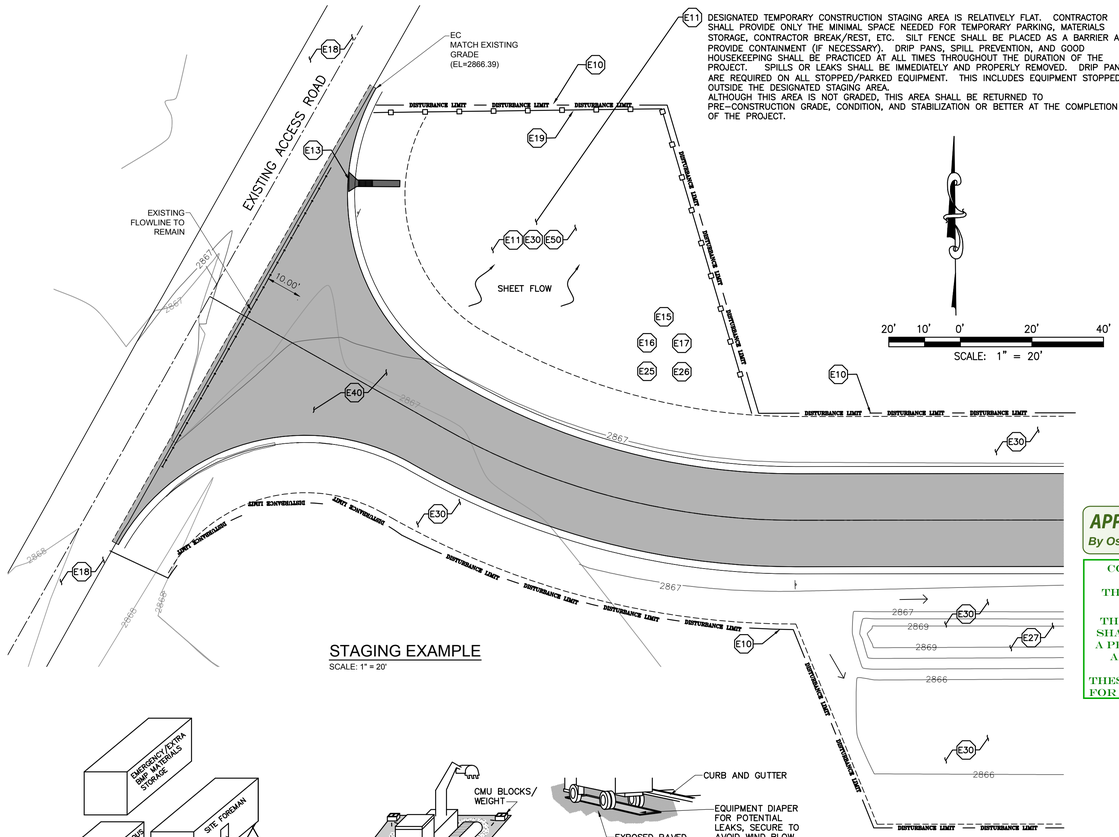
E22 SECURE MATERIALS FROM WIND BLOW AWAY. INSPECT WEEKLY.

E23 INSTALL FIBER ROLLS ALONG LOW POINTS/SHEET FLOW CROSSINGS WHERE SOILS HAVE BEEN DISTURBED AND NOT FULLY COMPLETED. PROVIDE TO LENGTH NEEDED TO INTERCEPT SHEET FLOW AND REDUCE EROSION OF WORK AREA(S) AND DOWN GRADIENT. MAINTAIN, REAPPLY/ADD AS NEEDED UNTIL PERMANENT STABILIZATION IS IMPLEMENTED. SEE SE-5, AND DETAILS ON SHEET 1.

E24 CONSTRUCT PERMANENT DRAINAGE CROSSING BMP WITH RIP RAP AS DISSIPATION DEVICE PER CIVIL ROAD PLANS. PROTECT AREA WITH TEMPORARY BMPS DURING ACTIVE CONSTRUCTION AND WHEN RAIN IS IN FORECAST. TEMPORARY BMPS INCLUDE BUT NOT LIMITED TO SILT FENCE, FIBER ROLLS, OR DIVERSION BARRIERS. SEE DETAIL IN SHEET 3.

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E26 FIELD VERIFY AND MANAGE TRENCHING SPOILS AND STOCKPILES. COVER STOCKPILES FROM EROSION. DO NOT PLACE STOCKPILES IN FLOW PATHS WHERE SEDIMENT MAY TRAVEL DUE TO STORM AND NON-STORM ACTIVITIES (I.E., PIPE CONNECTIONS, FLUSHING OR TESTING). SAME DAY FILL-IN TRENCHES SHALL APPLY SURFACE STABILIZATION METH



STAGING EXAMPLE
SCALE: 1" = 20'

E11 DESIGNATED TEMPORARY CONSTRUCTION STAGING AREA IS RELATIVELY FLAT. CONTRACTOR SHALL PROVIDE ONLY THE MINIMAL SPACE NEEDED FOR TEMPORARY PARKING, MATERIALS STORAGE, CONTRACTOR BREAK/REST, ETC. SILT FENCE SHALL BE PLACED AS A BARRIER AND PROVIDE CONTAINMENT (IF NECESSARY). DRIP PANS, SPILL PREVENTION, AND GOOD HOUSEKEEPING SHALL BE PRACTICED AT ALL TIMES THROUGHOUT THE DURATION OF THE PROJECT. SPILLS OR LEAKS SHALL BE IMMEDIATELY AND PROPERLY REMOVED. DRIP PANS ARE REQUIRED ON ALL STOPPED/PARKED EQUIPMENT. THIS INCLUDES EQUIPMENT STOPPED OUTSIDE THE DESIGNATED STAGING AREA.
ALTHOUGH THIS AREA IS NOT GRADED, THIS AREA SHALL BE RETURNED TO PRE-CONSTRUCTION GRADE, CONDITION, AND STABILIZATION OR BETTER AT THE COMPLETION OF THE PROJECT.

20' 10' 0' 20' 40'
SCALE: 1" = 20'

BEST MANAGEMENT PRACTICES (BMPs) CALLOUTS & SEQUENCE OF PHASING

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E27 PROVIDE DUST CONTROL AND SLOPE PROTECTION (SHEEP-FOOT TRACKING SURFACE) TO DIRT BERM DIVERSION AND SLOPES. REFER TO CIVIL ROAD PLANS FOR CIVIL SPECIFICATIONS AND DETAILS.

E30 CONTRACTOR SHALL MAINTAIN DUST CONTROL AT ALL TIMES THROUGHOUT THE DURATION OF CONSTRUCTION ACTIVITY. CONTINUOUS WATER SPRAY, COMPACTIONS PER CIVIL PLANS, AND SATURATIONS TO FORM CRUSTS PER SPECIFICATIONS. APPLICATION OF WEED CONTROLS, OR SOIL STABILIZERS SHALL BE PRE-APPROVED BY OWNER AND DOCUMENTED.

E40 IMPLEMENT MEASURES TO PREVENT DISCHARGE OF POLLUTANTS FROM PAVING APPLICATIONS. ENSURE SCHEDULING ON NON-RAINY DAYS, WITH SUFFICIENT CURING/DRYING TIME. REFER TO NS-3 FOR OPERATIONS REGARDING REMOVAL, PAVING, SEALING, EQUIPMENT AND RE-STRIPING STREET MARKINGS.

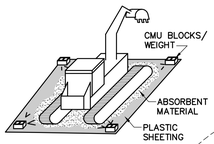
E50 RECONSTRUCT AREA OF STORAGE TO A POLLUTANT AND DEBRIS FREE AREA AT PRE-DISTURBANCE ELEVATION. REMOVE FINE SEDIMENTS THAT MAY HAVE BEEN TRAPPED BY BMPS AT LOW POINTS. REFER TO SE-2, SE-3, EC-15, EC-16, EC-5 FOR APPLICATIONS PER APPROVED PLANS.

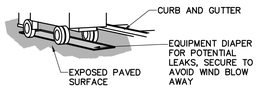
APPROVED
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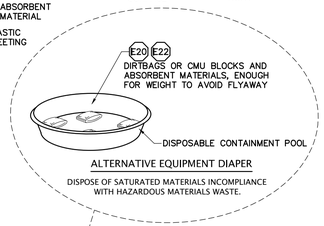
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THESE PLANS SHALL BE ON THE JOB FOR ALL REQUESTED INSPECTIONS.

PROVIDE FIBER ROLLS WHILE PAVING/CURING TO PROTECT INSTALLED RIPRAP (DISSIPATION DEVICE) FROM ACTIVITIES. REMOVE ALL TEMPORARY BMPS AFTER ENTIRE TRIBUTARY AREA IS COMPLETED. QSP SHALL CONTINUE TO MONITOR AND REPORT IF EROSION OCCURS AND REPORT TO CONTRACTOR, QSD & CIVIL ENGINEER.

OFFICE(S)-SECURITY STATION
ENCLOSED CONTAINERS/STORAGE
HAZARDOUS MATERIALS
BMP OVERSTOCK



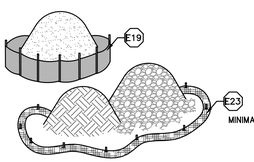




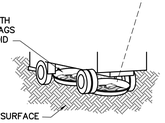
ALTERNATIVE EQUIPMENT DIAPER
DISPOSE OF SATURATED MATERIALS INCOMPLIANCE WITH HAZARDOUS MATERIALS WASTE.



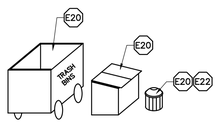
E15 SANITARY/SEPTIC WASTE AREA
ABOVE GROUND ONLY - PORTABLE PREFERED
ANY STAINS, SPILLS AND LEAKS WITHIN 20'∅ IS CONSIDERED HAZARDOUS AND REQUIRES TO BE REMOVED/CLEANED IMMEDIATELY AS HAZARDOUS WASTE.



E26 STOCK PILE AREA
VARIOUS STOCKPILES, INCLUDING AREAS USED FOR IMPORT/EXPORT
TEMPORARY BATCH SILOS, MIXING UNITS

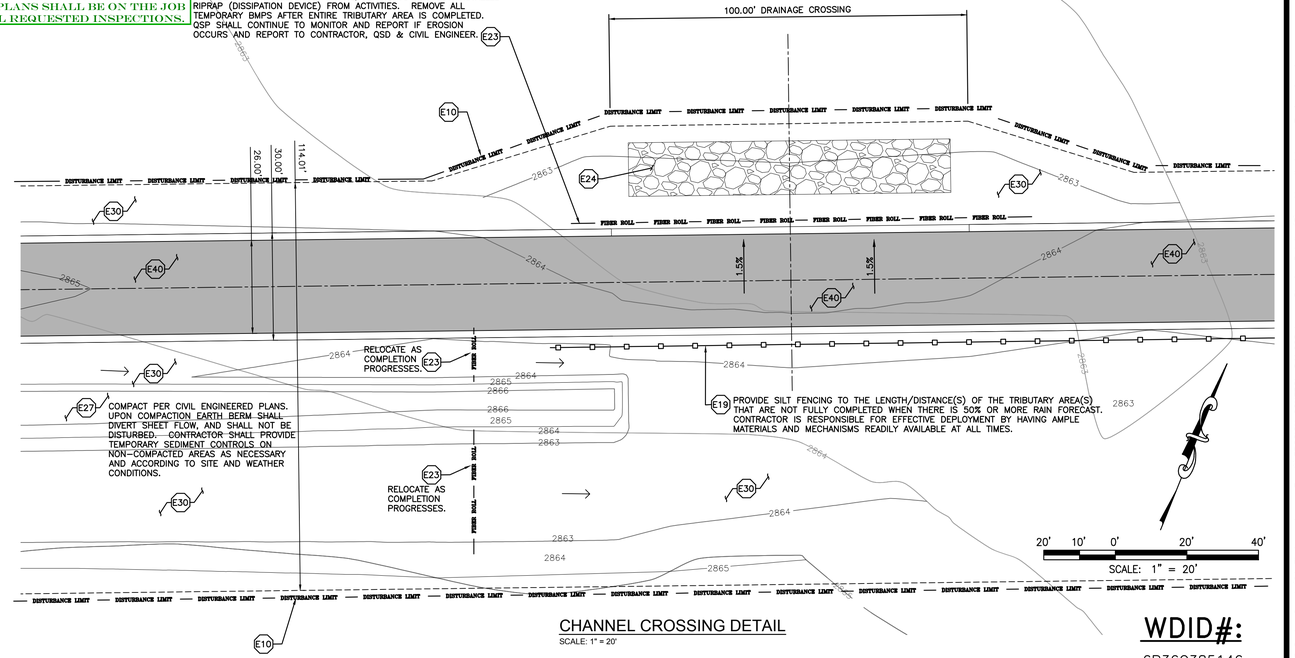


E25 HEAVY EQUIPMENT AREA & VEHICLE PARKING AREAS
PARKING - FUELING - MAINTENANCE OF EQUIPMENT
ALL VEHICLES PARKED ON NATIVE SOILS (INCLUDING PERSONAL VEHICLES BELONGING TO WORKERS) ARE SUBJECT TO CATCH PANS AS NECESSARY TO MINIMIZE FUEL LEAKS/STAINS/DRIPS. CATCH PANS SHALL BE STORED ON SITE AND PLACED IN A PROTECTED AREA PRIOR TO RAIN.



E16 WASTE MANAGEMENT AREA
ENSURE EACH CONTAINER IS SECURELY COVERED WITH TARP/PLASTIC OR LIDS ARE IN PLACE PRIOR TO AND DURING RAIN AND/OR HEAVY WINDS

E11 CONSTRUCTION STAGING AND LAYDOWN AREA, EXAMPLE
CONTRACTOR TO FIELD VERIFY BEST LAYOUT OF STAGING AREA. MAINTAIN PATH OF TRAVEL FROM STAGING AREA TO PROJECT SITE TO BE SEDIMENT AND TRACKING FREE. DAILY SWEEPING AND VACUUM



20' 10' 0' 20' 40'
SCALE: 1" = 20'

CHANNEL CROSSING DETAIL
SCALE: 1" = 20'

WDID#:
6B36C385146

"FOR APPROVAL NOT FOR CONSTRUCTION"

THE CONTRACTOR IS REQUIRED BY GOVERNMENT CODE 4216 "CALIFORNIA ONE CALL LAW" TO CALL DIG ALERT AT LEAST TWO (2) WORKING DAYS BEFORE DIGGING. CONTRACTOR IS REQUIRED BY SAME CODE TO HAND-EXPOSE TO THE POINT OF NO CONFLICT 24" ON EITHER SIDE OF THE UNDERGROUND FACILITY SO YOU CAN DETERMINE ITS EXACT LOCATION BEFORE USING POWER EQUIPMENT.

811 Know what's below. Call before you dig.

THE CONTRACTOR IS REQUIRED BY GOVERNMENT CODE 4216 "CALIFORNIA ONE CALL LAW" TO CALL DIG ALERT AT LEAST TWO (2) WORKING DAYS BEFORE DIGGING. CONTRACTOR IS REQUIRED BY SAME CODE TO HAND-EXPOSE TO THE POINT OF NO CONFLICT 24" ON EITHER SIDE OF THE UNDERGROUND FACILITY SO YOU CAN DETERMINE ITS EXACT LOCATION BEFORE USING POWER EQUIPMENT.

NOTE:
IF THIS PLAN IS NOT SIGNED AND DATED BY THE ENGINEER OF RECORD AND ALSO BY THE COUNTY OF SAN BERNARDINO OFFICIAL IN THE APPROVAL BLOCKS OF THIS PLAN THEN THIS PLAN IS PRELIMINARY AND NOT FOR CONSTRUCTION.

NOTE:
ALL SURVEY MONUMENTS AND MARKERS SHALL BE THE CONTRACTORS RESPONSIBILITY TO PROTECT IN PLACE UNTIL SURVEYOR HAS TIED OUT LOCATIONS FOR REPLACEMENT PURSUANT TO BUSINESS AND PROFESSIONS CODE SECTION 8700 TO 8805 (LAND SURVEYOR'S ACT).

NOTE:
THE LOCATIONS AND EXISTENCE OF UNDERGROUND UTILITIES ARE NOT SHOWN. THESE DRAWINGS WERE PREPARED BASED ON SURFACE DATA INFORMATION AND IT IS POSSIBLE THAT ADDITIONAL UNDERGROUND UTILITIES COULD BE PRESENT THAT ARE NOT SHOWN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFICATION OF THE LOCATION AND DEPTH OF EXISTING UNDERGROUND UTILITIES AND SHALL PERFORM POTHOLING AS NECESSARY AT ALL CROSSING PRIOR TO COMMENCING CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TAKING ALL PRECAUTIONS NECESSARY TO PROTECT ALL EXISTING UTILITIES AND STRUCTURES FROM DAMAGE DURING THE COURSE OF THE WORK, AND SHALL BE RESPONSIBLE FOR REPAIRING OR REPLACING ANY UTILITIES OR STRUCTURE DAMAGED DURING THE COURSE OF THE WORK.

REGISTERED PROFESSIONAL ENGINEER
BRAD S. MERRELL
No. C-49423
CIVIL
STATE OF CALIFORNIA
11/7/2018
QSD/QSP#01213

Merrell Johnson COMPANIES
22221 HIGHWAY 18
APPLE VALLEY, CALIFORNIA 92307
(760) 240-8000
(760) 240-1400 FAX
16091 KAMANA RD
APPLE VALLEY, CALIFORNIA 92307
(760) 256-2068
(760) 530-6672 FAX

ON-SITE ACCESS ROAD
GENERAL ATOMICS FIELD
EL MIRAGE
EROSION CONTROL
STAGING & DETAILS

DRAWN BY: JMC
DATE: 09/10/18
JOB NO. 841.008
SHEET 3 OF 3

Merrell-Johnson Engineering, Inc. — Staging Details (3) — J:\841.008 Cooley Const (GA Elmirage Access Road)\EROSION CONTROL-841.008.dwg — 7 November 2018 11:08am — Judieyv

BEST MANAGEMENT PRACTICES (BMPs) CALLOUTS & SEQUENCE OF PHASING

E10 ESTABLISH "OFF-LIMIT" AREAS. MARK-OFF OR CLEARLY INSTRUCT LIMIT PARAMETERS, OR "NO COMPACTION", AND INCLUDE A DESIGNATED (TEMPORARY) CONSTRUCTION ROADWAY/PATH OF TRAVEL. IT IS THE CONTRACTORS DISCRETION TO INSTALL ORANGE MARKING FENCES OR TEMPORARY SECURITY FENCES TO MAINTAIN AND DESIGNATE LIMITS OF DISTURBANCE.

E11 TEMPORARY CONSTRUCTION LAY DOWN "STAGING" AREA FOR EQUIPMENT, MATERIAL DELIVERY, AND TEMPORARY PARKING. MATERIAL DELIVERY/STORAGE BEST MANAGEMENT PRACTICES INCLUDE WATERTIGHT CONTAINERS AND SECONDARY CONTAINMENT FOR HAZARDOUS AND POTENTIALLY HAZARDOUS MATERIALS. ENSURE PROPER LABELS AND REGULAR INSPECTIONS. SEE WM-1 FOR APPLICATIONS AND PRACTICES. PROVIDE AMBLE SUPPLIES OF SPILL ABSORBENT MATERIALS, EQUIPMENT, AND DRIP PANS. REFER TO WASTE MANAGEMENT PRACTICES (WM) AND DETAILS ON SHEET 3.

E13 STABILIZED CONSTRUCTION ENTRANCE/EXIT WITH CORRUGATED STEEL PANELS. PANELS SHALL BE THE LENGTH OF FOUR TIMES THE CIRCUMFERENCE OF THE LARGEST CONSTRUCTION VEHICLE TIRE. STABILIZE A TEMPORARY CONSTRUCTION ROADWAY. SEE TC-1, & TC-2 AND FOR INSTALLATIONS. IF TC-3 MUST BE IMPLEMENTED, PLACE WITHIN PROPERTY. SEE DETAIL SHEET 1.

E15 DETERMINE BEST LOCATIONS FOR SANITARY/SEPTIC WASTE MANAGEMENT FACILITY/FACILITIES, MINIMUM 50' FROM DRAINAGE CONVEYANCES AND TRAFFIC AREAS. USE SECONDARY CONTAINMENT MEASURES, AND SECURE FACILITIES FROM OVERTURNING. ONLY A REPUTABLE, LICENSED WASTE HAULER SHALL BE USED. SEE WM-9 FOR INSTALLATION INSTRUCTIONS.

E16 INSTALL AND MAINTAIN TEMPORARY CONSTRUCTION TRASH CONTAINER(S). SEE WM-5 FOR INSTRUCTIONS AND LIMITATIONS. REFER TO WM-6 FOR HAZARDOUS WASTE MANAGEMENT APPLICATIONS. CONTAINERS SHALL BE SECURELY COVERED FROM WIND/RAIN, AND SHALL BE DUMPED FREQUENTLY AS NEEDED BY A REPUTABLE CONTRACTED WASTE HAULER.

E17 ENSURE HAZARDOUS WASTE MANAGEMENT PRACTICES ARE FOLLOWED BY ALL CONTRACTORS AND SUBCONTRACTORS ON SITE USING PETROLEUM PRODUCTS, CONCRETE CURING COMPOUNDS, DUST PALLIATIVES, SEPTIC WASTES, ASPHALT PRODUCTS, AND/OR PAVING TARS. MAKE AVAILABLE MANUFACTURES SAFETY HANDLING SPECIFICATIONS AND WM-6, WM-7, WM-4 FOR INSTRUCTIONS.

E18 IMPLEMENT STREET SWEEPING/VACUUMING METHODS THROUGHOUT THE DURATION OF THE PROJECT. TRACKING OF DIRT, MUD, TIRE MARKINGS, SAW-CUTTING DEBRIS, OR ANY OTHER FORMS OF SEDIMENT (DUST) THAT HAS BEEN TRANSPORTED (BY TRAFFIC, WIND, WATER, SPILLED) ON TO PAVED SURFACES (E.G. ROADS, SIDEWALKS, CURBS/GUTTERS, PATHS) SHALL BE REMOVED PRIOR TO END OF DAY. CONDUCT DAILY INSPECTIONS. CONTRACTOR MAY APPLY ADDITIONAL MEASURES BASED ON OBSERVATIONS TO MEET REQUIREMENT. SEE SE-7, NS-3, TC-1 AND TC-2 FOR APPLICATIONS, AS NEEDED.

E19 INSTALL AND MAINTAIN SILT FENCE. SEE SE-1 FOR INSTALLATION INSTRUCTIONS. REPLACE FALLEN AND DAMAGED PER SWPPP STANDARDS. SEE DETAIL ON SHEET 1.

E20 ENSURE RAIN EVENT DOES NOT OVER FILL CONTAINMENT UNIT AND DISCHARGE WASTE. REMOVE OR SECURELY COVER WHEN RAIN IS PREDICTED AT 50% REMOVE AND DISPOSE OF PROPERLY. DO NOT HOSE-OFF OR CLEAN ON SITE.

E22 SECURE MATERIALS FROM WIND BLOW AWAY. INSPECT WEEKLY.

E23 INSTALL FIBER ROLLS ALONG LOW POINTS/SHEET FLOW CROSSINGS WHERE SOILS HAVE BEEN DISTURBED AND NOT FULLY COMPLETED. PROVIDE TO LENGTH NEEDED TO INTERCEPT SHEET FLOW AND REDUCE EROSION OF WORK AREA(S) AND DOWN GRADIENT. MAINTAIN, REAPPLY/ADD AS NEEDED UNTIL PERMANENT STABILIZATION IS IMPLEMENTED. SEE SE-5, AND DETAILS ON SHEET 1.

E24 CONSTRUCT PERMANENT DRAINAGE CROSSING BMP WITH RIP RAP AS DISSIPATION DEVICE PER CIVIL ROAD PLANS. PROTECT AREA WITH TEMPORARY BMPS DURING ACTIVE CONSTRUCTION AND WHEN RAIN IS IN FORECAST. TEMPORARY BMPS INCLUDE BUT NOT LIMITED TO SILT FENCE, FIBER ROLLS, OR DIVERSION BARRIERS. SEE DETAIL IN SHEET 3.

E25 VEHICLE AND EQUIPMENT CLEANING AND MAINTENANCE SHALL BE CONDUCTED OFF-SITE AS MUCH AS POSSIBLE, HOWEVER, IN THE EVENT THE CONTRACTOR SHALL USE PHOSPHATE-FREE/BIODEGRADABLE SOAPS. SEE NS-8 FOR PROPER IMPLEMENTATION. DRIP PANS OR EQUIVALENT, SPILL KITS, PROPER TRAINING, AND DAILY INSPECTIONS SHALL BE USED FOR LEAKS DURING MAINTENANCE. SEE NS-10 FOR PROPER IMPLEMENTATION.

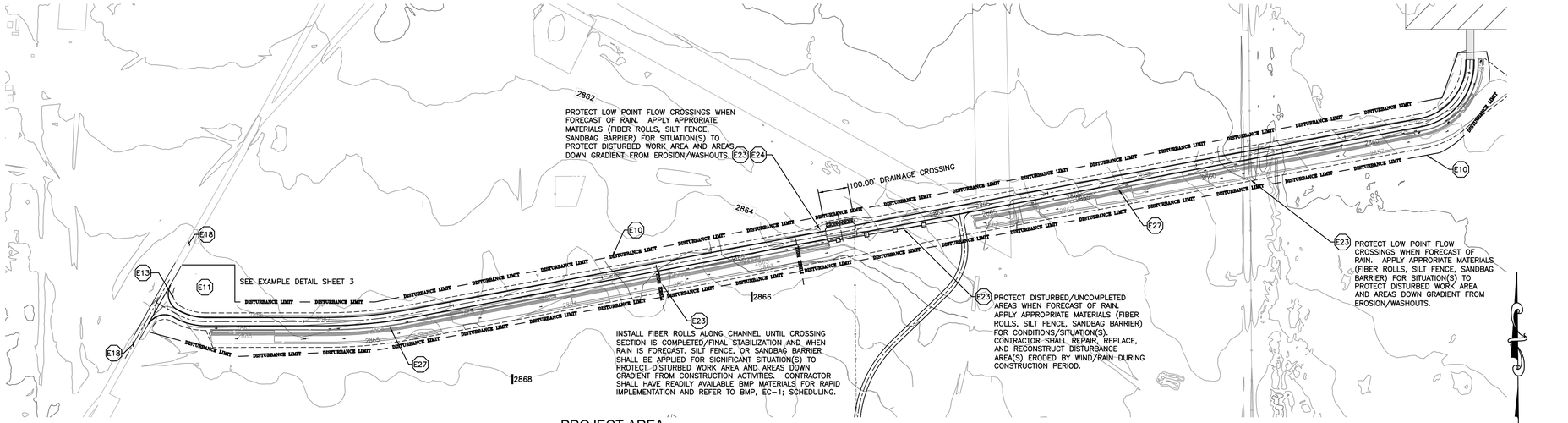
E26 FIELD VERIFY AND MANAGE TRENCHING SPOILS AND STOCKPILES. COVER STOCKPILES FROM EROSION. DO NOT PLACE STOCKPILES IN FLOW PATHS WHERE SEDIMENT MAY TRAVEL DUE TO STORM AND NON-STORM ACTIVITIES (I.E., PIPE CONNECTIONS, FLUSHING OR TESTING). SAME DAY FILL-IN TRENCHES SHALL APPLY SURFACE STABILIZATION METHODS (I.E., WATER SPRAY/COMPACTION/SOIL PREPARATION TO FORM TOP CRUST, OR APPLY SOIL STABILIZER SPRAYS) WHERE NEEDED TO OBTAIN SURFACE STABILIZATION UNTIL PERMANENT CONDITIONS AND FINAL STABILIZATION IS ACQUIRED PER CONTRACT. REFER TO EC-1, EC-5, EC-15, WE-1, & WM-3.

E27 PROVIDE DUST CONTROL AND SLOPE PROTECTION (SHEEP-FOOT TRACKING SURFACE) TO DIRT BERM DIVERSION AND SLOPES. REFER TO CIVIL ROAD PLANS FOR CIVIL SPECIFICATIONS AND DETAILS.

E30 CONTRACTOR SHALL MAINTAIN DUST CONTROL AT ALL TIMES THROUGHOUT THE DURATION OF CONSTRUCTION ACTIVITY. CONTINUOUS WATER SPRAY, COMPACTIONS PER CIVIL PLANS, AND SATURATIONS TO FORM CRUSTS PER SPECIFICATIONS. APPLICATION OF WEED CONTROLS, OR SOIL STABILIZERS SHALL BE PRE-APPROVED BY OWNER AND DOCUMENTED.

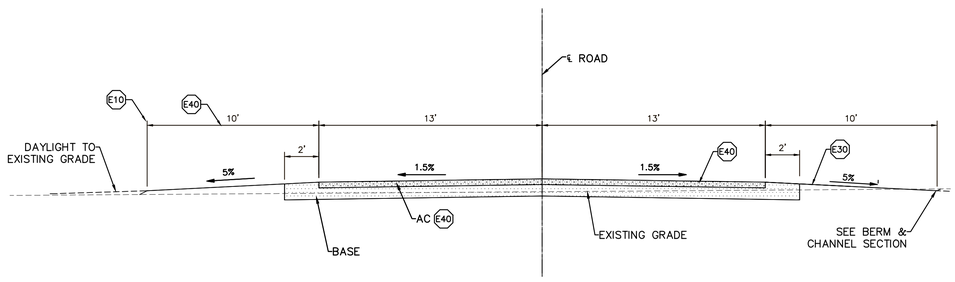
E40 IMPLEMENT MEASURES TO PREVENT DISCHARGE OF POLLUTANTS FROM PAVING APPLICATIONS. ENSURE SCHEDULING ON NON-RAINY DAYS, WITH SUFFICIENT CURING/DRYING TIME. REFER TO NS-3 FOR OPERATIONS REGARDING REMOVAL, PAVING, SEALING, EQUIPMENT AND RE-STRIPING STREET MARKINGS.

E50 RECONSTRUCT AREA OF STORAGE TO A POLLUTANT AND DEBRIS FREE AREA AT PRE-DISTURBANCE ELEVATION. REMOVE FINE SEDIMENTS THAT MAY HAVE BEEN TRAPPED BY BMPS AT LOW POINTS. REFER TO SE-2, SE-3, EC-15, EC-16, EC-5 FOR APPLICATIONS PER APPROVED PLANS.

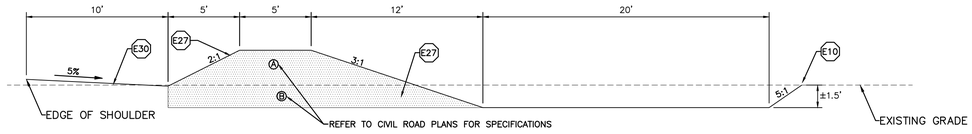


PROJECT AREA
SCALE: 1" = 200'

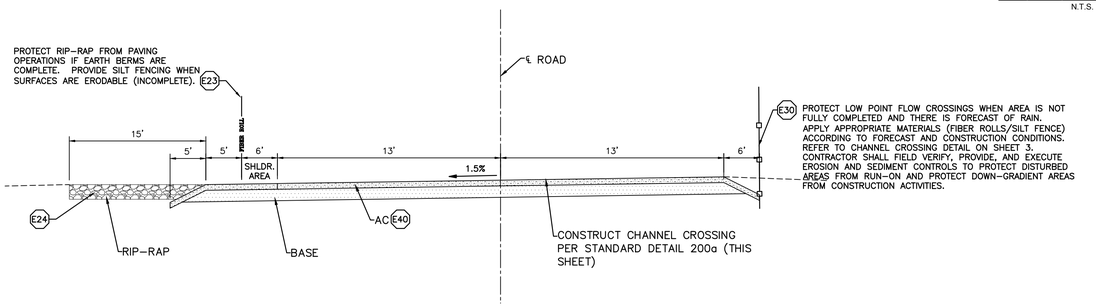
200' 100' 0' 200' 400'
SCALE: 1" = 200'



A - TYPICAL ROAD CROSS SECTION EXAMPLE
N.T.S.



B - (TYP) BERM & CHANNEL SECTION
N.T.S.



C - (TYP) TILT SECTION AT LOW PONT CROSSING
N.T.S.

APPROVED
By Osvaldo Roque at 7:58 am, Nov 08, 2018

COUNTY OF SAN BERNARDINO
BUILDING AND SAFETY
THESE PLANS AND DETAILS ARE
APPROVED
THE APPROVAL OF THESE PLANS SHALL NOT BE CONSTRUED TO BE A PERMIT FOR ANY VIOLATION OF ANY CODE OR ORDINANCE OF THIS COUNTY.
THESE PLANS SHALL BE ON THE JOB FOR ALL REQUESTED INSPECTIONS.

WDID#:
6B36C385146

THE CONTRACTOR IS REQUIRED BY GOVERNMENT CODE 4216 "CALIFORNIA ONE CALL LAW" TO CALL DIG ALERT AT LEAST TWO (2) WORKING DAYS BEFORE DIGGING. CONTRACTOR IS REQUIRED BY SAME CODE TO HAND-EXPOSE TO THE POINT OF NO CONFLICT 24" ON EITHER SIDE OF THE UNDERGROUND FACILITY SO YOU CAN DETERMINE ITS EXACT LOCATION BEFORE USING POWER EQUIPMENT.

811 Know what's below. Call before you dig.

THE CONTRACTOR IS REQUIRED BY GOVERNMENT CODE 4216 "CALIFORNIA ONE CALL LAW" TO CALL DIG ALERT AT LEAST TWO (2) WORKING DAYS BEFORE DIGGING. CONTRACTOR IS REQUIRED BY SAME CODE TO HAND-EXPOSE TO THE POINT OF NO CONFLICT 24" ON EITHER SIDE OF THE UNDERGROUND FACILITY SO YOU CAN DETERMINE ITS EXACT LOCATION BEFORE USING POWER EQUIPMENT.

NOTE:
IF THIS PLAN IS NOT SIGNED AND DATED BY THE ENGINEER OF RECORD AND ALSO BY THE COUNTY OF SAN BERNARDINO OFFICIAL IN THE APPROVAL BLOCKS OF THIS PLAN THEN THIS PLAN IS PRELIMINARY AND NOT FOR CONSTRUCTION.

NOTE:
ALL SURVEY MONUMENTS AND MARKERS SHALL BE THE CONTRACTORS RESPONSIBILITY TO PROTECT IN PLACE UNTIL SURVEYOR HAS TIED OUT LOCATIONS FOR REPLACEMENT PURSUANT TO BUSINESS AND PROFESSIONS CODE SECTION 8700 TO 8805 (LAND SURVEYORS'S ACT).

NOTE:
THE LOCATIONS AND EXISTENCE OF UNDERGROUND UTILITIES ARE NOT SHOWN. THESE DRAWINGS WERE PREPARED BASED ON SURFACE DATA INFORMATION AND IT IS POSSIBLE THAT ADDITIONAL UNDERGROUND UTILITIES COULD BE PRESENT THAT ARE NOT SHOWN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFICATION OF THE LOCATION AND DEPTH OF EXISTING UNDERGROUND UTILITIES AND SHALL PERFORM POTHOLING AS NECESSARY AT ALL CROSSING PRIOR TO COMMENCING CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TAKING ALL PRECAUTIONS NECESSARY TO PROTECT ALL EXISTING UTILITIES AND STRUCTURES FROM DAMAGE DURING THE COURSE OF THE WORK, AND SHALL BE RESPONSIBLE FOR REPAIRING OR REPLACING ANY UTILITIES OR STRUCTURE DAMAGED DURING THE COURSE OF THE WORK.

"FOR APPROVAL – NOT FOR CONSTRUCTION"

REGISTERED PROFESSIONAL ENGINEER
BRAD S. MERRELL
No. C-49423
CIVIL
STATE OF CALIFORNIA
11/7/2018
QSD/QSP#01213

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ON-SITE ACCESS ROAD
GENERAL ATOMICS FIELD
EL MIRAGE
EROSION CONTROL
PROJECT VIEW

DRAWN BY: JMC
DATE: 09/10/18
JOB NO. 841.008
SHEET 2 OF 3

Judecyr 11:11am 7 November 2018 P:\841.008 Cooley Const (GA Elmirage Access Road)\EROSION CONTROL-841.008.dwg – Erosion Plan View (2) Merrell-Johnson Engineering, Inc.

Hydrology Study

El Mirage Airport
Runway & Taxiway Expansion

General Atomics

El Mirage, California

Prepared by
Epic Engineering, PC



David Larson
California Professional Engineer #52991

July 7, 2017

PROFESSIONAL ENGINEER'S AFFIRMATIVE STATEMENT:
I have examined and am familiar with the information in this document and all appendices, and based on my inquiries of individuals immediately responsible for obtaining the information in this document, I believe that the information is true, accurate, and complete.

Heber City, UT 435-654-6600 West Valley, UT 801-955-5605 Williston, ND 701-774-5200 Killdeer, ND 701-764-7131
Vernal, UT 435-781-2113 Mesa, AZ 480-309-6504
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I. Investigation Report

A. PURPOSE AND SCOPE

This study has been performed to determine storm drain sizes and pad elevations required to convey the 100-year Storm Event through the site and protect the existing structures while mitigating the change in storm flows associated with the new development prior to exiting the site.

The on-site and off-site drainage is expected to be conveyed to a new retention / detention basin facility at the northeast corner of the project, located in El Mirage, California.

The intent of this study is to protect the site by sizing the on-site retention/detention basin infiltration system and storm drain to meet the Qpm and LID requirements for the County, and to determine the water surface elevation of surface flows within the project site as the 100-year storm flows confluence within the interior site. Once this water surface elevation is determined a pad height will be recommended with a minimum elevation of one foot above this water surface elevation.

B. METHODOLOGY

This study was performed using the "San Bernardino County Rational Hydrology Program by CIVILCADD/CIVIL Design Engineering Software 1989-2014 Version 9.0; the Arid Region Hydrology Addendum, and the Detention Basin Design Criteria for San Bernardino County.

The following criteria were used:

1. Point Precipitation Estimates based on NOAA Atlas 14, Volume 6, Version 2
2. Hydrologic Soils Group: "A" per USDA Soils Survey CA671
3. SCS Curve No. (AMCII): Chaparral/Sage Poor Cover Soils Type A=55
4. Tributary Off-Site: 100-year design storm frequency
   Antecedent Moisture Condition 3 (AMC III)
5. Antelope Valley-Mojave River Watershed (HUC 12-180902080702)
6. 100-Year 24-hour Rainfall Intensity of 3.51 inches
7. Soils Classification Area 146-147
8. Current off-site land use: Vacant Undisturbed
9. Current on-site land use: Private Airport
10. Proportion Impervious: 10%
11. Intended Use: Commercial Private Airport.

II. General Location and Development Description

A. LOCATION OF PROPERTY

The El Mirage Airport is generally located one mile north of El Mirage Road, one mile east of Gray Mountain along the southern boundary of the El Mirage Dry Lake Recreational Area. It is bounded on the west by Gitano Road, on the south by Linson Street, and on the north by Colusa Road, and its easterly boundary is 0.5 miles east of Sheep Creek Road comprising of approximately 807 acres near the City of Adelanto, San Bernardino County, California. See the Vicinity Map in Exhibit A for a project location map. The site is located at Latitude 34°37'24" North Longitude 117°36'00" West within the E ¾ of Section 10 and W 1/2 of Section 11, Township 6 North, Range 7 West, in San Bernardino Meridian California. Also see the Assessor's Parcels Map (APN: 0457-041-02, 03 & 04 and 0457-052-12, 13, 14, and 15) in Appendix A.

B. DESCRIPTION OF EXISTING PROPERTY

The El Mirage Airport Site is approximately an 807-acre parcel that is undergoing runway and taxiway extentions on the east 160 acres. The site generally drains from the southwest to the northeast at 0.5 percent grade. The site is in Flood Zone D of the Flood Insurance Rate Map Panel 06071C5775H and 06071C51000H effective 8/28/2008. (see Appendix A) for the San Bernardino county. Zone D is described as "areas in which flood hazards are undetermined, but possible."

C. PROPOSED LAND USE

There is no significant change in the drainage character following future development of the project site. The existing and proposed on-site surface water runoff generated from the proposed site will be conveyed to the Northeast area of the project site to a below grade retention/detention basin system, without causing objectionable backwater, excessive velocities, erosion or unduly affecting local traffic.

The proposed drainage plan, the existing and proposed topography and flow paths will be shown on the grading plans, which will cover the proposed development site and will be submitted to the County of San Bernardino. The plan also will show that the proposed drainage conditions from the development site will have no negative impact in the neighboring lots.

III. Tributary Drainage Area Description

A. OFFSITE DRAINAGE DESCRIPTION

Historic patterns for offsite drainage are generally from southwest to northeast according to the USGS topographic survey of the area. See the Existing Conditions Drainage Basin Map in Appendix A. Off-site flows are generally captured within one of two naturally occurring on-site drainage conveyances that divide the project site on the east and west. The project is 6-miles west of the closest master plan facilities proposed in the Adelanto Master Plan of drainage dated November 1992. Thus, all off-site flows must be maintained in their historic drainage conveyances as they enter and exit the project site.

B. ON-SITE DRAINAGE DESCRIPTION

The existing airport was constructed such that it straddles an existing topographic ridge line that bisects the off-site tributary drainage. Thus, historically the on-site drainage patterns push off-site flows to the east and west of the existing facilities. A review of the on-site topographic survey shows that these flows reenter their historic drainage conveyances prior to exiting the site as show on the hydrology map in Appendix A. Thus, downstream neighbors should have seen little to no changes in their acceptance of natural drainage flows.

C. FLOODPLAIN INFORMATION

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map Panels 06071C5775H and 06071C51000H effective August 28, 2008, indicates that the site is located in “Zone D”. Zone D is defined by FEMA as “areas in which flood hazards are undetermined, but possible” (see Appendix A) for the San Bernardino County. Thus, all new improvements will be elevated a minimum of one-foot to protect them from potential flooding.

IV. Proposed Drainage Facilities

A. GENERAL DESCRIPTION

In order to divert off-site flows through the proposed expanded site, the proposed project will employ 6090 linear feet of earthen channel and 390 lineal feet of storm drain that will convey storm flows around future facilities, under the taxiway and runway extensions and into an infiltration/dispersion basin that will release the off-site flows back into its historic drainage conveyance. The proposed channels and basins will also provide infiltration to meet the hydromodification requirements.

A Developed Conditions Drainage Map is provided in Appendix E.

B. COMPLIANCE WITH REGULATIONS

San Bernardino County Hydrology Manual

All calculations are based on generally accepted engineering practices in accordance with the San Bernardino County Hydrology Manual's Hydrologic Criteria and Drainage Design including the April 2010 Addendum addresses the Antecedent Moisture Condition (AMC) for arid regions of the County.

C. HYDROLOGIC ANALYSES

Detailed calculations of the tributary existing off-site hydrologic conditions are referenced and provided in **Appendix A**. A summary of the developed conditions hydrology results is provided in **Table 1**.

Existing Tributary Off-Site Rainfall Calculations

The site is located within the Antelope Valley-Mojave River Watershed (HUC 12-180902080702). Rainfall intensities were determined from the most recent NOAA calculations from Atlas 14 (Appendix A). Times of concentration were determined as outlined in San Bernardino Drainage Manual using CIVILCADD/CIVIL Design Engineering Software 1989-2014 Version 9.0 using the area centroidal as required in the San Bernardino County Synthetic Unit Hydrograph Method. The program determines the time of concentration, area averaged SCS curve number, and area averaged pervious area fraction (Ap). The Synthetic Unit Hydrograph analysis then calculates a hydrograph and determined the peak flow to be 1,186 cubic feet per second (cfs) and the overall storm runoff volume to be 462 acre feet for the 24-hour storm and 176 acre-feet for the 3-hour storm.

A summary of results is listed in **Table 1**. Detailed output files are provided in **Appendix A**.

TABLE 1. EXISTING OFF-SITE CONDITIONS RUNOFF

Drainage Area (file name)	Area [ac]	Q_{100} [cfs]	TC hrs	Yb	SCS Curve No. AMC III
Unit Hydro	3495	1,186	1.633	0.577	75

D. PROPOSED FACILITY DESIGN CALCULATIONS

Earthen Channels

The proposed channels begi on the ridge line that bisects the tributary flows and slowly accumulates half the off-site flows as the channels direct flows east. Since these flows will resemble sheet flows across the site, we can lineally average these flows from west to east across the site. Thus, the off-site 1,516flows can be expressed as (1,186/6,600 lf = 0.18 cfs/lf) 0.18 cfs/lf of frontage along the airport runway. Thus, Channel Section C-C begins with little to no tributary drainage and picks up approximately 248 cfs (0.18*1375=248) along its 1,375-foot length. Channel D-D will pick up approximately an additional 76 cfs (424 lf * 0.18 cfs/lf = 76 cfs) for a total of 324 cfs. Channel E-E will pick up the remaining existing and proposed expansion at (2720 lf * 0.18 cfs/lf = 490 cfs) 490 cfs for a total of (490+324 = 814) 814 cfs. A summary of the channel calculation results are shown on **Table 2** below. (See channel calculations in **Appendix B**)

TABLE 2. DEVELOPED CHANNEL CROSS SECTION RESULTS

Channel (Cross Section ID)	Manning's n	Base Width	Side Slope Z	S [ft/ft]	d min [ft]	Q [cfs]	V [ft/s]
C-C	0.033	20	3:1	0.003	3.8	322	4.06
D-D	0.033	20	5:1	0.003	4.0	421	4.01
D-D	0.033	20	5:1	0.05	2.5	460	11.17
E-E	0.033	17	5:1	.003	5.9	1039	5.17
E-E	0.033	17	5:1	.005	5.35	1053	6.25
F-F	0.033	28	5:1	.003	5.3	1082	5.09

The remaining (1186-814= 327) 327 cfs storm flows will remain in their historic conveyances traveling around the east and west ends of the runway.

Box Culvert Sizing

In order to pass the off-site flows under the proposed runway and taxiway, two (2) 5 ft high x 10 ft wide Box Culverts are proposed. The greatest capacity for a box culvert occurs at a depth of 0.96*d prior to becoming pressure pipe flow. Thus an 5'x10' box will have its greatest capacity at (5*0.96=4.8 ft) 4.8 ft max depth. Thus, each Box Culvert can pass 546 cfs for a total of 1092 cfs < 814 cfs required. (see Box Culvert Calculations in Appendix B)

TABLE 3. BOX CULVERT RESULTS

Box Culvert	Manning's n	Base Width	S [ft/ft]	d min [ft]	Q [cfs]	V [ft/s]
	0.014	10	0.003	4.8	546	11.38

Retention/Detention Basin Sizing

The proposed retention/detention infiltration basin is located at the northeast corner of the site. The design shall comply with the San Bernardino basin design guidelines limiting the depth to six (6) feet with two (2) foot of freeboard for the 100-year storm event without consideration for multiple storm events. Considering that effective rainfall for the site is 1.59 inches and we have a total of 100.24 acres of impervious area on-site, then the volume of rain falling on the impervious areas would be (100.24*1.59/12 = 13.28 acre ft) 13.28 acre feet of rain water. If we assume that 100% of this volume must be retained, then our Central Basin, Northern Basin and channel storage capacity would need be designed to contain this volume. A summary of these areas and their capacities are listed in Table 4 below.

TABLE 4. STORM WATER RETENTION FACILITIES

Retention volume	Length (ft)	Width (ft)	Z	Depth (ft)	Slope	V Acre ft
North Basin	620	45	5:1	4	0	4.48
North Channel	950	17	5:1	4	0.005	3.22
Central Basin	450	150	5:1	4	0.005	7.94
					Total Storage	**14.66**

Retention Basin Outflow – Broad Crested Weir Calculations

The proposed retention/detention outflow must be released in its historic conveyance width, depth, and velocity. Thus the 814 cfs exiting the basin must be release in a nonerosive size and velocity. The northerly basin has been located such that the northern edge is located so it can release the offsite flows in the historic drainage conveyance. In order to allow these flows to reenter this drainage conveyance without detrimental effects to the existing conveyance flows, Epic will calculate the exiting flows to exit the drainage basin as non-erosive shallow flows that will consolidate into native historic flows.

Using the Broad Crested Weir Equation Q=CLH^3/2 and solving it for length gives us the equation;

L= Q / (C*H^3/2) = 814 (3*0.58^3/2) = 614 Lineal Feet.

Checking that the velocity is less than 4 fps to be considered non-erosive.

V=Q/A V=814 cfs / (620*0.58 sf) = 2.26 fps < 4 fps

Thus, a broad-crested weir outlet running the length of the northern basin can release the peak flows back into the historic channel conveyance at a width and reduced velocity that will allow it to find its natural course and cross-section profile.

V. Conclusions

Compliance with Drainage Laws

The proposed project is in compliance with regional and local laws and ordinances.

Compliance with Master Plans

The proposed project is in compliance with the Adelanto Master Plan of drainage dated November 1992

Compliance with FEMA Requirements

The proposed project is located in an undetermined the 100-year floodplain.

Compliance with MANUAL

Hydrology and hydraulic calculations are based on generally accepted engineering practices and are in accordance with the County of San Bernardino Hydrology Manual.

Impact of proposed development on off-site property and facilities

The proposed development results in a decrease in runoff and flow depth to the adjacent regional drainage conveyances and proposed channel #2B. The historic drainage discharge points have been maintained with this design, and offsite flows are conveyed around the site within the proposed drainage channels.

VI. References

County San Bernardino of Public Works Low Impact Development Standards Manual. Updated February 2014.

County of San Bernardino Public Works Hydrology Manual. Created August 1986.

http://cms.sbcounty.gov/Portals/50/floodcontrol/HydrologyManual.pdf

Federal Emergency Management Agency website: https://msc.fema.gov/portal accessed December 2016.

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